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## Course and Curricular Updates to the 2009-11 Catalog

### Effective Summer 2009 through Spring 2011:

Listed below are updates to the 2009-11 catalog. This includes new courses, course changes, corrections, and curriculum substitutions.

- o New courses and course changes are the result of the Pilot Continuous Course Review Process.
- o Corrections have been identified since the printing of the 2009-11 catalog.
- o Curriculum substitutions are the result of approved blanket curriculum substitutions.
- o For updates to other information in the Catalog, please see the appropriate web sites (e.g., Admissions, Office of the Registrar - Records and Evaluations, Financial Aid, Housing, etc.).

### Course and Curricular Updates

Item	New Courses, Course Changes, Corrections, and Curriculum substitutions	Effective beginning
<a href="#">Academic Freedom</a>	Statement on page 16 revised.	Aug. 26, 2009
<a href="#">Academic Probation and Disqualification</a>	Policy updated for Fall 2010.	Fall 2010
<a href="#">Admissions, Undergraduate</a>	Correction: To include statement omitted at time of printing, regarding consideration for admission, under "Admission Requirements" on page 35.	Summer 2009
<a href="#">AERO 301, 302, 303</a>	Prerequisites clarified.	Spring 2010
<a href="#">AERO 400</a>	Prerequisite added.	Winter 2011
<a href="#">AERO 425</a>	New course, "Aircraft Performance (4)".	Fall 2010
<a href="#">AERO 517</a>	New course, "Multidisciplinary Design and Optimization (4)".	Spring 2010
<a href="#">AERO 557</a>	New course, "Advanced Orbital Mechanics (4)".	Spring 2011
<a href="#">Aerospace Engineering, BS</a>	Curriculum substitution: In Support Coursework, change requirement <i>from</i> "PHYS 131	5/23/12

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	General Physics I (Add'l Area B)**" to " PHYS 131 General Physics or PHYS 141 General Physics IA (Add'l Area B)**".	
<u>Aerospace Engineering, BS</u>	For Aeronautics and Astronautics Concentrations, additional courses added to list of approved electives.	5/2/11
<u>Agricultural Business, BS</u>	Curriculum substitution: In Major Courses, change <i>from</i> "AGB 460 & AGB 461" to "AGB 460 & AGB 461 or AGB 462 or AGB 463 or AGB 464".	6/14/13
<u>Agricultural Business, BS</u>	Curriculum substitution: In Support Courses, change <i>from</i> "STAT 221 (5)" to "STAT 221 (5) or STAT 251 (4)".	6/13/13
<u>Agricultural Business, BS</u>	Curriculum substitution: In Support Courses, add "EHS" to "Any FRSC, CRSC, HCS, PPSC or VGSC course".	6/10/11
<u>Agricultural Business, BS</u>	Curriculum substitution: In Support Courses, expanded to include any GE Area F course.	8/18/11
<u>Agricultural Education, Master of</u>	New graduate degree program.	Fall 2010
<u>Agricultural Science, BS</u>	Curriculum substitution: In approved electives, Teaching Agriculture area, change option <i>from</i> , "BUS 212 or AGB 321" to "BUS 212 or AGB 214 or AGB 321".	3/16/15
<u>Agricultural Science, BS</u>	Curriculum substitution: In Approved Electives for Teaching Agriculture, change option <i>from</i> , "AGED 330" to "AGED 330 or AGED 303 and AGED 350".	8/29/13
<u>Agricultural Science, BS</u>	Curriculum substitution: In Support Courses, change "BRAE 340" to "BRAE 340 or BRAE 348".	2/28/12
<u>Agricultural Science, BS</u>	Curriculum substitution: In Major Courses, change "CRSC 123" to "CRSC 123 or CRSC 132 or HCS 120".	4/7/11
<u>Agricultural Science, BS</u>	Curriculum substitution: In Major Courses, change "AG 360/ASCI 476/AG 450" to "AG 360/ASCI 476/AG 450/AG 452".	2/28/11
<u>Agricultural Science, BS</u>	Curriculum substitution: In Animal Science Concentration, change "ASCI 220" to "ASCI	5/27/10

	220 <i>or</i> DSCI 101".	
<u>Agricultural Science. BS</u>	Electives units corrected in Major and Support Courses.	5/20/10
<u>Agricultural Science. BS</u>	Curriculum substitution: In Major Courses, change "CRSC 123" <i>to</i> "CRSC 123 <i>or</i> CRSC 132".	5/7/10
<u>Agricultural Systems Management. BS</u>	Add Request for Approved Electives: Add FSN 370.	6/13/13
<u>Agricultural Systems Management. BS</u>	Curriculum substitution: In Support Courses, change "BUS 212 or AGB 321" <i>to</i> "BUS 212 or AGB 214 or AGB 321".	12/13/12
<u>Agricultural Systems Management. BS</u>	Course BRAE 337 added to list of approved electives.	4/19/12
<u>Agricultural Systems Management. BS</u>	Curriculum substitution: In Support Courses, change "ENGL 148" <i>to</i> "ENGL 148 <i>or</i> ENGL 145".	Summer 2009
<u>Animal Science. BS</u>	Curriculum substitution: In Major Courses under Technology/Management, add ASCI 410 to list of options.	12/11/14
<u>Animal Science. BS</u>	Curriculum substitution: In Major Courses under Technology/Management, add ASCI 310 to list of options.	3/24/14
<u>Animal Science. BS</u>	Curriculum substitution: In Major Courses, change "ASCI 476, or ASCI 477, or ASCI 478, or ASCI 461, ASCI 462" <i>to</i> "ASCI 476, or ASCI 477, or ASCI 478, or ASCI 461 and ASCI 462 or ASCI 479"	5/31/12
<u>Animal Science. BS</u>	Change: In Major Courses, change ASCI 463 <i>to</i> ASCI 363.	Winter 2011
<u>Animal Science. BS</u>	Curriculum substitution: In Major Courses, replace three courses, ASCI 461, ASCI 462 and ASCI 476 with "ASCI 476 (3), <i>or</i> ASCI 477 (3), <i>or</i> ASCI 478 (3), <i>or</i> ASCI 461, 462 (1)(2).....3 units"	5/25/10
<u>Anthropology and Geography. BS</u>	Curriculum substitution: In Cross-Cultural Studies and International Development Concentration change option for Problems and Issues courses <i>from</i> "foreign language 121" <i>to</i> "foreign language 121 or 201".	8/30/13
<u>Anthropology and</u>	Correction in Environmental	11/18/10

<u>Geography, BS</u>	Studies and Sustainability Concentration (electives section): PSC 201 provides GE B5 credit, not D5 credit.	
<u>Anthropology and Geography, BS</u>	New degree program.	Fall 2009
<u>ARCE 257</u>	Change prerequisite.	Winter 2011
<u>ARCE 415</u>	New course, "Interdisciplinary Capstone Project (5)".	Spring 2010
<u>ARCE 449</u>	New course, "Cold Formed Steel Design Laboratory (3)".	Spring 2010
<u>ARCE 460</u>	Change units from 1 laboratory <i>to</i> 2 laboratories. Change total credit limit to 4 units.	Winter 2010
<u>ARCE 473</u>	New course, "Advanced Timber and Masonry Structures Laboratory (3)".	Spring 2010
<u>ARCH 101</u>	Change units from 2 lectures <i>to</i> 1 lecture. Change total credit limit to 3 units.	Summer 2009
<u>ARCH 400</u>	Prerequisite added.	Winter 2011
<u>ARCH 462</u>	Change total credit limit from 6 <i>to</i> 8 units.	Summer 2009
<u>ARCH 519</u>	Change prerequisite.	Winter 2011
<u>ARCH 531</u>	Change prerequisite.	Winter 2011
<u>Architectural Engineering, BS</u>	Curriculum substitution: In Advanced Structural Electives, add ARCE 475 to list of options.	3/12/14
<u>Architectural Engineering, BS</u>	Curriculum substitution: In Advanced Structural Electives, add ARCE 410 to list of options.	5/2/13
<u>Architectural Engineering, BS</u>	Curriculum substitution: a) In Support Courses, change "ARCH 217, or ARCH 218, or ARCH 219" <i>to</i> "ARCE 260, ARCH 217, ARCH 218, or ARCH 219". b) In Support Courses, change "ARCH 105" <i>to</i> "ARCH 105 or ARCE 354".	2/7/13
<u>Architectural Engineering, BS</u>	Curriculum substitution: a) In Support Courses, replace "ARCH 121, 122, 123" <i>with</i> "ARCH 131, 132, 133"	5/24/10

	b) In Support Courses, delete ARCH 221	
<u>Architecture, BArch</u>	Curriculum substitution: a) In Major Courses, change ARCH 105 (1) <b>to</b> ARCH 101 (1)(1)(1) b) In Major Courses, delete choice of "ARCH 121, 122, 123 & ARCH 160" c) In Support Courses, reduce Professional Electives from 20 <b>to</b> 16 units d) Reduce total units required to 225.	Summer 2009
<u>ART 302</u>	Change prerequisite.	Summer 2010
<u>ART 370</u>	New course, "Michelangelo (4)". Provides GE C4 credit except for Art and Design majors.	Winter 2010
<u>ART 371</u>	New course, "Topics in Renaissance Art (4)". Provides GE C4 credit except for Art and Design majors.	Spring 2010
<u>ART 388</u>	Prerequisite change, to be effective Summer 2010, has been rescinded.	Summer 2010
<u>ART 437</u>	Change prerequisite.	Summer 2010
<u>ART 461</u>	Correction: Prerequisite: Senior standing and ART 360.	Summer 2009
<u>ART 462</u>	Change: Prerequisite: Senior standing and ART 360.	Winter 2010
<u>Art and Design, BFA</u>	Correction: In Studio Art Concentration, ART 148 does not provide GE C4 credit.	10/29/09
<u>Art and Design, BFA</u>	Curriculum substitution: In Major Courses, delete ART 461 Senior Project (2). Total units: change from 186 <b>to</b> 184.	10/19/09
<u>Art and Design, BFA</u>	Correction: In Major Courses, for <b>"Art History"</b> . Select two courses...", ART 311, 314 and 318 do not provide GE C4 credit.	Summer 2009
<u>Art and Design, BFA</u>	Correction: In Photography Concentration, ART 314 does not provide GE C4 credit.	Summer 2009
<u>Art History Minor</u>	For requirement, "Select one 300-level Western Course" add ART 371 (C4) to list.	Spring 2010
<u>Art History Minor</u>	For requirement, "Select one 300-level Western Course" add	Winter 2010

	ART 370 (C4) to list.	
<a href="#"><u>ASCI 329</u></a>	Change from (3) 3 lectures <i>to</i> (4) 3 lectures, 1 laboratory.	Winter 2011
<a href="#"><u>ASCI 463</u></a>	Change course number from ASCI 463 <i>to</i> ASCI 363. Change description and prerequisite.	Winter 2011
<a href="#"><u>ASCI 477</u></a>	New course, "Senior Project - Research Experience in Animal Science (3)".	Winter 2011
<a href="#"><u>ASCI 478</u></a>	New course, "Senior Project - Advanced Internship Experience in Animal Science (3)".	Winter 2011
<a href="#"><u>ASCI/BIO/BMED 593</u></a>	New course, "Stem Cell Research Internship (5)".	Winter 2011
<a href="#"><u>ASCI/BIO/BMED 594</u></a>	New course " Applications in Stem Cell Research (2)".	Spring 2011
<a href="#"><u>Asian Studies Minor</u></a>	Curriculum substitution: In Lower Division Electives updated, "MLL 121 <i>to</i> MLL 201", "MLL 122 <i>to</i> MLL 202" and added CHIN 201, 202; and JPNS 201 to the list of options.	8/30/13
<a href="#"><u>Asian Studies Minor</u></a>	Curriculum substitution: In Required Courses, add CHIN 103 to list of options.	9/25/12
<a href="#"><u>Asian Studies Minor</u></a>	Course added to list of upper division approved electives.	7/21/11
<a href="#"><u>Asian Studies Minor</u></a>	Correction to ART 318 in approved electives.	07/12/2011
<a href="#"><u>Asian Studies Minor</u></a>	New minor.	Spring 2010
<a href="#"><u>BIO 405</u></a>	Change units from (5) 3 lectures, 2 laboratories <i>to</i> (4) 3 lectures, 1 laboratory; change prerequisite.	Spring 2011
<a href="#"><u>BIO 534</u></a>	New course, "Principles of Stem Cell Biology (2)".	Winter 2011
<a href="#"><u>BIO 599</u></a>	Change units from (3) 3 laboratories <i>to</i> (1-3) 1-3 laboratories.	Spring 2011
<a href="#"><u>Biochemistry, BS</u></a>	Add Request for Advanced Electives: In Advanced Electives list A add CHEM 450, 451; SCM 302.	2/21/15
<a href="#"><u>Biochemistry, BS</u></a>	Add Request for Advanced Electives: In Advanced Electives list A add CHEM 414; SCM 325. In list B add ZOO 331, 332.	11/17/14

<u>Biochemistry, BS</u>	Curriculum substitution: In Major Courses, add CHEM 441 to List A of approved biochemistry electives.	5/17/12
<u>Biochemistry, BS</u>	Correction to Free Electives units.	1/24/11
<u>Biological Sciences, BS</u>	Curriculum substitution: In the Anatomy and Physiology concentration added CHEM 219 and CHEM 319 to list of approved electives.	6/26/14
<u>Biological Sciences, BS</u>	Curriculum substitution: In the Anatomy and Physiology concentration added BIO 462 to list of approved electives.  In the General Biology concentration added BIO 200, 325, 327, 330, 419, 427, 428, 438, 439, 440, 442, 443, 444, 445, 446, 450, 462, 470, 471 to list of approved electives.  In the Marine Biology and Fisheries concentration added BIO 325, 327, 440, 445, 446; ZOO 324 to list of approved electives.	6/24/14
<u>Biological Sciences, BS</u>	Curriculum substitution: In the Molecular and Cellular Biology concentration added BIO 462 to List A in approved electives.	6/20/14
<u>Biological Sciences, BS</u>	Curriculum substitution: In Biology Teaching and Ecology concentrations added BIO 361, 427; NR 311, 421; SS 121, 421, 422 to list of approved electives.	4/24/14
<u>Biological Sciences, BS</u>	Curriculum substitution: In Biology Teaching and Field and Wildlife concentrations added BIO 445, 446, 462, 463 to list of approved electives.	4/24/14
<u>Biological Sciences, BS</u>	Curriculum substitution: In Major courses under Ecology topic added BIO 327 to list of options.	3/17/14
<u>Biological Sciences, BS</u>	Curriculum Substitution: In General Biology concentration approved electives, add SCM 302 to list of options.	3/12/14
<u>Biological Sciences, BS</u>	Curriculum Substitution: In Ecology, Field and Wildlife Biology and Marine Biology & Fisheries concentrations	10/29/13

	changed required coursework and approved electives, <i>from</i> "ZOO 437" <i>to</i> "ZOO 437 or ZOO 442".	
<u>Biological Sciences.</u> <u>BS</u>	Curriculum substitution: In Major courses under Ecology topic added BIO 445 and BIO 446 to list of options.	9/26/13
<u>Biological Sciences.</u> <u>BS</u>	Curriculum substitution: In General Concentration, change required course <i>from</i> "BIO 452" <i>to</i> "BIO 405, 426; BIO/CHEM 375, 441, 476; BOT/HCS 450; MCRO 402; ZOO 428" and change units <i>from</i> "4" <i>to</i> "2-4". Updated Approved Elective total units <i>from</i> "15-13" <i>to</i> "13-17".	7/22/13
<u>Biological Sciences.</u> <u>BS</u>	Curriculum substitution: In Approved Electives, add SCM 302 to list of options for:  Anatomy and Physiology Concentration Ecology Concentration Field and Wildlife Biology Concentration Marine Biology and Fisheries Concentration Molecular and Cellular Biology Concentration	3/13/13
<u>Biological Sciences.</u> <u>BS</u>	Curriculum substitution: In Required Courses, change requirement <i>from</i> "SCM 451" <i>to</i> "SCM 451 or PHIL 339, PHIL 340 or SCM 325".	10/3/12
<u>Biological Sciences.</u> <u>BS</u>	Curriculum substitution: In Major Courses change BIO 162 <i>from</i> "5 units" <i>to</i> "4/5 units". Updated total units in Major coursework <i>from</i> "78-79" <i>to</i> "77-79". Updated total units in Free Electives <i>from</i> "4-5" <i>to</i> "4-6".	9/24/12
<u>Biological Sciences.</u> <u>BS</u>	Curriculum substitution: In General Biology Concentration, add CHEM 217 to list of approved electives.	9/21/12
<u>Biological Sciences.</u>	Curriculum substitution: In	7/13/12



<u>BS</u>	Support Courses, add CHEM 216 to list of options.	
<u>Biological Sciences.</u> <u>BS</u>	<p>Anatomy and Physiology Concentration Curriculum substitution: In Approved Electives, add CHEM 217 and 218 to list of options.</p> <p>Marine Biology and Fisheries Concentration Curriculum substitution: In Approved Electives, add CHEM 217 to list of options.</p> <p>Molecular and Cellular Biology Concentration Curriculum substitution: For required courses add CHEM 217. In Approved Electives List B, add CHEM 218 to list of options.</p>	7/9/12
<u>Biological Sciences.</u> <u>BS</u>	Curriculum substitution: For Ecology choices in Major Courses, add BIO 328.	9/30/10
<u>Biological Sciences.</u> <u>BS</u>	Curriculum substitution: In General Biology Concentration, change "CHEM 313" <i>to</i> "CHEM 313 <i>or</i> CHEM 371"	Summer 2009
<u>Biological Sciences.</u> <u>BS</u>	In Biology Teaching Concentration, for footnote attached to title of concentration, strike out "or KINE 255".	Summer 2009
<u>Biology Minor</u>	Curriculum substitution: In Required Courses, change BIO 162 <i>from</i> "5 units" <i>to</i> "4/5 units".	9/24/12
<u>Biology Minor</u>	Curriculum substitution: In first combination, change BIO 160 <i>to</i> BIO 160 or MCRO 221 or MCRO 224.	3/23/10
<u>Biomedical Engineering. BS</u>	Add Request for Approved Electives: Add list of courses to Approved Technical and Support Electives.	12/31/14
<u>Biomedical Engineering. BS</u>	Curriculum substitution: In Major Courses, add footnote to BMED 481, 482.	7/31/14
<u>Biomedical</u>	Curriculum substitution: In	12/13/13

<a href="#"><u>Engineering. BS</u></a>	Major Courses, change requirement <i>from</i> "CSC 101 or CSC 234" <i>to</i> "CSC 101 or CSC 234 or CSC 234" and a added footnote.	
<a href="#"><u>Biomedical Engineering. BS</u></a>	Curriculum substitution: In Major Courses, change "BMED 111" <i>to</i> "BMED 111 or ENGR 111".	12/11/12
<a href="#"><u>Biomedical Engineering. BS</u></a>	Curriculum substitution: Unit value for BMED 481 and 482 changed to '2' units in the 2011-13 catalog. Allow students to use BMED 481 (1), BMED 482 (1) and BMED 483 (2) to satisfy the 4 units of required senior project in Major Coursework.	2/21/12
<a href="#"><u>BioResource and Agricultural Engineering. BS</u></a>	Course BRAE 337 added to list of approved electives.	4/19/12
<a href="#"><u>Biotechnology. Minor</u></a>	Curriculum substitution: Change SCM 201 <i>from</i> "1" <i>to</i> "1-2" units. Change Approved Electives total <i>from</i> "7-13" <i>to</i> "6-13".	8/22/14
<a href="#"><u>BMED 510</u></a>	Change prerequisite.	Winter 2010
<a href="#"><u>BMED 512</u></a>	Change prerequisite.	Spring 2011
<a href="#"><u>BMED 515</u></a>	Change prerequisite.	Spring 2011
<a href="#"><u>BMED 545</u></a>	Change prerequisite.	Winter 2011
<a href="#"><u>BRAE 301</u></a>	Change prerequisite.	Spring 2011
<a href="#"><u>BUS 395</u></a>	Change prerequisite.	Fall 2010
<a href="#"><u>BUS 401</u></a>	Change prerequisite.	Spring 2011
<a href="#"><u>BUS 488</u></a>	Change prerequisite.	Winter 2011
<a href="#"><u>BUS 498</u></a>	Change prerequisite.	Fall 2010
<a href="#"><u>BUS 501, 502</u></a>	Correction: Courses deleted from catalog.	Summer 2009
<a href="#"><u>Business Administration. BS</u></a>	Curriculum substitution: In Information Systems Concentration, add BUS 470 (Android Application Development) to list of approved electives.	3/25/15
<a href="#"><u>Business</u></a>	Curriculum substitution: In	5/23/13

Administration, BS	Major coursework under Production Management add IT 303 to list of electives.	
<u>Business Administration, BS</u>	Curriculum substitution: In Support Courses, added footnote, "STAT 301 (4) and STAT 302 (4) may be used as a substitute for STAT 251 (4) and STAT 252 (5). All students must still complete two approved GE B1 courses. Students pursuing the Quantitative Concentration should take MATH 141 and MATH 142 instead of MATH 221".	4/12/13
<u>Business Administration, BS</u>	In Major Courses, add BUS 301 to International Business course options.	4/17/12
<u>Business Administration, BS</u>	Curriculum substitution: In Financial Management Concentration updated requirement from "BUS 443" <i>to</i> "BUS 443 <i>or</i> ECON 339".	4/10/12
<u>Business Administration, BS</u>	Curriculum substitution: In Major Courses, for International business, add BUS 304 to list.	4/20/11
<u>Business Administration, BS</u>	Curriculum substitution: In Information Systems Concentration, delete "BUS 290 <i>or</i> CSC/CPE 101 <i>or</i> CSC/CPE 237" and reduce concentration units to 24; see footnote for additional information.	4/8/10
<u>CD 207</u>	Change description.	Fall 2010
<u>CE 537</u>	Correction to prerequisite.	Summer 2009
<u>Change of Major</u>	Policy updated for Fall 2010.	7/19/10
<u>CHEM 212</u>	Change description and prerequisite.	Winter 2011
<u>CHEM 312</u>	Change prerequisite.	Winter 2011
<u>CHEM 354</u>	Change prerequisite.	Spring 2011
<u>CHEM/MATE 446</u>	Change prerequisite.	Spring 2011
<u>Chemistry, BS</u>	Add Request for Advanced Electives: Add CHEM 414; SCM 325.	11/17/14
<u>Chemistry, BS</u>	Curriculum substitution: Merge two lists of Advanced	11/4/11

	Chemistry Electives into a single list.	
<a href="#"><u>Child Development. BS</u></a>	Correction: PSY 256, not CD 256 (Developmental Psychology) is a required course (Major Course).	Summer 2009
<a href="#"><u>City and Regional Planning. BS</u></a>	Curriculum substitution: In Major Courses, add footnote to CRP 436, "An additional 4 units of upper division Approved Electives and/or upper division CRP courses may substitute".	2/21/15
<a href="#"><u>City and Regional Planning. BS</u></a>	Curriculum substitution: In Support Courses, change requirement <i>from</i> "POLS 375 or 471 or 516" <i>to</i> "POLS 316 or 340 or 349 or 375 or 471 or 516".	5/6/14
<a href="#"><u>City and Regional Planning. BS</u></a>	Curriculum substitution: In Support Courses, change requirement <i>from</i> "STAT 221" <i>to</i> "STAT 221 or STAT 217".	4/17/14
<a href="#"><u>City and Regional Planning. BS</u></a>	Add Request for Approved Electives: Add PSY 303.	4/3/14
<a href="#"><u>Civil Engineering. BS</u></a>	Curriculum substitution: In Major Coursework, add footnote to CE 251, "If CE 251 is taken for 2 units then an additional 2 units of Technical Electives is required".	6/7/13
<a href="#"><u>Civil Engineering. BS</u></a>	Add Request for Approved Technical Electives: add CE 371 or CM 371.	5/21/13
<a href="#"><u>Civil Engineering. BS</u></a>	Curriculum substitution: In Technical Electives, increase total Technical Electives to 24 and remove requirement for students to select one course from: CE 454, CE 440, CE 422/522 or CE 481.	9/6/11
<a href="#"><u>Civil Engineering. BS</u></a>	Curriculum substitution: In Major Courses, CE 114 substitutes for CE 112 and CE 113.	Summer 2009
<a href="#"><u>CM 115</u></a>	Change prerequisite.	Winter 2010
<a href="#"><u>CM 213</u></a>	Change prerequisite.	Winter 2010
<a href="#"><u>CM 331</u></a>	Change prerequisite.	Winter 2010
<a href="#"><u>CM 333</u></a>	Change title, description and prerequisite.	Winter 2010

CM 400	Change total credit limit from 4 to 6 units, with a maximum of 4 units per quarter.	Spring 2010
<u>CM 433</u>	Change prerequisite.	Winter 2010
<u>CM 433</u>	Change title, description and mode (from 2 lectures <i>to</i> 2 activities).	Fall 2009
<u>Communication Studies, BA</u>	Curriculum substitution: In Support Courses, change <i>from</i> "HIST 111" <i>to</i> "HIST 111 or HIST 202 or HIST 207 or HIST 223".	7/26/13
<u>Communication Studies, BA</u>	Curriculum substitution: In Support Courses, change "Modern language 121..." <i>to</i> "Modern language 103 or 121..."	5/9/11
<u>Communication Studies, BA</u>	<del>For GE C3, add "Not COMS".</del> For GE C4, add "Not COMS".	Summer 2009
<u>Comparative Ethnic Studies, BA</u>	For GE C4, add "no ES course except ARCH/ES 326 or ES/NR 360".  For GE D5, add "No ES course except ES/NR 308".	3/2/15
<u>Comparative Ethnic Studies, BA</u>	Add Request for Approved Electives: Add ES/NR 406.	10/7/13
<u>Comparative Ethnic Studies, BA</u>	Add Request for Approved Electives: add PSY 303.	1/24/13
<u>Comparative Ethnic Studies, BA</u>	Correction for GE total units: Area F credit is provided in Major Courses. Total GE units are thus reduced, and Free Electives increased.	1/21/10
<u>Computer Engineering, BS</u>	Add Request for Approved Electives: add PHYS 322.	3/1/13
<u>Computer Engineering, BS</u>	Curriculum substitution: Added footnote to CPE 400, "CPE 400 requires an approved course substitution form and up to 4 units may be used".	3/1/13
<u>Computer Engineering, BS</u>	Curriculum substitution: Course added to list of approved technical electives.	3/29/12
<u>Computer Engineering, BS</u>	Curriculum substitutions in Major Courses: 1) Change "CPE 129, 169....3,1" <i>to</i> "CPE 129, 169 (3)(1) <i>or</i> CPE/EE 133 (4)". 2) Change "CPE 229, 269....3,1" <i>to</i> "CPE 229, 269	10/22/10

	(3)(1) <i>or</i> CPE/EE 233 (4)".	
<u>Computer Engineering. BS</u>	Curriculum substitution: In Support Courses, for freshmen and transfer students admitted Fall 2010, replace "ME 211 <i>or</i> MATE 210, 215" with "CSC/CPE 123".	5/25/10
<u>Computer Engineering. BS</u>	Curriculum substitution: In Major Courses, change "CPE 102, 103 Fund Computer Science II, III....4,4" <i>to</i> "CPE 102 <i>or</i> CPE 108...4" and "CPE 103....4".	3/10/10
<u>Computer Science. BS</u>	Add Request for Technical Electives: In Category 2b, add CSC 496.	6/26/14
<u>Computer Science. BS</u>	Add Request for Technical Electives: In Category 2a, add CSC 570.	5/14/13
<u>Computer Science. BS</u>	Curriculum substitution: In Category 2c External Electives, add CHEM 216, 217 and 218 to list of options.	7/5/12
<u>Computer Science. BS</u>	Curriculum substitution: Changed support courses <i>from</i> "BIO 213 and ENGR/BRAE 213" <i>to</i> "BIO 213 and ENGR/BRAE 213 or BIO 111 or BIO 115 or BIO 161 BOT 121 or MCRO 221 or MCRO 224 (B2)*"	4/3/12
<u>Computer Science. BS</u>	Curriculum substitution: Added to footnote CSC 431 (4), "Alternately, an additional 4 units of CSC/CPE technical electives may be substituted.	2/27/12
<u>Computer Science. BS</u>	Correction for Support Courses: For mathematics/statistics electives, change STAT 322 <i>to</i> STAT 325.	Summer 2009
<u>Computer Science. BS</u>	Curriculum substitution: In Support Courses, change "STAT 321" <i>to</i> "STAT 321 <i>or</i> STAT 312".	Summer 2009
<u>Computer Science Minor</u>	Add Request for Approved Electives: Add CSC 570.	5/14/13
<u>COMS/ENGL/HNRS 145</u>	Correction to prerequisite for ENGL 145 and HNRS 145.	11/17/10
<u>COMS 208</u>	Delete "Communication Studies majors will not receive GE C3 credit."	Summer 2009
<u>Construction</u>	Curriculum substitution: In	3/12/14

<u>Management, BS</u>	Major Courses, change requirement <i>from</i> "CM 463" <i>to</i> "CM 463 or CM 461 & CM 462".	
<u>Construction Management, BS</u>	Curriculum substitution: In Support Courses, change requirement <i>from</i> "BUS 300-400 level advisor approved elective" <i>to</i> "BUS 300-400 level advisor approved elective or ECON 303".	11/27/13
<u>Construction Management, BS</u>	Curriculum substitution: In Major Courses, change requirement <i>from</i> "CM 433" <i>to</i> "CM 433 or CM 480".	9/24/13
<u>Construction Management, BS</u>	Curriculum substitution: In Support Courses, change "ARCE 211 and ARCE 212" <i>to</i> "ARCE 211 and ARCE 212 <i>OR</i> ME 211 and CE 204."	Summer 2009
<u>CPE/CSC 102</u>	Delete corequisite.	Winter 2011
<u>CPE/CSC 105</u>	New course, "Fundamentals of Computer Science I Supplemental Instruction (1)."	Winter 2011
<u>CPE/CSC 123</u>	New course, "Introduction to Computing (4)". Change description to state "Not for students with credit in CPE/CSC 103."	Fall 2010
<u>CPE/EE 129</u>	Change description to add "Not open to students with credit in CPE/EE 133."	Winter 2011
<u>CPE/EE 133</u>	New course, "Digital Design (4)".	Winter 2011
<u>CPE/EE 169</u>	Change description to add "Not open to students with credit in CPE/EE 133."	Winter 2011
<u>CPE/EE 229</u>	Change description to add "Not open to students with credit in CPE/EE 233." Change prerequisite.	Winter 2011
<u>CPE/EE 233</u>	New course, "Computer Design and Assembly Language Programming (4)".	Winter 2011
<u>CPE/EE 269</u>	Change description to add "Not open to students with credit in CPE/EE 233." Change prerequisite.	Winter 2011
<u>CPE/EE 329</u>	Change description to add "Not open to students with credit in CPE/EE 336." Change prerequisite.	Spring 2011

<u>CPE/EE 336</u>	Change description, including to add "Not open to students with credit in CPE/EE 329." Change prerequisite.	Spring 2011
<u>CPE/EE Courses</u>	The following CPE courses, which are crosslisted as EE courses, have had the prerequisite statement "...with a C- grade or better..." removed: CPE 229, 269, 328, 329, 336, 368, 427, 432, 439, 441, 521, 522, 523.	Spring 2010
<u>Crop Science, BS</u>	Curriculum substitution: In Major Courses, add footnote to HCS 463.	12/11/14
<u>CRP 214</u>	Change mode from (4) 4 lectures to (4) 3 lectures, 1 activity.	Spring 2011
<u>CRP 408</u>	Prerequisite corrected: "NR 306 (not NR 302) or equivalent or instructor approval, senior standing or graduate standing."	7/19/10
<u>CRP 424</u>	Prerequisite corrected: "CRP 212 (or CRP 501 for graduate students), or equivalent."	Fall 2009
<u>CRP 462</u>	For CRP 462: Change "corequisite: CRP 410" to "prerequisite: CRP 410."	Fall 2009
<u>CRP 509</u>	New course, "Professional Development (1-3)".	Winter 2011
<u>CSC 141</u>	Change prerequisite; delete corequisite.	Winter 2011
<u>CSC 400</u>	Correction: Change from (1-2) units to (1-4) units. Delete statement "...with a maximum of 2 units per quarter."	Summer 2009
<u>CSC 445</u>	Change prerequisite.	Summer 2010
<u>CSC 560</u>	Change prerequisite.	Fall 2010
<u>Dairy Science, BS</u>	Add Request for Approved Electives: Add AGB 214.	10/28/13
<u>Dairy Science, BS</u>	Curriculum substitution: In Approved Electives, add CHEM 216 and 217 to list of options.	7/12/12
<u>Dairy Science, BS</u>	Curriculum substitution: In Major Courses revise requirement <i>from</i> "DSCI 333 Dairy Cattle Management, Safety and Animal Well-Being <i>or</i> DSCI 402 Quality Assurance and Control of Dairy Products" <i>to</i>	6/15/12



	"DSCI 333 Dairy Cattle Management, Safety and Animal Well-Being or DSCI 402 Quality Assurance and Control of Dairy Products or <b>DSCI 412 Dairy Farm Consultation or ASCI 415 HACCP for Meat and Poultry Operations</b> ".	
<u>Dairy Science, BS</u>	Curriculum substitution: In Support Courses, change "CHEM 312 or BIO 111" to "CHEM 312/BIO 111/BIO 115/BIO 151/BIO 161"	10/22/09
<u>Dairy Science Minor</u>	Curriculum substitution: In Advisor Approved Electives, add course ASCI 415.	6/15/12
<u>Dance Minor</u>	Curriculum substitution: Change requirement <b>from</b> "DANC 134 or DANC 234" <b>to</b> "DANC 134 or DANC 234 or DANC 130". Added footnote.	7/17/14
<u>DSCI 330</u>	Correction to prerequisite.	6/30/10
<u>Earth Sciences, BS</u>	Curriculum Substitution: In Geosciences Teaching Concentration required coursework, change requirement <b>from</b> "BIO 113" <b>to</b> "BIO 113 or BIO 112".	10/3/13
<u>Earth Sciences, BS</u>	Add Request for Approved Electives: Add NR/ES 406 to list of options in Environmental Interpretation and Assessment Concentration.	6/30/13
<u>Earth Sciences, BS</u>	Curriculum substitution: In Major Coursework, change requirement <b>from</b> "ERSC/SS 110" <b>to</b> "ERSC/SS 110 or NR 140".	7/2/13
<u>Earth Sciences, BS</u>	Curriculum substitution: In Geosciences Teaching Concentration, corrected 'PSC 424 or EDUC 480' unit value from 4/3 <b>to</b> 4/2. Unit value of EDUC 480 was changed from '3' <b>to</b> '2' units with the 2009-11 catalog. Updated concentration units from 41-42 <b>to</b> 40-42. Updated total units in Major coursework from 124-125 <b>to</b> 123-125. Updated free electives from 0 <b>to</b> 0-1.	2/9/12
<u>ECON 405</u>	Change prerequisite.	Spring 2011
<u>Economics, BS</u>	For GE D5, add "Not ECON".	Summer 2009

<u>Education. MA</u>	Specialization in Educational Leadership and Administration: In Winter Quarter class list, corrected EDUC 515 title. Changed <i>from</i> Curriculum and Program Evaluation <i>to</i> Educational Program Management & Evaluation	11-9-11
<u>EDUC 125</u>	Change: Add crosslisting as UNIV 125.	Fall 2009
<u>EDUC 207</u>	Change description.	Fall 2010
<u>EDUC 300</u>	Change description.	Fall 2010
<u>EDUC 310</u>	Change prerequisite.	Spring 2011
<u>EDUC 310</u>	Change description.	Fall 2010
<u>EDUC 480</u>	Change prerequisite.	Spring 2011
<u>EE Courses</u>	The prerequisite statement "...with a C- grade or better..." has been removed from the following EE courses: EE 211, 212, 228, 229, 241, 242, 255, 269, 295, 306, 307, 308, 314, 328, 329, 335, 336, 342, 346, 347, 348, 368, 402, 403, 405, 406, 409, 415, 416, 418, 419, 421, 422, 427, 431, 432, 439, 445, 449, 456, 459, 460, 513, 514, 515, 517, 521, 522, 523, 526, 528, 530.	Spring 2010
<u>EE 112</u>	Change prerequisite: remove "Concurrent or prerequisite: PHYS 133."	Fall 2009
<u>EE 211</u>	Change prerequisite: add "Prerequisite or concurrent: PHYS 133."	Fall 2009
<u>EE 241</u>	Change prerequisite <i>to</i> : "EE 112 with a C- grade or better, EE 151 for EE students and CPE 169 for CPE students. Prerequisite or concurrent: MATH 244, PHYS 133. Concurrent: EE 211."	Fall 2009
<u>EE 307</u>	Change prerequisite.	Spring 2011
<u>EE 321</u>	Change prerequisite.	Spring 2011
<u>EE 347</u>	Change prerequisite.	Spring 2011
<u>EE 495</u>	Change prerequisite.	Summer

		2010
<u>EHS 127</u>	Change title and description.	Winter 2011
<u>EHS 301</u>	Change description and prerequisite.	Spring 2011
<u>EHS 424</u>	Change description and prerequisite.	Winter 2011
<u>Electrical Engineering. BS</u>	Add Request for Approved Engineering Support Electives: Add CPE 290 Introduction to C++ Programming.	7/18/13
<u>Electrical Engineering. BS</u>	Curriculum substitution in Major Courses: Change "EE 329" to "EE 329 or CPE/EE 336".	2/15/11
<u>Electrical Engineering. BS</u>	Curriculum substitutions in Major Courses: 1) Change "EE 129, 169....3,1" <i>to</i> "EE 129, 169 (3)(1) <i>or</i> CPE/EE 133 (4)". 2) Change "EE 229, 269....3,1" <i>to</i> "EE 229, 269 (3)(1) <i>or</i> CPE/EE 233 (4)".	10/27/10
<u>Engineering College</u>	Change to Academic Expectations for all bachelor's programs: "Students are expected to: * complete a <i>minimum</i> of 45 <del>36</del> degree applicable units each academic year...."	Summer 2009
<u>ENGL 332</u>	Change: Add crosslisting as HNRS 332.	Fall 2010
<u>ENGL 370, 371</u>	Correction to prerequisite.	Spring 2010
<u>ENGL 515</u>	Prerequisite clarified.	Spring 2011
<u>English. BA</u>	Curriculum substitution: In Support Courses, change "Foreign Language (121 or 122)" <i>to</i> "Foreign Language (121 or 122 or 201 or 202)".	5/30/13
<u>ENGR 322/SCM 302</u>	SCM 302 becomes crosslisted as ENGR 322.	Spring 2011
<u>ENVE 536</u>	Change units from 3 lectures <i>to</i> 4 lectures.	Winter 2010
<u>Environmental Engineering. BS</u>	Curriculum substitution: In Major Coursework, add footnote to ENVE 439, "An additional 3 units of technical electives may substitute".	1/6/14
<u>Environmental Engineering. BS</u>	Curriculum substitution: In Support Courses, change	Summer 2009

	"MCRO 221" to "MCRO 221 or MCRO 224".	
<a href="#"><u>Environmental Horticultural Science, BS</u></a>	Curriculum substitution: In Major Courses, add footnote to HCS 463.	12/11/14
<a href="#"><u>Environmental Horticultural Science, BS</u></a>	Curriculum substitution: In Nursery and Floriculture Production concentration and Individualized Course of Study changed requirement <i>from</i> "EHS 128" <i>to</i> "EHS 128 or EHS 127" and added a footnote.	12/20/13
<a href="#"><u>Environmental Horticultural Science, BS</u></a>	Correction to Landscape Horticulture Concentration: BRAE 337 is a 4-unit course, not 3; change units of approved electives from 11 to 10. Correction to Turfgrass Management Concentration: BRAE 337 is a 4-unit course, not 3; change units of approved electives from 12 to 11.	Summer 2009
<a href="#"><u>Environmental Management and Protection, BS</u></a>	Curriculum substitution: In Major Courses, change <i>from</i> "BIO 115/ BIO 162/ NR 208" <i>to</i> BIO 115 or BIO 114/ BIO 162/ NR 208".	7/2/13
<a href="#"><u>Environmental Management and Protection, BS</u></a>	Add Request for Approved Electives: Add NR/ES 406 to list of options in Environmental Policy and Management Concentration.	6/30/13
<a href="#"><u>Environmental Management and Protection, BS</u></a>	Curriculum substitution: In Watershed Management and Hydrology Concentration, change "SS 440" to "SS 440 or ERSC 323".	8/24/10
<a href="#"><u>ERSC 461</u></a>	Correction to prerequisite.	8/9/10
<a href="#"><u>ES 350 / WGS 350</u></a>	Change to description and prerequisite.	Winter 2011
<a href="#"><u>Fees Disclaimer</u></a>	First paragraph of "Fees and Expenses" modified.	8/18/09
<a href="#"><u>Fire Protection Engineering, MS</u></a>	Add Request for Approved Technical Electives: add FPE 554.	12/26/12
<a href="#"><u>Fire Protection Engineering, MS</u></a>	Curriculum substitution: Added footnote to FPE 596 (5), "FPE 599 (9 units) may substitute for FPE 596 and 4 units of technical electives".	12/26/12

<a href="#"><u>Fire Protection Engineering, MS</u></a>	Add Request for Approved Technical Electives: add FPE 555.	11/1/12
<a href="#"><u>Fire Protection Engineering, MS</u></a>	New graduate degree program.	Fall 2010
<a href="#"><u>Food Science, BS</u></a>	Curriculum substitution: In Emphasis Area Courses, change requirement <i>from</i> "FSN 275" <i>to</i> "FSN 275 or FSN 375".	8/17/13
<a href="#"><u>Food Science, BS</u></a>	Curriculum substitution: In Major Courses, change requirement <i>from</i> "FSN 270" <i>to</i> "FSN 270 or FSN 370".	8/17/13
<a href="#"><u>Food Science, BS</u></a>	Curriculum substitution: In Concentrations; Advanced Food Science and Applied Food Technology, add CHEM 217 and CHEM 218 to list of advisor approved electives.	9/5/12
<a href="#"><u>Food Science, BS</u></a>	For each concentration, courses added to list of approved electives.	6/30/11
<a href="#"><u>Food Science, BS</u></a>	Change name of concentration from "Culinology®" <i>to</i> "Culinary".	Summer 2009
<a href="#"><u>Food Science, BS</u></a>	For Advanced Food Science Concentration, added FSN 343 to approved electives.	10/10/11
<a href="#"><u>Food Science Minor</u></a>	Curriculum substitution: In Emphasis Area Courses, change option <i>from</i> "FSN 270" <i>to</i> "FSN 270 or FSN 370".	8/17/13
<a href="#"><u>Food Science Minor</u></a>	Add Request for Approved Electives: add FSN 275 and FSN 375.	4/29/13
<a href="#"><u>Forestry and Natural Resources, BS</u></a>	For GE C4, add "no NR course except ES/NR 360".  For GE D5, add "No NR course except ES/NR 308".	3/2/15
<a href="#"><u>Forestry and Natural Resources, BS</u></a>	Add Request for Approved Electives: Add NR/ES 406 to list of options in: Environmental Planning and Assessment Concentration Urban Forestry Concentration Wildland Fire and Fuels Management concentration	6/30/13
<a href="#"><u>Forestry and Natural Resources, BS</u></a>	Curriculum substitution: In Watershed Management and	8/24/10

	Hydrology Concentration, change "SS 440" to "SS 440 or ERSC 323".	
<u>FPE Courses</u>	New courses, Fire Protection Engineering (for new graduate degree program).	Fall 2010
<u>French Minor</u>	Curriculum substitution: Change requirement <i>from</i> "FR 122" <i>to</i> "FR 122 or FR 202".	9/27/13
<u>French Minor</u>	For list of electives: Add MLL 400.	Summer 2009
<u>Fruit Science, BS</u>	Curriculum substitution: In Major Courses, add footnote to HCS 463.	12/11/14
<u>Fruit Science, BS</u>	Remove PPSC 327 from list of approved electives. PPSC 327 is listed in Major Courses.	11/30/11
<u>FSN 275</u>	Change prerequisite.	Spring 2010
<u>FSN 319</u>	Change mode from 3 lectures, 1 activity <i>to</i> 4 lectures.	Winter 2011
<u>FSN 401</u>	Change from credit/no credit grading <i>to</i> regular grading.	Winter 2011
<u>FSN 430</u>	Change mode from 4 lectures <i>to</i> 3 lectures, 1 lab.	Fall 2009
<u>General Education Courses</u>	Add HNRS 332 to the list for GE Area C4.	Fall 2010
<u>General Engineering, BS</u>	Curriculum substitution: In Major Coursework, change requirement <i>from</i> "ENGR 481 & ENGR 482 or Sr. Project..." <i>to</i> "ENGR 481 & ENGR 482 or ENGR 462 or Sr. Project...".	1/16/15
<u>General Engineering, BS</u>	Correction in Bioengineering concentration: "Special Topics in Bioengineering" from ENGR 450 <i>to</i> ENGR 451.	10/31/11
<u>General Engineering, BS</u>	Correction in Biomedical Engineering Concentration: "Special Topics in Bioengineering" from ENGR 450 <i>to</i> ENGR 451.	10/31/11
<u>Geographic Information Systems for Agriculture Minor</u>	Curriculum substitution: Change requirement <i>from</i> "BRAE 133 & BRAE 151 <i>or</i> CE 114 <i>or</i> LA 111 & LA 310" <i>to</i> "BRAE 133 & BRAE 151 <i>or</i> CE 114 <i>or</i> LA 111 & LA 310 <i>or</i> CE 112 & CE 113".	6/30/14
<u>German Minor</u>	Curriculum substitution: Change requirement <i>from</i>	9/27/13

	"GER 122" <i>to</i> "GER 122 or GER 202".	
<u>German Minor</u>	For list of electives: Add MLL 400.	Summer 2009
<u>Gerontology Minor</u>	Curriculum substitution: Add PSY 401 as option for Gerontology-related Fieldwork	9/26/11
<u>Graduate Programs, Orfalea College of Business</u>	Curriculum substitution for MBA Specializations; General Management, Agribusiness and Graphic Communication Document Systems Management: Change required courses <i>from</i> "GSB 524" <i>to</i> "GSB 524 or GSB 573".	8/29/12
<u>Graduate Programs</u>	Additional information provided, "Graduate Student Continuous Enrollment Policy" (page 68) under "Academic Requirements and Responsibilities"	Fall 2009
<u>Graduate Programs</u>	Correction to "Eligibility for Blended Programs" (page 69), item #1: "Students must successfully complete a minimum of 180 units / maximum 192 units (for engineering programs the maximum number of units is 205)....."	Summer 2009
<u>Graphic Communication, BS</u>	For Graphics for Packaging Concentration, the advisor approved elective list (4 units) is included.	Summer 2009
<u>Graphic Communication, BS</u>	For GE Area F, add "Not GRC".	Summer 2009
<u>GS 597</u>	New course, "Continued Graduate Study (1-15) CR/NC".	Fall 2009
<u>GSA 539</u>	Correction: Title changed to "Clinical Tax Education Internship", and grading method <i>to</i> credit/no credit ( <i>Effective Winter 2008</i> ).	
<u>GSA 541</u>	Change description.	Fall 2010
<u>GSA 542, 544, 545</u>	Change prerequisite.	Winter 2011
<u>GSA 551</u>	New course, "International Taxation (4)".	Spring 2010
<u>GSB 522</u>	Change description.	Winter 2011
<u>GSB 556</u>	Change title to: "Entrepreneurship and New Venture Management".	Winter 2010

<u>GSB 573</u>	New course, "Marketing Research (4)".	Spring 2011
<u>HCS 231</u>	Correction: "Prerequisite: HCS 120 or VGSC 230, or consent of instructor."	Summer 2009
<u>HCS 327</u>	Change prerequisite.	Fall 2009
<u>HIST 100</u>	New course, "Introduction to the Study of History (2)".	Fall 2009
<u>HIST 216</u>	Change: Add crosslisting as HNRS 216.	Spring 2010
<u>HIST 425</u>	Change mode from 1 seminar to supervision; modify description	Winter 2010
<u>HIST 512</u>	Change mode from (2) 2 seminars <i>to</i> (2) independent study.	Spring 2011
<u>History. BA</u>	Add Request for Approved Electives: Add HIST 409 to Non-U.S., Non-European HIST electives.	6/4/14
<u>History. BA</u>	Curriculum Substitution: In Major Coursework under Foreign Language Requirement change <i>from</i> "FR 121" <i>to</i> "FR 121 or 201", <i>from</i> "GER 121" <i>to</i> "GER 121 or 201" <i>from</i> "SPAN 121" <i>to</i> "SPAN 121 or 201" <i>from</i> "MLL 121" <i>to</i> "MLL 121 or 201" and added "CHIN 121 or CHIN 201" to list of options.	8/30/13
<u>History. BA</u>	Add Request for Approved Electives: In Foreign Language Requirement add ITAL 201 and JPNS 201 to list of options.	5/17/13
<u>History. BA</u>	Courses HIST 422, 423, 459 added to list of approved electives.	5/10/12
<u>History. BA</u>	Curriculum substitution in Major Courses: Change "History electives (any 300-400 level HIST courses)" to include "excluding HIST 400, 467, 468, 485, 495".	Spring 2011
<u>HNRS 143</u>	Correction: Add prerequisite to match that of MATH 143 (crosslisted courses).	1/26/11
<u>HNRS 216</u>	"New" course, crosslisted with existing HIST 216.	Spring 2010
<u>HNRS 230</u>	Change title and course description. (A GE C2 course)	Spring 2010



<u>HNRS 332</u>	"New" course, crosslisted with existing ENGL 332.	Fall 2010
<u>Industrial Engineering. BS</u>	Curriculum substitution: In Major Coursework, add footnote to IME 421, "An additional 3 units of technical electives may substitute".	1/13/14
<u>Industrial Engineering. BS</u>	Curriculum substitution: For technical electives, changed "all but 4 units must be upper level (300-level or above) engineering courses" <i>to</i> "at least 6 units must be upper level (300-level or above) engineering courses."	10/18/11
<u>Industrial Technology. BS</u>	Curriculum substitution: In Major Coursework, change requirement <i>from</i> "IT 137" <i>to</i> "IT 137 or IT 371 or IT 303". Change <i>from</i> "IT 329 or IT 390" <i>to</i> "IT 329 or IT 390 or IT 303".	2/4/14
<u>Industrial Technology. BS</u>	Curriculum substitution: In Major Coursework, change requirement <i>from</i> "IT 403" <i>to</i> "IT 403 or IT 303". Added footnote.	1/23/14
<u>Industrial Technology. BS</u>	Curriculum substitution: In Major Coursework, change requirement <i>from</i> "IT 329" <i>to</i> "IT 329 or IT 390 (formerly IT 445)".	4/19/13
<u>IT 407</u>	Change title and course description.	Winter 2011
<u>IME 421</u>	Change prerequisite.	Spring 2011
<u>IME 577</u>	Change mode <i>from</i> (4) 3 lectures, 1 laboratory <i>to</i> (4) 4 lectures.	Winter 2011
<u>JOUR 413</u>	Change description.	Fall 2009
<u>Journalism. BS</u>	Curriculum substitution: In Major Coursework, change <i>from</i> "JOUR 460" <i>to</i> "JOUR 460 or JOUR 462".	8/29/13
<u>Journalism. BS</u>	Add Request for Approved Electives:  In Support Courses deleted "No journalism or mass communication courses" and added footnote, "No more than 12 units in journalism and/or mass communication".	8/29/13

	In Free Electives added footnote, "If GE courses are used to satisfy Support requirements, additional units may be required to complete the 180 total unit requirement."	
<u>Journalism, BS</u>	For the JOUR electives listed under Major Courses, change the statement, "4 units must be 300-400 level" <i>to</i> "Maximum 4 units of lower division."	Summer 2009
<u>Journalism, BS</u>	Curriculum substitution: In JOUR electives, remove maximum 4 units of lower division and JOUR 201, 205, 331, 470. Add Select 8 units from <i>any</i> JOUR course not used elsewhere in the major.	1/24/12
<u>KINE 260</u>	Change: GE D4 credit approved.	Summer 2009
<u>Kinesiology, BS</u>	Curriculum Substitution: For Approved Electives: Individualized Course of Study, add KINE 231, KINE 260, KINE 265, KINE 298, KINE 308, KINE 311, KINE 320, KINE 434, KINE 435, KINE 449, KINE 450, KINE 453, or KINE 454".	7/25/12
<u>Kinesiology, BS</u>	Curriculum Substitution: For Health Education Specialist Track, added footnote to COMS 418, "Students may substitute KINE 260, KINE 298, KINE 308, KINE 406, KINE 446, KINE 449, KINE 453, or KINE 454".	7/25/12
<u>Kinesiology, BS</u>	Curriculum Substitution: Because KINE 218 is required in both concentrations for the BS Kinesiology, it has been moved from the concentrations (Exercise Science and Health Promotion Concentration, Individualized Course of Study) to Major Courses.	7/17/12
<u>Kinesiology, BS</u>	Curriculum substitution: In Major Courses, change requirement <i>from</i> "KINE 218" <i>to</i> "KINE 218 or KINE 230". Updated total units in Major coursework <i>from</i> "112-127" <i>to</i> "111-127". Updated free electives <i>from</i> "1-16" <i>to</i> "1-17"	6/28/12

<a href="#"><u>Kinesiology, BS</u></a>	Add Request for Approved Electives: Individualized Course of Study, add KINE 401.	2/15/12
<a href="#"><u>Kinesiology, BS</u></a>	Add Request for Approved Electives: Individualized Course of Study, add PHYS 104.	2/15/12
<a href="#"><u>Kinesiology, BS</u></a>	Add Request for Approved Electives: Individualized Course of Study, add PHYS 121.	2/15/12
<a href="#"><u>Kinesiology, BS</u></a>	Curriculum substitution: In Major Courses, change "KINE 461 or KINE 462" <b>to</b> "KINE 460 or KINE 461 or KINE 462".	5/10/11
<a href="#"><u>Kinesiology, BS</u></a>	Curriculum substitution: For Approved Electives in Individualized Course of Study, add KINE 319.	12/14/10
<a href="#"><u>Kinesiology, BS</u></a>	Curriculum substitution: Replace MATE 119, listed under Major Courses, with "MATH 119 or MATH 141".	8/18/10
<a href="#"><u>Kinesiology, BS</u></a>	Teaching Concentration inactivated. To be revised for 2011.	Summer 2009
<a href="#"><u>Kinesiology, BS</u></a>	Curriculum substitution: For Exercise Science and Health Promotion Concentration, Clinical Exercise Science Track, change KINE 446 <b>to</b> "446 <b>or</b> 406"	Summer 2009
<a href="#"><u>Kinesiology, BS</u></a>	Curriculum substitution: In Major courses, change KINE 250 or KINE 255 <b>to</b> KINE 250, 255, or 260.	2/15/12
<a href="#"><u>Kinesiology, MS</u></a>	Curriculum substitution: The following requirement has been removed: "At least 18 units must be completed after advancement to candidacy."	6/14/10
<a href="#"><u>LA 330</u></a>	Change mode from 3 lectures, 1 activity <b>to</b> 4 lectures. Change prerequisite.	Fall 2010
<a href="#"><u>LA 400</u></a>	Change units from (1-3) <b>to</b> (1-4). Increase total credit limit to 8 units, with a maximum of 4 units per quarter.	Fall 2010
<a href="#"><u>LAES 411</u></a>	Change prerequisite.	Spring 2011
<a href="#"><u>Landscape Architecture, BLA</u></a>	Curriculum substitution: In Major courses, change	5/24/13

	requirement <i>from</i> "LA 130" <i>to</i> "LA 130 or LA 171".	
<u>Landscape Architecture, BLA</u>	Curriculum substitution: In Major courses, add EDES 333 to Upper division LA electives list.	4/29/10
<u>Latin American Studies Minor</u>	Curriculum substitution: In Required Courses change <i>from</i> "SPAN 121" <i>to</i> "SPAN 121 or SPAN 201".	8/30/13
<u>Law and Society Minor</u>	Add Request for Approved Electives: Add ES 380; JOUR 302; LS 214; NR 404; PHIL 334; POLS 295, 340, 386 (4 units max), 426; PSY 375; SOC 402, 406, 412.	7/2/13
<u>Liberal Arts and Engineering Studies, BA</u>	Curriculum substitution: In Major Courses, change requirement <i>from</i> "LAES 411" <i>to</i> "LAES 411 or LAES 302".	3/12/14
<u>Liberal Studies, BS</u>	Curriculum substitution: In Support courses, change requirement <i>from</i> "EDUC 430" <i>to</i> "EDUC 430 or EDUC 428".	3/21/13
<u>Liberal Studies, BS</u>	Curriculum substitution: In Support courses, change requirement <i>from</i> "EDUC 310" <i>to</i> "EDUC 310 or EDUC 427".	3/21/13
<u>Liberal Studies, BS</u>	Curriculum substitution: In Major courses, change "BIO 113 or any GE B2/B4 life science course" <i>to</i> "BIO 113 (4) or BIO 160 (4) or any GE B2/B4 life science course".	3/16/12
<u>Liberal Studies, BS</u>	Curriculum substitution: In Major courses, change "or transfer of any GE B2 life science course" for BIO 114 <i>to</i> "or any GE B2 life science course."	8/30/11
<u>Liberal Studies, BS</u>	Curriculum substitution: In Major Courses, change LS 461 to "LS 461 <i>or</i> BIO 400 and BIO 462".	4/8/10
<u>LS 230</u>	Change title and units of fieldwork required.	Winter 2011
<u>LS 250</u>	Change title and units of fieldwork required.	Winter 2011
<u>LS 270</u>	Change description.	Winter 2011
<u>LS 310</u>	Change title and description.	Winter 2011
<u>LS 311</u>	Change description and	Winter

	prerequisite.	2011
<u>LS 312</u>	Change description.	Winter 2011
<u>Manufacturing Engineering. BS</u>	Curriculum substitution: In Major Coursework, change requirement <i>from</i> "IME 352" <i>to</i> "IME 352 or IME 450".	1/23/14
<u>Manufacturing Engineering. BS</u>	Curriculum substitution: In Major Coursework, change requirement <i>from</i> "IME 341" <i>to</i> "IME 341 or IME 330".	1/23/14
<u>Manufacturing Engineering. BS</u>	Curriculum substitution: In Major Coursework, change requirement <i>from</i> "IME 326" <i>to</i> "IME 326 or IME 327".	1/23/14
<u>Manufacturing Engineering. BS</u>	Curriculum substitution: In Major Coursework, add footnote to IME 241, "An additional 4 units of technical electives may substitute".	1/23/14
<u>Manufacturing Engineering. BS</u>	Curriculum substitution: In Major Coursework, add footnote to IME 157, "IME 156 (2 units) and an additional 2 units of technical electives may substitute".	1/23/14
<u>Materials Engineering. BS</u>	Curriculum substitution: Added footnote to MATE 481, "1 additional unit of an upper-division technical elective or an approved technical breadth elective may substitute".	7/15/13
<u>Materials Engineering. BS</u>	Add Request for Approved Electives/Technical Electives: add NR 434.	10/5/12
<u>Materials Engineering. BS</u>	Curriculum substitution: Added footnote to CHEM 305 (4), "MATE 470 with the topic 'Thermodynamics of Materials' for 4 units may substitute".	8/30/12
<u>Materials Engineering. BS</u>	Curriculum substitution: In Approved Electives, add CHEM 216, 217 and 218 to list of options.	7/5/12
<u>MATE 120</u>	Change prerequisite.	Spring 2011
<u>MATE 130</u>	Change prerequisite.	Spring 2011
<u>MATE 360</u>	Change prerequisite.	Spring 2011
<u>MATE 430</u>	Change prerequisite.	Spring 2011

<a href="#"><u>MATH /HNRS 141</u></a>	Change prerequisite.	Spring 2011
<a href="#"><u>MATH 335</u></a>	Change prerequisite.	Fall 2010
<a href="#"><u>MATH 336</u></a>	Change prerequisite.	Winter 2011
<a href="#"><u>Mathematics, BS</u></a>	Correction to Applied Mathematics Concentration: Total units for two tracks is 16, not 12.	Summer 2009
<a href="#"><u>ME 211</u></a>	Change prerequisite.	Winter 2011
<a href="#"><u>ME 326</u></a>	Change from (4) 4 lectures <i>to</i> (4) 3 lectures, 1 activity. Change to prerequisite.	Winter 2011
<a href="#"><u>ME/ CE/ BMED 404</u></a>	Change: crosslist ME/CE 404 also as BMED 404; change prerequisite.	Fall 2010
<a href="#"><u>ME 412</u></a>	Correction to prerequisite.	Summer 2009
<a href="#"><u>Mechanical Engineering, BS</u></a>	Curriculum substitution: In Major Courses, add footnote to ME 251, "ME 271 (Intermediate Solid Modeling) may substitute".	7/23/13
<a href="#"><u>Mechanical Engineering, BS</u></a>	Curriculum substitution: In Support Courses, change "CSC 231 or CSC 234" to "CSC 231 <i>or</i> CSC 234 <i>or</i> CPE/CSC 101".	Summer 2009
<a href="#"><u>Microbiology, BS</u></a>	Curriculum substitution: Updated footnote to CHEM 371.	11/5/13
<a href="#"><u>Microbiology, BS</u></a>	Curriculum substitution: In Approved Electives, add SCM 302 to list of options.	3/13/13
<a href="#"><u>Military Science Minor</u></a>	Courses MSL 310, 312, 410 and 412 added to list of approved electives.	4/10/12
<a href="#"><u>Military Science Minor</u></a>	Curriculum substitution: Change "MSL 240" to "MSL 240 <i>or</i> HIST 320 <i>or</i> HIST 321 <i>or</i> HIST 322"	4/1/10
<a href="#"><u>Military Science Minor</u></a>	Curriculum substitution: Add MSL/RPTA 275 to list of approved electives.	3/8/12
<a href="#"><u>Modern Languages and Literatures, BA</u></a>	Curriculum substitution: In Major Courses, change <i>from</i> "SPAN 124" <i>to</i> "SPAN 124 or SPAN 203".	9/11/13
<a href="#"><u>Modern Languages and Literatures, BA</u></a>	Course SPAN 307 (C4) added to list of Primary	5/22/12

	language/culture electives.	
<u>Modern Languages and Literatures, BA</u>	For GE C4, change <i>from</i> "not in Spanish" <i>to</i> "Not SPAN, FR, GER".	Summer 2009
<u>MU 328</u>	Change: USCP credit.	Winter 2011
<u>Music, BA</u>	Add Request for Approved Electives: Additions to lists of Major Ensemble courses.	4/19/13
<u>Nutrition, BS</u>	Curriculum Substitution: In Major Courses, add CHEM 216 to list of options and footnotes. In Nutrition Science Concentration, add CHEM 217 and CHEM 218 to list of advisor approved electives.	9/5/12
<u>Packaging Minor</u>	Curriculum substitution: Change "PHYS 104 Introductory Physics (B3) or PHYS 121 College Physics I (B3&B4)" <i>to</i> "PHYS 104 Introductory Physics (B3) or PHYS 121 College Physics I (B3&B4) <i>or</i> PSC 101 The Physical Environment: Matter and Energy (B3&B4)"	2/27/12
<u>PHIL 230</u>	Change title and course description. (A GE C2 course)	Spring 2010
<u>PHIL 460, 461</u>	Change: PHIL 460 is graded CR/NC, and PHIL 461 is given a letter grade.	Spring 2010
<u>Philosophy, BA</u>	Curriculum substitution: In Major Coursework, change requirement <i>from</i> "PHIL 225 Symbolic Logic" <i>to</i> "PHIL 225 Symbolic Logic or PHIL 241 Symbolic Logic I".	11/15/11
<u>Photography Minor</u>	Curriculum substitution: Expand list of core courses from which to select 12 units.	1/19/10
<u>Physics, BA</u>	Curriculum substitution: Add HIST 350 (D5) as option in Major Courses.	5/24/12
<u>PHYS 118</u>	Change prerequisite.	Winter 2010
<u>PHYS 122</u>	Change prerequisite.	Spring 2011
<u>PHYS 123</u>	Change prerequisite.	Spring 2011
<u>PHYS 301</u>	Change from (3) 3 lectures to (4) 4 lectures.	Spring 2010
<u>PHYS 301</u>	Correction: (3) 3 lectures,	Summer

	through Winter 2010.	2009
<u>PHYS 408, 409</u>	Descriptions separated for clarification.	Winter 2011
<u>PHYS 422</u>	Change prerequisite, due to crosslisting as EE course (see EE Courses, above). The prerequisite statement "...with a C- grade or better..." is removed.	Spring 2010
<u>Physics, BA</u>	Curriculum substitution: For Physics electives (300-400 level) in Major Courses, add PHYS 340, PHYS 422, and ASTR 444 to list.	12/15/10
<u>Physics, BS</u>	Curriculum substitution: For Advanced Physics Electives, add PHYS 422 and ASTR 444 to entry "Select two from: PHYS 323, 342, 357, 417, 423, 452"	12/15/10
<u>Physics, BS</u>	Curriculum substitution: Add CSC 235 to list of approved Advanced Physics Electives	11/22/11
<u>Political Science, BA</u>	Add Request for Approved Electives: in Pre-Law concentration add POLS 340.	3/21/13
<u>Political Science, BA</u>	Curriculum substitution: In Major Courses, change POLS 360 <del>to</del> POLS 359.	Summer 2009
<u>POLS 310</u>	Change to description.	Winter 2010
<u>POLS 336</u>	Course change to POLS 348, with prerequisite change and GE D5 credit.	Spring 2010
<u>POLS 337</u>	Course change to POLS 349, with prerequisite change and GE D5 credit.	Spring 2010
<u>POLS 360</u>	Change course number and title to: POLS 359 Research Design; also course description change.	Summer 2009
<u>POLS 518</u>	Change to description.	Fall 2010
<u>PSC 103</u>	Change from 3 lectures, 1 activity <del>to</del> 3 lectures, 1 laboratory.	Spring 2010
<u>PSY 329</u>	Change prerequisite.	Winter 2011
<u>PSY 333</u>	Change prerequisite.	Winter 2011
<u>Psychology, BS</u>	Curriculum substitution: In Counseling and Family	8/5/13



	Psychology Concentration, change requirement options <b>from</b> "PSY 314" <b>to</b> "PSY 314 or PSY 324".	
<u>Psychology Minor</u>	Add Request for Approved Electives: Add PSY 324 to approved electives list.	1/27/15
<u>Psychology Minor</u>	Add Request for Approved Electives: Add PSY 305, PSY 340, PSY 405 to approved electives list and add footnote, " If a course is taken to meet a requirement, it cannot be double-counted as an approved elective for the minor".	9/10/14
<u>Rangeland Resources Minor</u>	Change in Range Resource Area: ASCI 329 increasing units from (3) to (4)	Winter 2011
<u>Recreation, Parks and Tourism Administration, BS</u>	Curriculum substitution: In Major courses change requirements <b>from</b> "RPTA 205" <b>to</b> "RPTA 205 or RPTA 257", <b>from</b> "RPTA 252" <b>to</b> "RPTA 252 or RPTA 221" and <b>from</b> "RPTA 413 or EHS 337 or LA363" <b>to</b> "RPTA 413 or EHS 337 or LA363 or RPTA 302, or 313 or 314 or 321 or 325 or 370 or 412". Added footnotes.	10/22/13
<u>Recreation, Parks and Tourism Administration, BS</u>	Add Request for Approved Electives for Event Planning and Management Concentration: add FSN 275.	4/29/13
<u>Recreation, Parks and Tourism Administration, BS</u>	For Tourism Planning and Management Concentration, additional course added to list of approved electives.	5/9/11
<u>Recreation, Parks and Tourism Administration, BS</u>	Curriculum substitution: In Event Planning and Management Concentration, add additional RPTA courses to entry for RPTA 414 as options.	3/9/10
<u>Repeating a Course</u>	Changed per Executive Order 1037, issued by CSU Chancellor's Office, and per Academic Senate Resolution AS-645-06/IC.	Fall 2009
<u>RPTA 321</u>	Change prerequisite.	Winter 2011
<u>RPTA 412</u>	Change repeatability to "...repeatable in same term."	Fall 2009
<u>SCM 150</u>	Change total credit limit to 8	Winter

	units.	2010
<u>SCM 302/ENGR 322</u>	Description change and crosslisted as ENGR 322.	Spring 2011
<u>SCM 302</u>	New course, "The Learn By Doing Lab Teaching Practicum (2) (CR/NC)".	Winter 2010
<u>SCM 491</u>	Change title and mode <i>to</i> "Science Student Teaching Workshop" (1) 1 activity.	Spring 2010
<u>SOC 355, 356</u>	Correction: Reinstate former (2007) SOC 355 (with slight title modification); move existing SOC 355 to SOC 356.	Spring 2010
<u>Social Sciences, BS</u>	Curriculum substitution: In Organizations Concentration required course options added, "maximum 8 units" to SOCS 440. In approved electives added SOCS 440.	9/2/13
<u>Sociology, BA</u>	Curriculum substitution: In Organizations Concentration required course options added, "maximum 8 units" to SOC 440. In approved electives added SOC 440.	9/2/13
<u>Sociology, BA</u>	New degree program.	Fall 2009
<u>Software Engineering, BS</u>	Add Request for Technical Electives: In Category 2, add CSC 570.	5/14/13
<u>Software Engineering, BS</u>	Curriculum substitution: In External Electives add, CHEM 216, 217 and 218 to list of options.	7/5/12
<u>Software Engineering, BS</u>	Curriculum substitution: Changed support courses <i>from</i> "BIO 213 and ENGR/BRAE 213" <i>to</i> "BIO 213 and ENGR/BRAE 213 or BIO 111 or BIO 115 or BIO 161 BOT 121 or MCRO 221 or MCRO 224 (B2)*".	4/3/12
<u>Software Engineering, BS</u>	Curriculum substitution: Added to footnotes, "Alternately, an additional 4 units of CSC/CPE technical electives in Category 1 or 2 may be substituted.	2/27/12
<u>Soil Science, BS</u>	Add Request for Approved Electives: Add NR/ES 406 to list of options in: Environmental Management Concentration Land Resources Concentration.	6/30/13
<u>Soil Science, BS</u>	Curriculum substitution: In	7/2/13

	Major Coursework, change requirement <i>from</i> "SS 110" <i>to</i> "SS 110 or NR 140".	
<u>Soil Science, BS</u>	<p>Environmental Science and Technology Concentration Curriculum Substitution: Add CHEM 216 and 217 options for CHEM 316 and 317 requirements.</p> <p>Land Resources Concentration Curriculum Substitution: For Approved Electives, add CHEM 216, 217, 218 to list of options.</p>	7/27/12
<u>Soil Science, BS</u>	Correction for Environmental Management Concentration: Removed ERSC 323 (required in Major Courses) and increased approved electives from 8 units to 12 units. Removed GEOG 440 from approved electives (required in Concentration).	Summer 2009
<u>Soil Science, BS</u>	Curriculum substitution: In Major Courses, replace SS 345 with ERSC 323.	Summer 2009
<u>Soil Science Minor</u>	Curriculum substitution: Delete SS 345 from list of restricted electives.	Summer 2009
<u>Spanish Minor</u>	Curriculum substitution: In Required Courses, change <i>from</i> "SPAN 124" <i>to</i> "SPAN 124 or SPAN 203".	9/11/13
<u>Spanish Minor</u>	Course SPAN 307 (C4) added to list of approved electives.	5/22/12
<u>SS 131</u>	New Course, "Soils in Environmental and Agricultural Systems (4)".	Fall 2010
<u>SS 421</u>	Prerequisite corrected to "CHEM 128, BOT 313 (not BOT 223), SS 321."	7/19/10
<u>SS 461</u>	Correction to prerequisite.	8/9/10
<u>STAT 221</u>	Change prerequisite.	Winter 2010
<u>STAT 302</u>	Change description.	Fall 2010
<u>STAT 325</u>	Change: "Not open to students with credit in STAT 321 or STAT 425."	Winter 2010
<u>STAT 416</u>	Change prerequisite.	Winter 2010

<a href="#"><u>STAT 418</u></a>	Change prerequisite.	Winter 2010
<a href="#"><u>STAT 465</u></a>	Change prerequisite.	Winter 2010
<a href="#"><u>STAT 513</u></a>	Change prerequisite.	Fall 2010
<a href="#"><u>STAT 570</u></a>	New course, "Selected Advanced Topics (1-4)".	Spring 2010
<a href="#"><u>Statistics, BS</u></a>	Curriculum substitution: Add STAT 331 to Statistics electives	7/28/11
<a href="#"><u>Statistics, BS</u></a>	Curriculum substitutions in Major Courses: Change "STAT 301" to "STAT 301 or STAT 321". Change "STAT 302" to "STAT 302 or STAT 322".	10/22/09
<a href="#"><u>Statistics, BS</u></a>	Correct Note in heading of curriculum display to state "Note: No course with a STAT prefix may be taken as credit/no credit."	Summer 2009
Stem Cell Research Specializations	New specialization in <a href="#"><u>MS Biological Sciences</u></a> , <a href="#"><u>MS Biomedical Engineering</u></a> , and a track in <a href="#"><u>Animal Science Specialization, MS Agriculture</u></a>	Winter 2011
<a href="#"><u>Studio Art Minor</u></a>	Correction: For ART advisor approved electives, ART 121 does not provide GE C3 credit. Correction: For ART advisor approved electives, ART 455 is no longer available.	Summer 2009
<a href="#"><u>Sustainable Environments Minor</u></a>	Curriculum Substitution: Add CRP 214, CRP 336, CRP 342, and CRP 436 to list of courses that do not count for City and Regional Planning majors.	2/29/12
<a href="#"><u>TH 295</u></a>	New course, "Foundations in Theatrical Design (4)".	Spring 2010
<a href="#"><u>UNIV 125</u></a>	"New" course, crosslisted with existing EDUC 125.	Fall 2009
<a href="#"><u>Values, Technology &amp; Society Minor</u></a>	Course HIST 350 (D5) added to list of Technology approved electives.	6/11/12
<a href="#"><u>Wine &amp; Viticulture, BS</u></a>	Add Request for Approved Electives in Enology, Viticulture and Wine Business concentrations: Add WVIT 433 to list of Approved Electives.	11/4/14
<a href="#"><u>Wine &amp; Viticulture, BS</u></a>	Curriculum Substitution: In the Enology concentration: added	8/5/14

	footnote to WVIT 103.	
<u>Wine &amp; Viticulture.</u> <u>BS</u>	Add Request for Approved Electives in Enology and Wine Business concentrations: Add FR 201, 202; GER 201, 202; ITAL 201; SPAN 201 and SPAN 202 to list of Approved Electives.	1/29/14
<u>Wine &amp; Viticulture.</u> <u>BS</u>	Curriculum Substitution: In Wine Business and Viticulture concentrations: add WVIT 339 to list of Approved Electives.	12/17/13
<u>Wine &amp; Viticulture.</u> <u>BS</u>	Add Request for Approved Electives in Enology, Viticulture and Wine Business concentrations: Add WVIT 423.	10/17/13
<u>Wine &amp; Viticulture.</u> <u>BS</u>	<p>Curriculum Substitution: In Major Coursework, change requirement <i>from</i> "FRSC 231" <i>to</i> "FRSC/WVIT 231" and <i>from</i> "FRSC 331" <i>to</i> "FRSC/WVIT 331".</p> <p>Viticulture concentration added footnote to FRSC 202 and FRSC 402, "WVIT 424 or WVIT 425 or WVIT 426 or WVIT 427 may substitute".</p> <p>Wine Business concentration change requirement <i>from</i> "AGB 444" <i>to</i> "AGB 444 or WVIT 444" and <i>from</i> "AGB 450" <i>to</i> "AGB 450 or WVIT 450".</p>	8/15/13
<u>Wine &amp; Viticulture.</u> <u>BS</u>	Curriculum Substitution: Enology and Wine Business concentrations, add WVIT 461 and WVIT 462 to required course list. Wine Business concentration, add footnote to AGB 460 & AGB 461, "WVIT 460 may be used as a substitute for AGB 460 and AGB 461".	6/12/13
<u>Wine &amp; Viticulture.</u> <u>BS</u>	Add Request for Approved Electives: add FSN 370 to the Enology and Wine Business concentrations.	6/7/13
<u>Wine &amp; Viticulture.</u> <u>BS</u>	Curriculum substitution: In Required Courses, change "BUS 212" <i>to</i> "BUS 212 or AGB 214".	2/22/13
<u>Wine &amp; Viticulture.</u> <u>BS</u>	Curriculum substitution: In Required Courses, change "AGB 443" <i>to</i> "AGB 443 or WVIT 433".	2/12/13

<a href="#"><u>Wine &amp; Viticulture. BS</u></a>	Curriculum substitution: In Approved Electives, add CHEM 216 and 217 to list of options.	7/13/12
<a href="#"><u>Wine &amp; Viticulture. BS</u></a>	Correction: For Viticulture Concentration, BIO 303 is a 4-unit course. For Concentration courses entry for Major Courses, change units from "43" <i>to</i> "43-59". Change Advisor-approved electives to "6-22".	Summer 2009
<a href="#"><u>Withdrawals from Courses</u></a>	New CSU policy: Undergraduate students may withdraw from no more than 28 quarter units.	Summer 2009
<a href="#"><u>Women's &amp; Gender Studies Minor</u></a>	Add Request for Approved Electives: add TH 300.	10/11/12
<a href="#"><u>ZOO 331</u></a>	Add to description, "Not open to students with credit in BIO 432."	Summer 2009
<a href="#"><u>ZOO 332</u></a>	Add to description, "Not open to students with credit in BIO 433."	Summer 2009

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# Academic Programs

**BA** Bachelor of Arts  
**BFA** Bachelor of Fine Arts  
**BS** Bachelor of Science  
**BArch** Bachelor of Architecture  
**BLA** Bachelor of Landscape Architecture  
**EdD** Doctor of Education  
**MA** Master of Arts  
**MS** Master of Science  
**MBA** Master of Business Admin  
**MCRP** Master of City & Regional Planning  
**MPP** Master of Public Policy  
**Concentration** within bachelor's program  
**Specialization** within master's program  
**minor**

Program name	Program type
Accounting	<a href="#">MS</a> , <i>concentration</i>
Aeronautics	<i>concentration</i>
Aerospace Engineering	<a href="#">BS</a> , <a href="#">MS</a>
Agribusiness	<a href="#">MS</a> , <i>specialization</i> , <i>minor</i>
Agribusiness Finance & Appraisal	<i>concentration</i>
Agribusiness Management	<i>concentration</i>
Agribusiness Marketing	<i>concentration</i>
Agribusiness Policy	<i>concentration</i>
Agricultural Business	<a href="#">BS</a>
Agricultural Communication	<i>minor</i>
Agricultural Education	<a href="#">MAgEd</a>
Agricultural Engineering Technology	<i>specialization</i> , <i>concentration</i>
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Agricultural Supplies & Services	<i>concentration</i>
Agricultural Systems Management	<a href="#">BS</a>
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American Politics	<i>concentration</i>
Anatomy-Physiology	<i>concentration</i>
Animal Science	<a href="#">BS</a> , <i>concentration</i> , <i>specialization</i>
Anthropology and Geography	<a href="#">BS</a> , <i>minor</i>
Applied Food Technology	<i>concentration</i>
Applied Mathematics	<i>concentration</i>
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Astronautics	<i>concentration</i>
Astronomy	<a href="#">minor</a>
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Biochemistry	<a href="#">BS</a>
Bioengineering	<i>concentration</i> , <i>specialization</i>
Biological Sciences	<a href="#">BS</a> , <a href="#">MS</a> , <a href="#">MA</a>
Biology	<i>concentration</i> , <a href="#">minor</a>
Biology Teaching	<i>concentration</i>
Biomedical Engineering	<a href="#">BS</a> , <a href="#">MS</a> , <i>concentration</i> , <i>specialization</i>
BioResource & Agricultural Engineering	<a href="#">BS</a>
Biotechnology	<a href="#">minor</a>
Business	<a href="#">minor</a>
Business Administration	<a href="#">BS</a> , <a href="#">MBA</a>
Business & Technology	<a href="#">MS</a>
Chemistry	<a href="#">BS</a>
Child Development	<a href="#">BS</a> , <i>minor</i>
City & Regional Planning	<a href="#">BS</a> , <a href="#">MCRP</a> , <i>minor</i>
Civil Engineering	<a href="#">BS</a>
Civil & Environmental Engineering	<a href="#">MS</a>
Climate Change Studies	<i>concentration</i>
Communication Studies	<a href="#">BA</a> , <i>minor</i>
Comparative Ethnic Studies	<a href="#">BA</a>
Computer Engineering	<a href="#">BS</a>
Computer Graphics	<i>concentration</i>
Computer Science	<a href="#">BS</a> , <a href="#">MS</a> , <i>minor</i>
Construction Management	<a href="#">BS</a> , <i>minor</i>
Counseling & Family Psychology	<i>concentration</i>
Counseling & Guidance	<i>specialization</i>
Criminal Justice	<i>concentration</i>
Crop & Soil Science	<i>concentration</i>
Crop Science	<a href="#">BS</a> , <i>specialization</i> , <i>minor</i>
Cross-Cultural Studies & International Devel	<i>concentration</i>
Culinary	<i>concentration</i>
Culture, Society and Technology	<i>concentration</i>
Dairy Products Technology	<i>specialization</i>
Dairy Science	<a href="#">BS</a> , <i>minor</i>
Dance	<i>minor</i>
Design Reproduction Technology	<i>concentration</i>
Developmental Psychology	<i>concentration</i>
Disaster Management & Homeland Security	<i>minor</i>
Document Systems Management	<i>specialization</i>
Earth Sciences	<a href="#">BS</a>
Ecology	<i>concentration</i>
Economics	<a href="#">BS</a> , <a href="#">MS</a> , <i>minor</i>
Education	<a href="#">MA</a>
Educational Leadership	<a href="#">EdD</a>

Educational Leadership & Administration	<i>specialization</i>
Electrical Engineering	<a href="#"><i>BS, MS</i></a>
Electrical Engineering (Power)	<i>concentration</i>
Electronics	<i>concentration</i>
Electro-Optics	<i>concentration</i>
Engineering	<a href="#"><i>MS</i></a>
Engineering Management	<a href="#"><i>MBA/MS</i></a>
English	<a href="#"><i>BA, MA, minor</i></a>
Enology	<i>concentration</i>
Entrepreneurship	<i>concentration</i>
Environmental Design	<i>specialization</i>
Environmental Engineering	<a href="#"><i>BS</i></a>
Environmental Horticultural Science	<a href="#"><i>BS, specialization</i></a>
Environmental Impact Mitigation Strategies	<i>concentration</i>
Environmental Interpretation and Assessment	<i>concentration</i>
Environmental Management	<i>concentration</i>
Environmental Management & Protection	<a href="#"><i>BS</i></a>
Environmental Planning and Assessment	<i>concentration</i>
Environmental Policy and Planning	<i>concentration</i>
Environmental Science and Technology	<i>concentration</i>
Environmental Studies	<a href="#"><i>minor</i></a>
Environmental Studies & Sustainability	<i>concentration</i>
Equine Science	<a href="#"><i>minor</i></a>
Ethnic Studies	<a href="#"><i>minor</i></a>
Event Planning & Management	<i>concentration</i>
Exercise Science & Health Promotion	<i>concentration</i>
Field & Wildlife Biology	<i>concentration</i>
Financial Management	<i>concentration</i>
Fire Protection Engineering	<a href="#"><i>MS</i></a>
Food Science	<a href="#"><i>BS, concentration, minor</i></a>
Food Science and Nutrition	<i>specialization</i>
Forest & Environmental Practices	<i>concentration</i>
Forestry & Natural Resources	<a href="#"><i>BS, concentration</i></a>
Forestry Sciences	<a href="#"><i>MS</i></a>
French	<a href="#"><i>minor</i></a>
Fruit Science	<a href="#"><i>BS, minor</i></a>
General Engineering	<a href="#"><i>BS</i></a>
Geographic Information Systems (GIS)	<a href="#"><i>minor</i></a>
Geology	<a href="#"><i>minor</i></a>
Geosciences Teaching	<i>concentration</i>
German	<a href="#"><i>minor</i></a>
Gerontology	<a href="#"><i>minor</i></a>
Global Politics	<i>concentration, minor</i>
Graphic Communication	<a href="#"><i>BS, minor</i></a>
Graphic Communication Document Sys Mgt	<i>specialization</i>
Graphic Communication Management	<i>concentration</i>
Graphic Design	<i>concentration</i>
Graphics for Packaging	<i>concentration</i>
Heating, Ventilating, Air-Conditioning and Refrigerating	<i>concentration</i>
History	<a href="#"><i>BA, MA, minor</i></a>
Human Ecology	<i>concentration</i>

Industrial Engineering	<a href="#"><i>BS, MS</i></a>
Industrial Technology	<a href="#"><i>BS, minor</i></a>
Information Systems	<i>concentration</i>
Interactive Communication-Cinema	<i>concentration</i>
Interactive Communication-Theater	<i>concentration</i>
Integrated Project Delivery	<a href="#"><i>minor</i></a>
Integrated Technology Management	<i>specialization</i>
Interdisciplinary Studies	<a href="#"><i>BA</i></a>
International Agribusiness Management	<i>concentration</i>
International Business	<i>concentration</i>
Irrigation	<i>specialization</i>
Journalism	<a href="#"><i>BS</i></a>
Kinesiology	<a href="#"><i>BS, MS</i></a>
Land Rehabilitation	<a href="#"><i>minor</i></a>
Land Resources	<i>concentration</i>
Land & Water Resources	<i>concentration</i>
Landscape Architecture	<a href="#"><i>BLA</i></a>
Landscape Horticulture	<i>concentration, minor</i>
Latin America Studies	<a href="#"><i>minor</i></a>
Law and Society	<a href="#"><i>minor</i></a>
Liberal Arts and Engineering Studies	<a href="#"><i>BA</i></a>
Liberal Studies	<a href="#"><i>BS</i></a>
Linguistics	<a href="#"><i>minor</i></a>
Management	<i>concentration</i>
Manufacturing Engineering	<a href="#"><i>BS</i></a>
Marine Biology & Fisheries	<i>concentration</i>
Marketing Management	<i>concentration</i>
Materials Engineering	<a href="#"><i>BS, specialization</i></a>
Mathematics	<a href="#"><i>BS, MS, minor</i></a>
Meat Science and Processing	<a href="#"><i>minor</i></a>
Mechanical Engineering	<a href="#"><i>BS, MS</i></a>
Mechatronics	<i>concentration</i>
Microbiology	<a href="#"><i>BS, minor</i></a>
Military Science	<a href="#"><i>minor</i></a>
Modern Languages & Literatures	<a href="#"><i>BA</i></a>
Molecular and Cellular Biology	<i>concentration</i>
<del>Molecular Biology</del>	<del><i>concentration</i></del>
Multidisciplinary Design	<a href="#"><i>minor</i></a>
Music	<a href="#"><i>BA, minor</i></a>
Natural Resources Recreation	<i>concentration</i>
Nursery & Floriculture Production	<i>concentration</i>
Nutrition	<a href="#"><i>BS, minor</i></a>
Nutrition & Food Industries	<i>concentration</i>
Nutrition Science	<i>concentration</i>
Organizations	<i>concentration</i>
Ornamental Horticulture	<i>concentration</i>
Ornamental Plant Production	<a href="#"><i>minor</i></a>
Outdoor, Adventure, & Resource Recreation	<i>concentration</i>
Packaging	<a href="#"><i>minor</i></a>
Packaging & Logistics	<i>concentration</i>
Philosophy	<a href="#"><i>BA, minor</i></a>
Photography	<i>concentration, minor</i>

Physics	<a href="#"><i>BA, BS, minor</i></a>
Plant Protection Science	<i>specialization, minor</i>
Political Science	<a href="#"><i>BA</i></a>
Poultry Management	<a href="#"><i>minor</i></a>
Polymers & Coatings Science	<i>concentration, <a href="#"><i>MS</i></a></i>
Pre-Law	<i>concentration</i>
Professional Practice	<i>specialization</i>
Psychology	<a href="#"><i>BS, MS, minor</i></a>
Public Policy	<a href="#"><i>MPP</i></a>
Publishing Technology	<i>concentration</i>
Pure Mathematics	<i>concentration</i>
Quantitative Economics	<i>concentration</i>
Rangeland Resources	<a href="#"><i>minor</i></a>
Real Estate Economics	<i>concentration</i>
Real Property Development	<a href="#"><i>minor</i></a>
Recreation, Parks, & Tourism Administration	<a href="#"><i>BS, specialization</i></a>
Religious Studies	<a href="#"><i>minor</i></a>
Research	<i>specialization</i>
Social Sciences	<a href="#"><i>BS</i></a>
Social Services	<i>concentration</i>
Sociology	<a href="#"><i>BA, minor</i></a>
Software Engineering	<a href="#"><i>BS</i></a>
Soil Science	<a href="#"><i>BS, specialization, minor</i></a>
Space Systems Engineering	<i>specialization</i>
Spanish	<a href="#"><i>minor</i></a>
Special Education	<i>specialization</i>
Statistics	<a href="#"><i>BS, minor</i></a>
Studio Art	<i>concentration, minor</i>
Sustainable Agriculture	<a href="#"><i>minor</i></a>
Sustainable Environments	<a href="#"><i>minor</i></a>
Systematics & Biodiversity	<i>concentration</i>
System Design	<i>concentration</i>
Tax	<i>specialization</i>
Teaching	<i>concentration</i>
Technical Communication	<i>concentration</i>
Theatre	<a href="#"><i>BA, minor</i></a>
Tourism Planning & Management	<i>concentration</i>
Transportation Planning	<a href="#"><i>MCRP/MS</i></a>
Turfgrass Management	<i>concentration</i>
Urban Forestry	<i>concentration</i>
Values, Technology and Society	<a href="#"><i>minor</i></a>
Viticulture	<i>concentration</i>
Water Engineering	<i>specialization</i>
Water Science	<a href="#"><i>minor</i></a>
Watershed Management & Hydrology	<i>concentration</i>
Web and Digital Media	<i>concentration</i>
Western Intellectual Tradition	<a href="#"><i>minor</i></a>
Wildland Fire and Fuels Management	<i>concentration</i>
Wine & Viticulture	<a href="#"><i>BS, minor</i></a>
Wine Business	<i>concentration</i>
Women's & Gender Studies	<a href="#"><i>minor</i></a>

## **CREDENTIAL PROGRAMS**

Administrative Services
Agriculture Specialist
Education Specialist (Mild/Moderate Disabilities)
Multiple Subject Instruction
Multiple Subject; Bilingual Cross-cultural Language and Academic Development (BCLAD) Emphasis
Single Subject; Agriculture Instruction
Single Subject; Biological Science Instruction
Single Subject; Chemistry Instruction
Single Subject; English Instruction
Single Subject; Mathematics Instruction
Single Subject; Social Science Instruction
Single Subject; Physical Education Instruction
Single Subject; Physics Instruction

## **OTHER PROGRAMS**

<a href="#"><u>ROTC</u></a>
<a href="#"><u>Gerontology Certificate</u></a>
<a href="#"><u>Teaching English as a Second Language (TESL) Certificate</u></a>
<a href="#"><u>Technical Communication Certificate</u></a>

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# Course Descriptions

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## SELECTED TOPICS COURSES – Specific Titles (270, 470, 570 Courses)

### **PREFIX TITLE**

[AERO Aerospace Engineering](#)  
[AG Agriculture](#)  
[AGB Agribusiness](#)  
[AGC Agricultural Communication](#)  
[AGED Agricultural Education](#)  
[ANT Anthropology](#)  
[ARCE Architectural Engineering](#)  
[ARCH Architecture](#)  
[ART Art](#)  
[ASCI Animal Science](#)  
[ASTR Astronomy and Astrophysics](#)  
[BIO Biology](#)  
[BMED Biomedical Engineering](#)  
[BOT Botany](#)  
[BRAE BioResource and Agricultural Engineering](#)  
[BUS Business](#)  
[CD Child Development](#)  
[CE Civil Engineering](#)  
[CHEM Chemistry](#)  
[CM Construction Management](#)  
[COMS Communication Studies](#)  
[CPE Computer Engineering](#)  
[CRP City and Regional Planning](#)  
[CRSC Crop Science](#)  
[CSC Computer Science](#)  
[DANC Dance](#)  
[DMHS Disaster Management and Homeland Security](#)  
[DSCI Dairy Science](#)  
[ECON Economics](#)  
[EDES Environmental Design](#)  
[EDUC Education](#)

### **PREFIX TITLE**

[EE Electrical Engineering](#)  
[EHS Environmental Horticultural Science](#)  
[ENGL English](#)  
[ENGR Engineering](#)  
[ENVE Environmental Engineering](#)  
[ERSC Earth Sciences](#)  
[ES Ethnic Studies](#)  
[FPE Fire Protection Engineering](#) **NEW Fall 2010**  
[FR French](#)  
[FRSC Fruit Science](#)  
[FSN Food Science and Nutrition](#)  
[GEOG Geography](#)  
[GEOL Geology](#)  
[GER German](#)  
[GRC Graphic Communication](#)  
[GS Graduate Studies](#)  
[GSA Graduate Studies–Accounting](#)  
[GSB Graduate Studies–Business](#)  
[HCS Horticulture and Crop Science](#)  
[HIST History](#)  
[HNRC Honors Contract](#)  
[HNRS Honors](#)  
[HUM Humanities](#)  
[IME Industrial and Manufacturing Engineering](#)  
[IS Interdisciplinary Studies](#)  
[IT Industrial Technology](#)  
[ITAL Italian](#)  
[JOUR Journalism](#)  
[JPNS Japanese](#)  
[KINE Kinesiology](#)  
[LA Landscape Architecture](#)  
[LAES Liberal Arts and Engineering Studies](#)  
[LIB Library](#)  
[LS Liberal Studies](#)  
[MATE Materials Engineering](#)  
[MATH Mathematics](#)  
[MCRO Microbiology](#)

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**PREFIX TITLE**

<a href="#"><u>ME</u></a>	<a href="#"><u>Mechanical Engineering</u></a>
<a href="#"><u>MLL</u></a>	<a href="#"><u>Modern Languages and Literatures</u></a>
<a href="#"><u>MSL</u></a>	<a href="#"><u>Military Science Leadership</u></a>
<a href="#"><u>MU</u></a>	<a href="#"><u>Music</u></a>
<a href="#"><u>NR</u></a>	<a href="#"><u>Natural Resources</u></a>
<a href="#"><u>PEM</u></a>	<a href="#"><u>Physical Education: Men</u></a>
<a href="#"><u>PEW</u></a>	<a href="#"><u>Physical Education: Women</u></a>
<a href="#"><u>PHIL</u></a>	<a href="#"><u>Philosophy</u></a>
<a href="#"><u>PHYS</u></a>	<a href="#"><u>Physics</u></a>
<a href="#"><u>PM</u></a>	<a href="#"><u>Poultry Management</u></a>
<a href="#"><u>POLS</u></a>	<a href="#"><u>Political Science</u></a>
<a href="#"><u>PPSC</u></a>	<a href="#"><u>Plant Protection Science</u></a>
<a href="#"><u>PSC</u></a>	<a href="#"><u>Physical Science</u></a>
<a href="#"><u>PSY</u></a>	<a href="#"><u>Psychology</u></a>
<a href="#"><u>RELS</u></a>	<a href="#"><u>Religious Studies</u></a>
<a href="#"><u>RPTA</u></a>	<a href="#"><u>Recreation, Parks and Tourism Administration</u></a>
<a href="#"><u>SCM</u></a>	<a href="#"><u>College of Science and Mathematics</u></a>
<a href="#"><u>SOC</u></a>	<a href="#"><u>Sociology</u></a>
<a href="#"><u>SOCS</u></a>	<a href="#"><u>Social Sciences</u></a>
<a href="#"><u>SPAN</u></a>	<a href="#"><u>Spanish</u></a>
<a href="#"><u>SS</u></a>	<a href="#"><u>Soil Science</u></a>
<a href="#"><u>STAT</u></a>	<a href="#"><u>Statistics</u></a>
<a href="#"><u>TH</u></a>	<a href="#"><u>Theatre</u></a>
<a href="#"><u>UNIV</u></a>	<a href="#"><u>University Studies</u></a>
<a href="#"><u>VGSC</u></a>	<a href="#"><u>Vegetable Science</u></a>
<a href="#"><u>VS</u></a>	<a href="#"><u>Veterinary Science</u></a>
<a href="#"><u>WGS</u></a>	<a href="#"><u>Women's and Gender Studies</u></a>
<a href="#"><u>WVIT</u></a>	<a href="#"><u>Wine and Viticulture</u></a>
<a href="#"><u>ZOO</u></a>	<a href="#"><u>Zoology</u></a>

# Colleges, Departments, Units and Course Prefixes

## COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENTAL SCIENCES

Agriculture .....	AG
Agribusiness .....	AGB
Agricultural Education and Communication .....	AGC, AGED
Animal Science .....	ASCI, PM, VS
BioResource and Agricultural Engineering .....	BRAE
Dairy Science .....	DSCI
Earth and Soil Sciences .....	ERSC, SS
Food Science and Nutrition .....	FSN
Horticulture and Crop Science .....	CRSC, EHS, FRSC, HCS, PPSC, VGSC , WVIT
Military Science .....	MSL
Natural Resources Management .....	NR
Recreation, Parks, and Tourism Administration.....	RPTA

## COLLEGE OF ARCHITECTURE AND ENVIRONMENTAL DESIGN

Environmental Design .....	EDES
Architectural Engineering .....	ARCE
Architecture .....	ARCH
City and Regional Planning .....	CRP
Construction Management .....	CM
Landscape Architecture .....	LA

## ORFALEA COLLEGE OF BUSINESS

Business .....	BUS
Economics.....	ECON
Graduate Programs .....	GSA, GSB
Industrial Technology .....	IT

## COLLEGE OF ENGINEERING .....

	ENGR, FPE, LAES
Aerospace Engineering .....	AERO
Biomedical and General Engineering ....	BMED
Civil and Environmental Engineering ...	CE, ENVE
Computer Engineering .....	CPE
Computer Science .....	CSC
Electrical Engineering .....	EE
Industrial and Manufacturing Engineering .....	IME
Materials Engineering .....	MATE
Mechanical Engineering .....	ME

## COLLEGE OF LIBERAL ARTS

Art and Design .....	ART
Communication Studies .....	COMS
English .....	ENGL
Ethnic Studies .....	ES
Graphic Communication .....	GRC
History .....	HIST
Humanities .....	HUM
Journalism .....	JOUR
Modern Languages and Literatures .....	FR, GER, ITAL, JPNS, MLL, SPAN
Music .....	MU
Philosophy .....	PHIL, RELS
Political Science .....	POLS
Psychology and Child Development .....	CD, PSY
Social Sciences .....	ANT, GEOG, SOC, SOCS
Theatre and Dance .....	DANC, TH
Women's and Gender Studies .....	WGS

## COLLEGE OF SCIENCE AND MATHEMATICS

Science and Mathematics .....	SCM
<b>School of Education</b> .....	EDUC
Biological Sciences .....	BIO, BOT, MCRO, ZOO
Chemistry and Biochemistry.....	CHEM
Kinesiology.....	KINE
Liberal Studies .....	LS
Mathematics .....	MATH
Physics .....	ASTR, GEOL, PHYS, PSC
Statistics .....	STAT

## CONTINUING EDUCATION .....

## UNIVERSITY-WIDE

Athletics.....	PEM, PEW
University Honors.....	HNRS, HNRC
University Library .....	LIB
University Studies.....	UNIV

# Graduate Programs

Research and Graduate Programs Office  
Math and Science Bldg. (38), Room 154  
805 756-1508 FAX 805 756-1725

## Master's Degree Programs

Accounting, MS  
Aerospace Engineering, MS \*  
    Research Specialization  
    Space Systems Engineering Specialization  
Agribusiness, MS  
**Agricultural Education, Master of** *New, Fall 2010*  
Agriculture, MS  
    Agricultural Engineering Technology Specialization  
~~— Agricultural Education Specialization~~  
    Animal Science Specialization  
    Crop Science Specialization  
    Dairy Products Technology Specialization  
    Environmental Horticulture Specialization  
    Food Science and Nutrition Specialization  
    Irrigation Specialization  
    Plant Protection Science Specialization  
    Recreation, Parks, and Tourism Management  
    Specialization  
    Soil Science Specialization  
Architecture, MS  
    Architectural Engineering Specialization  
Biological Sciences, MA, MS  
Biomedical Engineering, MS  
Business Administration, MBA  
    Agribusiness Specialization  
    General Management Specialization  
    Graphic Communication Document Systems  
    Management Specialization  
Business and Technology, MS  
City and Regional Planning, MCRP  
Civil and Environmental Engineering, MS  
Computer Science, MS  
Education, MA  
    Counseling and Guidance Specialization  
    Educational Leadership and Administration  
    Specialization  
    Special Education Specialization  
Electrical Engineering, MS \*  
Engineering, MS  
    Biochemical Engineering Specialization \*  
    Bioengineering Specialization \*  
    Biomedical Engineering Specialization \*  
    Integrated Technology Management Specialization \*  
    Materials Engineering Specialization \*  
    Water Engineering Specialization  
Engineering Management (Specialization), MBA/MS  
Engineering  
English, MA  
**Fire Protection Engineering, MS** *New, Fall 2010*  
Forestry Sciences, MS  
History, MA  
Industrial Engineering, MS \*

Kinesiology, MS  
Mathematics, MS \*  
Mechanical Engineering, MS\*  
Polymers and Coatings Science, MS  
Psychology, MS  
Public Policy, MPP  
Transportation Planning (Specialization), MCRP/MS  
Engineering

Cal Poly offers studies leading to advanced degrees through its instructional departments. University policy governing graduate study emphasizes the need for students to demonstrate maturity, responsibility and scholarly integrity. Graduate students should have a command of the basic knowledge, techniques, and skills essential for independent and self-directed study.

In graduate courses, students cope with more complex ideas, problems, techniques and materials than in undergraduate courses. Graduate study requires searching and exhaustive analysis, identification and investigation of theories and principles; application of theory to new ideas, problems, and materials; extensive use of bibliographic and other resource materials, with emphasis on primary sources for data; and demonstration of competence in scholarly presentation of the results of independent study.

Regulations governing fees, grading, and financial aid are located elsewhere in the catalog. This section of the catalog reviews university definitions of policy and minimum requirements governing graduate studies. It is not, however, all inclusive.

*Within these general requirements there are specific departmental requirements for each degree. These are found in the descriptions of master's degree programs within each school's description. It is important that graduate students, in consultation with their advisors, familiarize themselves with these requirements. Failure to do so may result in a substantial delay in progress towards the degree and graduation. It is the responsibility of the student to ascertain and comply with all university, college and departmental procedures and requirements.*

## Application for Admission

An application for graduate studies may be obtained from the Admissions Office of any CSU campus. The application form and official transcripts should be sent directly to the Admissions Office at Cal Poly. An electronic version of the CSU graduate application is available on the World Wide Web at [www.csumentor.edu](http://www.csumentor.edu). The CSU Mentor system allows students to browse through general information about CSU's twenty-three campuses, view multimedia campus presentations, send and receive electronic responses to specific questions, and apply for admission and financial aid.

All graduate and post-baccalaureate applicants (e.g., joint PhD and EdD applicants, master's degree applicants, those seeking educational credentials, and holders of baccalaureate

\* Blended BS+MS programs available, see page 69.



degrees interested in taking courses for personal or professional growth) must file a complete graduate application as described in the graduate and post-baccalaureate admission materials at [www.csumentor.edu](http://www.csumentor.edu). Applicants who completed undergraduate degree requirements on a CSU campus and graduated the preceding term are also required to complete and submit an application and the \$55 nonrefundable application fee. Since applicants for post-baccalaureate programs may be limited to the choice of a single campus on each application, rerouting to alternative campuses or later change of campus choice is not guaranteed. To be assured of initial consideration by more than one campus, it is necessary to submit separate applications (including fees) to each. Applications submitted by way of [www.csumentor.edu](http://www.csumentor.edu) are expected unless submission of an electronic application is impossible.

The CSU advises prospective students that they must supply complete and accurate information on the application for admission, residence questionnaire, and financial aid forms. Further, applicants must submit authentic and certified transcripts of all previous academic work attempted. Transcripts must be official and sent directly from the issuing institution in a sealed envelope. Failure to file complete, accurate, and authentic application documents may result in denial of admission, cancellation of academic credit, suspension, or expulsion (Section 41301, Article 1.1, Title 5, *California Code of Regulations*).

All master's and credential applicants must submit the following documents to the Office of Admissions to establish their admission portfolio:

- Application for graduate admission
- \$55 application fee
- Certified transcripts from all schools attended

## Deadlines

Master's and credential applicants may file an application for admission at any time. In order to be considered for admission in the "targeted" quarter, the portfolio must be completed by the dates provided at the following websites:

Deadlines for graduate programs are available at [www.ess.calpoly.edu/\\_admiss/grad/regular.html](http://www.ess.calpoly.edu/_admiss/grad/regular.html).

Deadlines for credential programs are available at <http://coe.calpoly.edu>.

## Graduate and Post-Baccalaureate Admission Requirements

### Admission Requirements

Graduate and post-baccalaureate applicants may apply for a degree objective, a credential or certificate objective. Depending on the objective, the CSU considers an application for admission as follows:

- **General Requirements** -- The minimum requirements for admission to graduate and post-baccalaureate studies at a California State University campus are in accordance

with university regulations as well as Title 5, chapter 1, subchapter 3 of the *California Code of Regulations*.

Specifically, a student shall:

- (1) have completed a four-year college course of study and hold an acceptable baccalaureate degree from an institution accredited by a regional accrediting association, or shall have completed equivalent academic preparation as determined by appropriate campus authorities;
- (2) be in good standing at the last college or university attended;
- (3) have attained a grade point average of at least 2.5 (A = 4.0) in the last 60 semester (90 quarter) units attempted or have earned a grade point average of at least 2.5 on the last degree completed by the candidate; and
- (4) satisfactorily meet the professional, personal, scholastic, and other standards for graduate study, including qualifying examinations, as appropriate campus authorities may prescribe. In unusual circumstances, a campus may make exceptions to these criteria.

- **Post-Baccalaureate Unclassified** -- To enroll in graduate courses for professional or personal growth, a candidate must be admitted as a postbaccalaureate unclassified student. By meeting the minimum requirements, the candidate is eligible for admission as a postbaccalaureate unclassified student. Some departments may restrict enrollment of unclassified students due to heavy enrollment pressure.

Admission in this status does not constitute admission to, or assurance of consideration for admission to, any graduate degree or credential program, and requires approval from the Dean of Research and Graduate Programs.

- **Post-Baccalaureate Classified**, e.g., *admission to an education credential program* -- Candidates who wish to enroll in a credential or certificate program are required to satisfy additional professional, personal, scholastic, and other standards, including qualifying examinations, prescribed by the campus.
- **Graduate Conditionally Classified** -- Candidates may be admitted to a graduate degree program in this category if, in the opinion of appropriate campus authority, deficiencies can be remedied by additional preparation.
- **Graduate Classified** -- To pursue a graduate degree, candidates are required to fulfill all of the professional, personal, scholastic, and other standards, including qualifying examinations, prescribed by the campus.

If your transcript is not received by the Admissions Office prior to the first day of what would be your second quarter, or if your degree was not awarded for a preceding term, you are required to reapply for a subsequent quarter. A second application and fee to a post-baccalaureate program



are not accepted or processed until an official transcript is provided showing that your undergraduate degree has been awarded.

Unless proof of an undergraduate degree is provided by the registration date for your second quarter, you lose your registration priority.

Under special circumstances graduate coordinators may recommend admission of applicants who do not meet eligibility requirements. The Dean of Research and Graduate Programs acts on these recommendations.

### Residency Status Determination

The campus Admissions Office determines the residency status of all new and returning students for nonresident tuition purposes. Responses to the application for admission and, if necessary, other evidence furnished by the student are used in making this determination. A student who fails to submit adequate information to establish a right to classification as a California resident is classified as a nonresident. For detailed explanation please refer to Determination of Residence for Nonresident Tuition Purposes," page 492.

### International (Foreign) Student Admission Requirements

International master's and credential applicants must file an application for admission with the Office of Admissions. For this purpose, "foreign students" include those who hold U.S. temporary visas as students, exchange visitors, or in other non-immigrant classifications. The application may be filed at any time, but in order to be considered for admission in the targeted quarter the portfolio must be completed by the dates listed below.

	<b>Application Deadline</b>	<b>File Completion Date</b>
Fall Quarter	November 30	April 1 <sup>st</sup>
Winter Quarter	June 30	September 1 <sup>st</sup>

All master's and credential applicants must submit the following documents to establish their admission portfolio:

- Application form, Parts A and B
- \$55 application fee
- Certified transcripts from all schools attended, showing coursework. All official documents must be accompanied by a certified English translation from one of the following
  - Institute for International Education (IIE)
  - AMIDEAST
  - Saudi Arabian Education Mission
  - United States Embassy or Consulate
- Confidential financial statement
- Promissory note agreeing to purchase required health insurance

- International Educational Background form
- AACRAO credential analysis fee of \$75 in the form of a U.S. Postal Money Order or an International Money Order, made payable to "AACRAO" (American Association of Collegiate Registrars and Admissions Officers)
- Spouse/Dependent Declaration form

All graduate and post-baccalaureate applicants, regardless of citizenship, whose native language is not English and whose preparatory education was principally in a language other than English must demonstrate competence in English. Those who do not possess a bachelor's degree from a postsecondary institution where English is the principal language must take either the Test of English as a Foreign Language (TOEFL) or the International English Language Testing system (IELTS) exam.

The TOEFL must have been taken within the last two years with a minimum score of 550 (paper version), 213 (computerized version) or 80 (internet based). The minimum score for the IELTS is 6.0, although individual programs may require higher scores. Applicants are advised to review program specific information.

The TOEFL or IELTS requirement is waived for applicants whose native language is English. For a list of countries please refer to the following website:

[www.ess.calpoly.edu/\\_admiss/international/toefl.html](http://www.ess.calpoly.edu/_admiss/international/toefl.html)

The Office of Admissions completes an initial portfolio review that includes verification of an equivalent B.A./B.S. degree, a determination of the appropriate level of study and a narrative evaluation of all work completed. Copies are included in the applicant's file.

The Office of Admissions notifies all applicants of the documents needed to complete their portfolios. Graduate coordinators may require additional documentation to assist them in determining an applicant's eligibility.

International applicants for graduate study can receive either conditional or classified admission. The graduate coordinators make all recommendations to the Director of Admissions for conditional and classified admissions to the graduate program

### HEALTH SCREENING

All new and readmitted students born after January 1, 1957 are notified of the requirement to present proof of measles and rubella immunizations (two MMRs). All students 18 years of age or younger on the first day of their first quarter of enrollment are required to present proof of immunization against hepatitis B. These are *not* admission requirements, but are required of students as conditions of enrollment in CSU. Proof of measles and rubella immunizations is also required for certain groups of enrolled students who have increased exposure to these diseases. See page 58 for more information.

## Academic Requirements and Responsibilities

The following conditions and requirements are common to all master's degrees:

- All students shall attempt to satisfy the graduation writing requirement during the first quarter of enrollment.
- A student shall file an approved formal study plan before the twelfth unit of graduate study is completed.
- A student shall maintain a grade point average of 3.0 (grade of B on a scale where A = 4.0), or better, in all courses in the formal program of study for the degree. A course in which no letter grade is assigned shall not be used in computing the grade point average.
- A student shall maintain satisfactory scholarship and professional standards. Only those graduate students who continue to demonstrate a satisfactory level of scholastic competence and fitness, as determined by the appropriate university authorities, shall be eligible to continue in such curricula. Students whose performance is judged to be unsatisfactory by the authorities of the University may be required to withdraw from all graduate degree curricula offered by the University.
- A student shall be formally advanced to candidacy before being allowed to enroll for thesis or project units or to take the comprehensive examination.
- A student shall successfully complete a culminating experience (thesis, project and/or comprehensive examination).
- A student shall complete all of the graduate work in the formal study plan within the seven-year period preceding the date when all the requirements for the degree have been met.
- A student may elect to meet the graduation requirements in effect in the catalog either at the time the student was admitted to graduate standing (conditional or classified) provided that continuous enrollment was maintained, or at the time of graduation. The student may be required to make substitutions for discontinued courses.

### Graduate Student Continuous Enrollment Policy

*(Information Added 1/11/2010)*

Effective Fall Quarter 2009, graduate students are required to maintain continuous enrollment from the time of first enrollment in a graduate program until completion of the degree. Continuous enrollment is defined as being enrolled during Fall, Winter, and Spring quarters each year. Students can maintain continuous enrollment either by being enrolled as a regular student; obtaining approval for an education or medical leave prior to the quarter when such a leave would begin; or by registering in a special course designated for this purpose, during quarters in

which they are not regularly enrolled. The special course, GS 597, is listed in the University catalog and is taken through Cal Poly Continuing Education. GS 597 is a one-unit course, at a cost of \$230 per unit, offered credit/no credit; credits in GS 597 do not count toward meeting degree requirements. Students who fail to fulfill this continuous enrollment requirement will be not be permitted to graduate—even if all degree requirements have been completed—until payment has been made for all quarters of non-enrollment. This requirement is not retroactive to terms prior to Fall 2009. In addition, ALL graduate students must be enrolled the quarter they graduate.

For further information and a registration form, visit the Continuing Education website at: [www.continuing-ed.calpoly.edu/specialprograms/continuousenrollment.html](http://www.continuing-ed.calpoly.edu/specialprograms/continuousenrollment.html)

## General Policies Governing Graduate Studies

### Academic Probation

A student who is enrolled in a graduate degree program in conditionally classified or classified standing shall be placed on academic probation for failure to maintain a cumulative grade point average of at least 3.0 (grade of B on a scale where A = 4.0) in all courses in the formal program of study for the degree.

A student who has been admitted as post-baccalaureate-classified in order to pursue a credential program shall be subject to academic probation for failure to maintain a cumulative grade point average of at least 3.0 in all units taken in the credential program.

A post-baccalaureate unclassified student (one who has not been admitted to either a credential or graduate degree program) shall be subject to academic probation for failure to maintain a cumulative grade point average of at least 2.5 in all units attempted subsequent to admission to post-baccalaureate standing.

### Academic Disqualification

A graduate or post-baccalaureate student shall be subject to disqualification if while on probation the student fails to achieve a sufficient grade point average to be removed from probationary status. Disqualification may be either from further registration in the program or from further enrollment at the University as determined by the student's college dean. Notification of disqualification is made by the college dean.

### Administrative Academic Disqualification

A graduate student may also be placed on probation or may be disqualified by appropriate campus authorities for unsatisfactory scholastic progress regardless of grade point average. Such actions shall be limited to those arising from repeated withdrawal, failure to progress toward an educational objective or noncompliance with an academic requirement, and shall be consistent with guidelines issued by the Chancellor's Office.

### Advancement to Candidacy

Advancement to candidacy recognizes that the student has demonstrated the ability to operate at and sustain a level of scholarly competence that is satisfactory for successful completion of the degree requirements. The student is then cleared for the final stages of the program, which, in addition to any remaining coursework, includes the thesis, project, and/or comprehensive examination.

The student may request advancement to candidacy only after a formal program of study has been submitted, the graduation writing requirement has been satisfied, and sufficient coursework has been completed to allow the department to make a judgment about the student's potential to complete the program.

### Advisement

Soon after enrollment, students should contact the department for the assignment of an advisor in their area of study. Students should meet with their advisors prior to registration, for information concerning prerequisites, courses to be taken, and to develop an informal study plan. An informal study plan is a projection of initial coursework, including prerequisites, that the student undertakes prior to filing a formal study plan, or in lieu of the formal program of study, if the student is a post-baccalaureate student without credential or degree objective.

Departmental advisors and graduate coordinators share the responsibility for advising master's degree students throughout their work toward a degree. College or departmental graduate study committees certify completion of a master's degree program on the recommendation of the advisors. Students are urged to maintain a personal file of transcripts and other records of all undergraduate and graduate work undertaken, and to make this file available whenever they seek advising.

### Blended BS+MS Programs

#### Academic Objectives

Blended programs provide an accelerated route to a graduate professional degree, with simultaneous conferring of both bachelor's and master's degrees. Most blended programs allow for the possibility of students' earning graduate credit for several of their senior electives, effectively decreasing the summed unit requirements for both degrees. Blended programs provide a seamless process whereby students can progress from undergraduate to graduate status without having to apply through the Admissions Office (thereby eliminating the need to pay a \$55 fee). In addition, blended BS+MS programs provide a meaningful capstone experience that in most cases integrates the senior project with the graduate thesis/project.

#### Process for Changing Status

Students who are interested in pursuing blended programs should submit a request to the department head or graduate

coordinator for a change of degree objective. A draft graduate study plan is prepared, but not submitted to the Graduate Programs Office until after 12 graduate units have been completed.

The department head/graduate coordinator, with assistance of the Evaluations Office, determines whether students meet the eligibility criteria (see below). If criteria are met, the coordinator sends a change of degree objective form to Evaluations. Students are notified of their acceptance upon receipt of the signed Change of Objective form.

### Eligibility for Blended Programs

The following are minimum eligibility criteria; *individual departments may have more stringent requirements.*

1. Students must successfully complete a minimum of 180 units / maximum 192 units (for engineering programs the maximum number of units is 205). These units must count toward one or the other of the two degrees (BS or MS) that ultimately are awarded in the blended program; they need not be restricted to those counting toward the undergraduate degree alone.
2. Students cannot enter the blended BS+MS program if they have exceeded the maximum number of units as defined in #1.
3. Students must have a minimum 2.5 GPA in the last 90 quarter units attempted. (*Note that students, once admitted to graduate standing, must maintain a 3.0 GPA or better in courses counting toward the graduate degree.*)
4. Students are strongly encouraged to complete the Graduation Writing Requirement (GWR).

### Process to Graduate with Both Degrees

1. Students must be enrolled in BMS status a minimum of two quarters prior to graduation.
2. Students must submit the Formal Study Plan to Graduate Programs Office (only for courses counting toward MS); request Advancement to Candidacy; and maintain a minimum 3.0 GPA for courses counting toward MS.
3. When all requirements are met for both the undergraduate and graduate programs, both degrees are awarded at the same time and graduation ceremony.
4. If a student fails to complete the MS program requirements, then the BS degree may be granted when all requirements for that degree are met.

### Change of Post-Baccalaureate Objective

If students wish to change their post-baccalaureate objective, they must formally file this intention by obtaining a Post-baccalaureate Change of Objective form, available in the Graduate Programs Office or at [www.rgp.calpoly.edu](http://www.rgp.calpoly.edu).

### Comprehensive Examination

A comprehensive examination is one of the possible culminating experiences for the master's degree and

assesses the student's ability to integrate knowledge, show critical and independent thinking, and demonstrate mastery of the subject matter. The results of the examination should provide evidence of these abilities and achievement. A record of the examination questions and responses is maintained.

### **Courses Counting Towards Graduation and Credit/No Credit Grading**

Only those letter-graded courses in which an A, B, or C is earned (C- is acceptable) count towards satisfying the total unit requirement for the degree. Courses which are offered only on a credit/no credit basis also satisfy the unit requirement if a credit grade is earned. The equivalent of an A or a B is required to earn credit in such courses.

Graduate students may elect to take courses that are not part of their formal program of study on a credit/no credit basis.

### **Credit by Exam for Coursework**

See page 46.

### **Culminating Experience**

The culminating experience for the granting of a graduate degree is the successful completion of a thesis, project or comprehensive examination. The quality of work accomplished, including the quality of the writing, is the major consideration in judging the acceptability of the thesis, project, or comprehensive examination. The student must successfully complete the culminating experience required by the specific program to be granted a graduate degree.

### **Enrollment in Graduate Courses**

To enroll in 500-level graduate courses a student must have post-baccalaureate standing, graduate standing, or permission of the instructor.

### **Formal Study Plan**

The student should make an appointment with the advisor before the 12th unit of work is completed to develop a formal program of study for the master's degree. A formal study plan is an agreement between the student and the college on the specific coursework to be completed in order to fulfill the requirements for the master's degree. A copy of the study plan must be submitted to the Graduate Programs Office for review and final approval.

Certain 400-series courses may be completed by the graduate student as part of the degree program when this is consistent with university requirements, departmental master's degree specifications, and the candidate's formal program of study. The student should always consult the advisor to make certain that only approved courses are selected, since departmental requirements vary, and some courses are excluded. No fewer than one-half of the units required for the degree shall be in courses organized primarily for graduate students (500 level).

Only 400- and 500-level courses are allowed in an approved graduate plan of study. In those programs where specific courses below the 400-level may be essential for a student's success, the student may be conditionally accepted to the program contingent upon completing those courses. Courses below the 400-level may not constitute any part of the approved units in the plan of graduate study.

No fewer than 32 quarter units of a 45-unit program shall be completed in residence. In programs with more than 45 units an equivalent proportion (32/45) of units must be taken "in residence". A course taught "in residence" is normally a catalog offering or approved experimental course taught by a Cal Poly faculty member. Extension courses may not be used to fulfill the residency requirement. However, summer session courses, and up to 12 units taken through Open University, can be counted as courses in residence. Petitioned graduate courses taken at Cal Poly as an undergraduate count as taken in residence. Courses for which students received credit by examination may be petitioned to count as taken in residence. These situations are explained further below.

No more than 13 quarter units of approved extension courses shall be accepted for the master's degree. Regular extension courses may not be used to satisfy the residency requirement, but grades earned in these courses count in calculation of the student's grade point average if they are part of the formal study plan.

No more than 12 Open University quarter units shall be approved in the submission of a formal study plan. Open University courses are counted for "in residence" credit.

Up to 12 quarter units of summer session shall be granted credit if taken prior to the submission of a formal program of study. Summer session courses are counted as "in-residence" credit.

In addition to the above rules governing "in-residence" courses, the following apply to courses included on the formal study plan:

No more than nine quarter units shall be in student teaching.

No more than nine quarter units shall be allowed for a thesis or project.

No more than 12 quarter units of approved post-baccalaureate (unclassified) course credit is accepted for the master's degree.

### **Full-Time Graduate Student Status**

A full-time graduate student is defined as one taking 8 or more units in a quarter. Students receiving financial aid may need to meet different requirements to be considered full-time and should consult with the Financial Aid Office. Normally students are not permitted to enroll in more than 16 units each quarter.

### Grade Point Calculation for Graduate Degree

Satisfaction of the GPA requirement for the conferring of the master's degree requires a GPA of 3.0 or more in the courses taken in the formal study plan. Repeating a course does not remove a lower letter grade from the overall GPA calculation.

### Graduate Courses Taken by Undergraduates for Graduate Credit

Cal Poly undergraduates may take courses in the 400 or 500 series for graduate credit while still undergraduates. If they subsequently enter a Cal Poly master's or credential program, they may petition to have such course credit applied toward their master's degree or credential program, if the units were not used for the baccalaureate degree.

### Graduation

A student planning to graduate must request a final graduation evaluation from the Evaluations Office approximately two quarters prior to the anticipated date of degree completion. The Request for Graduation Evaluation is submitted to the Graduate Programs Office after both the Formal Study Plan and Advancement to Candidacy have been approved. A student cannot graduate without this evaluation.

### Graduation with Distinction

Some, but not all, graduate programs choose to confer the honor "graduation with distinction" on outstanding students. To be eligible for this recognition, students must have a GPA of 3.75 or better and meet specific program criteria.

### Graduation Requirement in Writing Proficiency

All students must demonstrate competency in writing skills as a requirement for graduation. Graduate students should attempt to meet the Graduation Writing Requirement in the first quarter of residence. There are three options for completing the requirement. Each student should review his or her curricular requirements to determine which of the following options is appropriate. If Option 3 is used, students must begin graduate coursework within seven years from the date the GWR was satisfied or the student is required to fulfill the requirement using one of the other options. The requirement must be met before the student can be advanced to candidacy.

Students may meet the Graduation Writing Requirement (GWR) through one of the following options:

1. Pass the Writing Proficiency Examination.
2. Pass an approved upper-division course with a grade of C (not C-) or better AND receive certification of proficiency in writing based on a 500-word, in-class essay.
3. Document that the GWR was met as part of an undergraduate program of study at Cal Poly within seven years of matriculation as a graduate student.

The following courses are approved for GWR credit:

ENGL 301, 302, 310, 317, 326, 330, 331, 332, 333, 334, 335, 339, 340, 341, 342, 343, 345, 346, 347, 349, 350, 351, 352, 354, 370, 371, 372, 380, 381 or 382.

The Graduation Writing Requirement may be waived, at the discretion of campus authorities, in the following circumstances:

1. The requirement was satisfied by the student as an undergraduate on one of the CSU campuses and no more than seven (7) years have elapsed before entering the graduate program at Cal Poly. **Documentation to support this waiver option must include date of satisfaction.**
2. An equivalent upper-division, graduation writing requirement was satisfied at another 4-year college or university. **Official, dated documentation must be provided (i.e., transcripts, catalog description, etc.).** Again, no more than seven (7) years may elapse between meeting the requirement and beginning graduate study.
3. The student has earned an advanced degree at least equivalent to the Master's. **Supporting documentation must be presented.**

Graduate students who wish to waive the GWR should present documentation to the Writing Skills Office (Bldg. 10, Rm. 130, 756-2067) in their first quarter of residence.

### Leaves of Absence

See undergraduate section, page 57.

### Prerequisites

Each master's degree program has specific prerequisites, both in courses and in grade-point average. Deficiencies in prerequisites must be removed prior to advancement to classified graduate status. Courses taken for this purpose normally do not count toward fulfillment of the unit requirement for the degree.

### Registration

The schedule and instructions for registration and payment of fees are available through the registration and enrollment tab at the MyCalPoly web portal. Detailed descriptions of courses are found in the back of this catalog.

### Repeating a Course

Students may enroll in a course for credit more than once only if the catalog course description states that the course may be repeated for credit. An exception to this policy allows the repeating of a course in cases where a grade of D or F was received. However, for graduate students both grades are reflected in the calculation of the grade point average. Graduate students are not eligible to repeat courses and remove the lower grade points from calculation of the GPA.

### Research Involving Special Conditions

Research that involves the use of human subjects, vertebrate animals, or hazardous materials requires special

campus review before the study begins. If your research involves any of these special conditions, check with your graduate coordinator and the Graduate Programs Office for procedures.

### Residence Courses

See "Formal Study Plan."

### Returning Students

Matriculated students who have not registered for three consecutive quarters and have not been on an approved leave of absence must file an application for readmission before the deadline dates listed below. The application fee must accompany the application for readmission.

Matriculated students who have not registered for one quarter or two consecutive quarters are entitled to their registration priority without applying for readmission. Summer Quarter is a regular quarter and is counted in determining the length of absence.

#### *Application Deadlines for Returning Students*

Summer Quarter.....	April 1
Fall Quarter.....	<del>May 1<sup>st</sup></del> July 1 <sup>st</sup> <i>changed 5/5/09</i>
Winter Quarter.....	October 1
Spring Quarter .....	February 1

### Second Master's Degree

A student can earn only one master's degree in any one of the graduate programs offered. A student who wishes to complete a second master's degree in another discipline, or two master's degrees simultaneously, must complete all the requirements for both degrees. Of the units required in common for each degree, no more than nine quarter units of coursework may be used to satisfy requirements in both master's degree programs.

### Thesis or Project Report Requirements

A thesis is the written product of a systematic study of a significant problem. It identifies the problem, states the major assumptions, explains the significance of the undertaking, sets forth the sources for and methods of gathering information, analyzes the data, and offers a conclusion or recommendation. The finished product evidences originality, critical and independent thinking, appropriate organization and format, and thorough documentation. Normally, an oral defense of the thesis is required.

A project is a significant undertaking appropriate to the fine and applied arts or to professional fields. It evidences originality and independent thinking, appropriate form and organization, and a rationale. It is described and summarized in a written report that includes the project's significance, objectives, methodology, and a conclusion or recommendation. An oral defense of the project may be required.

The following are requirements for a thesis/project committee: 1) that the graduate student have a thesis/project

advisor who is a permanent full-time faculty member from the student's program; 2) that the thesis/ project advisor and the student recommend, for approval by the graduate coordinator and/or department head, a thesis/project committee comprising at least three faculty members; 3) that two of these members, one of which is the committee chair, be from the student's program. Exceptions to the thesis/ project committee composition must be approved by the Graduate Programs Office.

If a thesis or project is required in a master's degree program, a committee-approved copy must be completed in accordance with university specifications. Guidelines to be followed in preparing final copy for filing with the University can be obtained from the Graduate Programs Office, or online at [www.rgp.calpoly.edu](http://www.rgp.calpoly.edu).

A copy of the thesis or project report must be received and reviewed by the Thesis Editor in the Graduate Programs Office. Upon completion of any required corrections, the student submits the electronic thesis/project report to the DigitalCommons@CalPoly, a digital archive for the University. These steps must be completed before the degree is awarded.

### Time Limit for Degree

The time allowed to complete all coursework in the formal study plan, including thesis and project courses, is seven years. The University, at its option, and in exceptional cases, may extend the time frame. Students who wish to extend the seven-year limit must file a petition for special consideration explaining the reasons why the extension is necessary, what courses are requested for inclusion in the study plan that will be over seven years old at the proposed time of graduation, and what evidence is offered to support claims of currency in that coursework.



# Welcome to Cal Poly

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## *A Message from President Baker*

As Cal Poly embarks upon its second century, we are firmly committed to the values and traditions that distinguished our first century, while continually improving our programs to be sure our students are educated to respond thoughtfully to the complex and challenging needs of society.

***Undergraduate Emphasis:*** As a predominantly undergraduate university, Cal Poly is known nationally for the quality of its baccalaureate degree programs in a variety of disciplines. We also offer outstanding masters degree programs.

***Residential Campus:*** Cal Poly is a residential campus. Our students find that the campus environment affords them time, resources and settings in which to discover values and interests – whether in the classroom, clubs, residence halls, or other extracurricular activities.

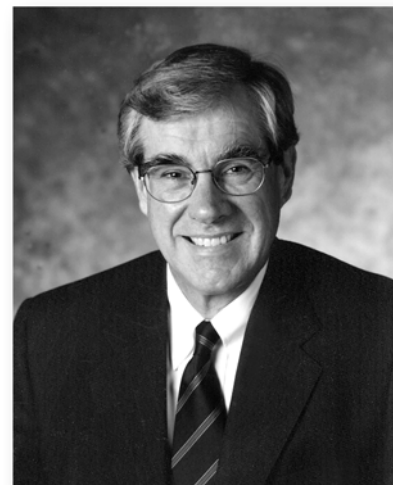
***Polytechnic Mission:*** At Cal Poly, we recognize that the liberal arts and sciences provide a critical and indispensable foundation for education in all academic disciplines and for the broader life of the University, as a living and learning community. At the same time, from its inception, Cal Poly has given particular emphasis to instruction in polytechnic disciplines. We provide opportunities for students in all programs to become familiar with the worlds of science and technology. We also prepare many of our graduates for careers in applied, scientific and technological fields.

***Information Technology to Support Teaching and Learning:*** Cal Poly is a leader in the use of information technology to enhance teaching and learning. Students and faculty have access to Internet resources, to course information, to library resources and to advanced software tools 24 hours a day. The Internet also permits us to offer courses to students temporarily off campus for various reasons and to provide continuing education for practicing professionals.

***Educational Philosophy:*** Cal Poly is committed to excellence in teaching and learning. In all disciplines we seek to provide a student-centered, learner-focused education, facilitated by a low student-teacher ratio in classes conducted primarily by full-time, regular faculty. The phrase, "Learn by Doing," also captures an essential quality of a Cal Poly education. At Cal Poly, classroom instruction is complemented by practical, "hands-on" learning in the laboratory, the studio and out in the field.

***Diversity:*** As a campus we welcome a diversity of ideas and cultures and we encourage international and multi-cultural education in order to prepare students for successful participation and competition in a diverse world and a global workforce. We believe that diversity of our students, faculty, and staff enlivens and enriches the University educational environment.

Cal Poly has at its core an educational philosophy that will sustain us far into the future. Of course, these values alone do not constitute our greatest strength. That strength rests in the quality of the students, faculty, staff, alumni, and friends—who make up, and who, indeed, are the University.



Warren J. Baker  
President

## *Mission Statement*

Cal Poly fosters teaching, scholarship, and service in a learn-by-doing environment where students and faculty are partners in discovery. As a polytechnic university, Cal Poly promotes the application of theory to practice. As a comprehensive institution, Cal Poly provides a balanced education in the arts, sciences, and technology, while encouraging cross-disciplinary and co-curricular experiences. As an academic community, Cal Poly values free inquiry, cultural and intellectual diversity, mutual respect, civic engagement, and social and environmental responsibility.

## *University Learning Objectives*

The University Learning Objectives (ULOs) are the knowledge and the skills that every Cal Poly student should have by the time of graduation. They are what every student needs for success in a career and in life, particularly within the context of a changing, global society. Mastering these objectives will empower students with core knowledge and transferable skills, and prepare them to encounter challenging issues as leaders in the twenty-first century.

All students who complete an undergraduate or graduate program at Cal Poly should be able to:

- Think critically and creatively
- Communicate effectively
- Demonstrate expertise in a scholarly discipline and understand that discipline in relation to the larger world of the arts, sciences, and technology
- Work productively as individuals and in groups
- Use their knowledge and skills to make a positive contribution to society
- Make reasoned decisions based on an understanding of ethics, a respect for diversity, and an awareness of issues related to sustainability
- Engage in lifelong learning

## *Diversity Learning Objectives*

All students who complete an undergraduate or graduate program at Cal Poly should be able to make reasoned decisions based on a respect and appreciation for diversity as defined in the Cal Poly Statement on Diversity, included in the catalog on page 15. They should be able to:

- Demonstrate an understanding of relationships between diversity, inequality, and social, economic, and political power both in the United States and globally
- Demonstrate knowledge of contributions made by individuals from diverse and/or underrepresented groups to our local, national, and global communities
- Consider perspectives of diverse groups when making decisions
- Function as members of society and as professionals with people who have ideas, beliefs, attitudes, and behaviors that are different from their own

## *Sustainability Learning Objectives*

Cal Poly defines sustainability as the ability of the natural and social systems to survive and thrive together to meet current and future needs. In order to consider sustainability when making reasoned decisions, all graduating students should be able to:

- Define and apply sustainability principles within their academic programs
- Explain how natural, economic, and social systems interact to foster or prevent sustainability
- Analyze and explain local, national, and global sustainability using a multidisciplinary approach
- Consider sustainability principles while developing personal and professional values



# Academic Calendar

## 2009–2011

**Please note:** This is not intended to be construed as an employee work calendar.

### SUMMER TERM 2009

June 22	Beginning of university year Beginning of summer term – classes begin
July 3	Academic holiday – Independence Day observed
July 6	End of second week of instruction
July 13	End of third week of instruction – Census date
July 24	End of first five-week term
July 27	Beginning of second five-week term
August 10	End of seventh week of instruction
August 14	End of eight-week term; finals August 17, 18, 19
August 28	Last day of classes
August 31–Sept 4	Final examination period for ten-week term
September 4	End of summer term
September 5–13	Academic holiday

### FALL TERM 2009

September 14	Beginning of fall term (faculty only)
September 21	Instructional Planning Day
September 22 Tuesday	Fall term classes begin
October 5	End of second week of instruction
October 12	End of third week of instruction – Census date
November 9	End of seventh week of instruction
November 11	Academic holiday – Veterans' Day observed
November 25–29	Academic holiday – Thanksgiving
December 4	Last day of classes
December 7–11	Final examination period
December 12	Mid-Year Commencement, End of fall term
December 13–January 3	Academic holiday

### WINTER TERM 2010

January 4	Beginning of winter term – classes begin
January 15	End of second week of instruction
January 18	Academic holiday – Martin Luther King, Jr.'s Birthday observed
January 25	End of third week of instruction – Census date
February 15	Academic holiday – Washington's Birthday observed
February 16, Tuesday	Classes follow a Monday schedule
February 23	End of seventh week of instruction
March 12	Last day of classes
March 15–19	Final examination period
March 22	*Evaluation Day, end of winter term
March 23–28	Academic holiday

### SPRING TERM 2010

March 29	Beginning of spring term – classes begin
March 31	Academic holiday – César Chávez's Birthday
April 12	End of second week of instruction
April 19	End of third week of instruction – Census date
May 17	End of seventh week of instruction
May 31	Academic holiday – Memorial Day observed
June 4	Last day of classes
June 7–11	Final examination period
June 12– <del>13</del> **	<a href="#">Commencement</a> ; end of spring term End of university year (faculty only)
June 14–20	Academic holiday

\* Faculty work day; not a class day.

\*\* **Commencement changed to Saturday only.**

**SUMMER TERM 2010**

June 21	Beginning of university year Beginning of summer term – classes begin
July 2	End of second week of instruction
July 5	Academic holiday – Independence Day Observed
July 12	End of third week of instruction – Census date
July 23	End of first 5-week term
July 26	Beginning of second 5-week term
August 9	End of seventh week of instruction
August 13	End of 8-week term, with finals August 16, 17, 18
August 27	Last day of classes
August 30– September 3	Final examination period for ten-week term
September 3	End of summer term
September 4– September 12	Academic holiday

**FALL TERM 2010**

September 13	Beginning of fall term (faculty only)
September 20	Fall term classes begin
October 1	End of second week of instruction
October 8	End of third week of instruction – Census date
November 5	End of seventh week of instruction
November 11	Academic holiday – Veterans' Day
November 24–28	Academic holiday – Thanksgiving
December 3	Last day of classes
December 6-10	Final examination period
December 11	Mid-Year Commencement End of fall term
December 12– January 2	Academic holiday

**WINTER TERM 2011**

January 3	Beginning of winter term – classes begin
January 14	End of second week of instruction
January 17	Academic holiday – Martin Luther King, Jr.'s Birthday observed
January 24	End of third week of instruction – Census date
February 21	Academic holiday – Washington's Birthday observed
February 22, Tuesday	Classes follow a Monday Schedule, End of seventh week of instruction
March 11	Last day of classes
March 14-18	Final examination period
March 21	*Evaluation Day, End of winter term
March 22–27	Academic holiday

**SPRING TERM 2011**

March 28	Beginning of spring term – classes begin
March 31	Academic holiday – Cesar Chavez's Birthday
April 11	End of second week of instruction
April 18	End of third week of instruction – Census date
May 16	End of seventh week of instruction
May 30	Academic holiday – Memorial Day observed
June 3	Last day of classes
June 6–10	Final examination period
June 11–12	Commencement End of spring term End of university year (faculty only)

# *A Guide to Using the Catalog*

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**General Information:** [www.calpoly.edu](http://www.calpoly.edu)

**Catalog:** [www.catalog.calpoly.edu](http://www.catalog.calpoly.edu)

**General Education:** [www.ge.calpoly.edu](http://www.ge.calpoly.edu)

Academic terminology and a university catalog can be confusing to someone first entering the University. This section explains some of the jargon you will quickly come to know and explains briefly how the catalog is organized.

For the most current information, students are encouraged to visit the Cal Poly web pages shown above and to consult with their academic advisors.

## **College and Departments**

The faculty who supply instruction at Cal Poly hold positions in academic departments, which in turn are grouped into Colleges. All of the academic programs offered by the University are described in the catalog. A complete listing of academic programs at Cal Poly may be found on page 11.

Sections for each College follow in alphabetical order. Departments are arranged alphabetically within the appropriate College.

## **Degrees**

A *degree* is an academic rank which the University confers on a student who satisfactorily completes a designated curriculum, or program of study. Cal Poly grants undergraduate degrees – also called baccalaureate degrees – as well as master's degrees, and, jointly with the University of California at Santa Barbara, the doctorate of education.

### **At the undergraduate level, Cal Poly grants the**

- \* Bachelor of Arts (BA),
- \* Bachelor of Science (BS),
- \* Bachelor of Architecture (BArch), and
- \* Bachelor of Landscape Architecture (BLA).

### **At the graduate level, Cal Poly grants the**

- \* Master of Arts (MA),
- \* Master of Science (MS),
- \* Master of Business Administration (MBA),
- \* Master of City and Regional Planning (MCRP),
- \* Master of Public Policy (MPP), and
- \* Doctorate of Education (EdD) jointly with UCSB

## **Majors**

A *major* is a program of study that provides students with the knowledge, skills and experience necessary to pursue a specific career or advanced study and leads to an undergraduate degree in that subject. Each major is offered in an academic department.

Undergraduate applicants to Cal Poly select a major at the time they apply for admission.

General requirements for bachelor's degrees are given in "Academic Requirements," and for master's degrees in "Graduate Programs." The specific requirements for a particular major degree program are listed under the academic department that offers the major.

The curriculum display for each bachelor's degree program shows courses arranged by *Major*, *Support*, *General Education* and *Electives*. These curriculum displays are useful guides, but students should consult with their academic advisors

**Academic Advising.** Information regarding academic advising is available on page 18.

## **Courses**

Descriptions of Cal Poly courses are located in the back half of the catalog, arranged alphabetically by course prefix (an abbreviation that represents the subject or offering department). The courses in a bachelor's degree curriculum are identified as *major courses*, *support courses*, *general education*, and *electives*.

**Major courses** are designed to provide competence in the professional field in which a degree is earned. They are usually offered by the academic department in which the degree program is offered, but they may include courses from other departments.

**Approved Electives** are courses that students can choose from within the parameters set by their departments.

**Support courses** provide background needed for major courses and are offered by departments other than the department in which the major is offered. For example, most majors in engineering and in the sciences require support courses in mathematics. Some degree programs do not include support courses.

**General Education (GE)** courses provide a common foundation of knowledge for all undergraduate programs. GE requirements are described in detail on page 50.

**Free Electives** are courses that students can choose simply to pursue their own interests. *(Updated 1/12/09)*

**Prerequisites** are one or more courses that must be completed, or other knowledge, skills, or standards that must be demonstrated, before a student is permitted to take certain courses. Prerequisites (if any) for a course are listed in the course description of the catalog.

Some prerequisites have their own prerequisites, forming a string of courses that must all be taken. The catalog course description shows the last course in the prerequisite string of courses. For example, *ME 212 Engineering Dynamics* has prerequisites of MATH 241 and ME 211. *MATH 241* requires MATH 143, which requires MATH 142, which requires MATH 141. *ME 211* requires ME 241 and PHYS 131. To enroll in ME 212, students must have successfully completed MATH 241, 143, 142, 141 and ME 211 and PHYS 131.

Statements in the catalog course descriptions may also contain the words “**concurrent**” which means that two or more courses must be taken in the same term or “**corequisite**” which means that the course or courses may be taken prior to the course being described (prerequisite) or in the same term (concurrent).

**Crosslisted courses** are shared by two or more academic units and have identical titles, descriptions, units, modes of instruction and prerequisites. They are interchangeable for degree requirements. They cannot be repeated for degree credit under separate prefixes. Example: HNRS 141/MATH 141 Calculus I

**Selected Advanced Topics (470s)** are generic courses that offer special topics on an “as needed basis.” The specific title appears in the Class Schedule and on the students’ transcripts.

**Topic courses** are shown in the catalog with generic titles and are repeatable with different topics. Specific topic titles appear in the Schedule of Classes and on students’ transcripts. Example: ENGL 439 Significant British Authors, repeatable to 12 units with different subtitles (e.g., Jane Austen, Victorian Poets, Hardy).

Other statements in the course descriptions include, “**major credit limit**” (total number of units allowed toward the major) and “**total credit limit**” (total number of units students can take a course for credit).

## COURSE NUMBERING SYSTEM

Courses are generally numbered according to the plan shown below.

- 010–099 Nondegree credit or short courses.
- 100–299 Courses primarily for freshman and sophomore students.
- 300–399 Courses primarily for advanced undergraduate students with prerequisite coursework.
- 400–499 Courses for advanced undergraduates. Certain 400-level courses can be used in graduate programs. See page 70.
- 500–599 Graduate courses.

## MODES OF INSTRUCTION

The mode of instruction is included in each course description; for supervision courses, no mode is indicated. Some courses have more than one mode of instruction.

Mode	Class meets weekly for:
Activity	2 hours per unit of credit.
Laboratory	3 hours per unit of credit.
Lecture	1 hour per unit of credit.
Seminar	1 hour per unit of credit.
Supervision	3 hours per week per unit of credit. Courses involve independent work done by students under the guidance of the faculty and do not meet regularly in a classroom.

## Concentrations

A **concentration** is a group of courses designed to provide specialized knowledge within a bachelor's degree program. Completion of a concentration is noted on the student's transcript, but not shown on the diploma.

## Specializations

A **specialization** is a similarly specialized group of courses in a master's degree program. Completion of a specialization is noted on the student's transcript and shown on the diploma.

## Minors

A **minor** is an integrated, coherent group of courses designed to give a student knowledge in an academic area outside of the major field of study. The minor is completed along with the requirements for the bachelor's degree. For more information and a list including available minors at Cal Poly, see page 11.

## Quarters and Quarter Units

Cal Poly's academic calendar consists of four quarters – Fall, Winter, Spring and Summer (see page 7 for Academic Calendar).

Cal Poly's **academic year** consists of Fall, Winter and Spring quarters.

The **university year** includes, and begins with, Summer Quarter.

Each course offered by the University carries a value in **quarter units**, often referred to simply as units or credits.

To convert semester units to quarter units, multiply by 1.5. For example,

$$6 \text{ semester units} \times 1.5 = 9 \text{ quarter units.}$$

# Accreditation

The University is fully accredited by the Western Association of Schools and Colleges (WASC), which may be contacted at:

Western Association of Schools and Colleges  
985 Atlantic Avenue, Suite 100  
Alameda, California 94501  
(510) 748-9001

The School of Education offers instruction and services credentials which are fully accredited by California Commission on Teacher Credentialing (CCTC). The credentials are described in catalog sections on "Teaching Credential Programs" and "Specialist Education Credentials."

Program	Accrediting Agency
Art and Design, BFA	National Association of Schools of Art and Design (NASAD)
Architecture, BArch	National Architectural Accrediting Board (NAAB)
Business Administration, BS, MBA	Association to Advance Collegiate Schools of Business (AACSB)
City and Regional Planning, BS, MCRP	Planning Accreditation Board (PAB)
Computer Science, BS	Accreditation Board for Engineering and Technology (ABET), Computing Accreditation Commission (CAC)
Construction Management, BS	American Council for Construction Education (ACCE)
Economics, BS	Association to Advance Collegiate Schools of Business (AACSB)
Engineering Programs: Aerospace Engineering, BS Architectural Engineering, BS BioResource and Agricultural Engineering, BS Civil Engineering, BS Computer Engineering, BS Electrical Engineering, BS Environmental Engineering, BS Industrial Engineering, BS Manufacturing Engineering, BS Materials Engineering, BS Mechanical Engineering, BS Software Engineering, BS	Accreditation Board for Engineering and Technology (ABET), Engineering Accreditation Commission (EAC)
Forestry and Natural Resources, BS	Society of American Foresters (SAF)
Graphic Communication, BS	Accrediting Counsel for Collegiate Graphic Communications (ACCGC)
Industrial Technology, BS	Association of Technology, Management, and Applied Engineering (ATMAE)
Landscape Architecture, BLA	American Society of Landscape Architects (ASLA) Landscape Architectural Accreditation Board (LAAB)
Music, BA	National Association of Schools of Music (NASM)
Nutrition, BS (Applied Nutrition Concentration)	American Dietetics Association (ADA), Commission on Accreditation for Dietetics Education (CADE)
Recreation, Parks, and Tourism Administration, BS	National Recreation and Parks Association (NRPA) and the American Association for Physical Activity and Recreation (AAPAR)

# Policies On The Rights & Responsibilities Of Individuals

## STATEMENT ON DIVERSITY

The following excerpts are taken from *The Cal Poly Statement on Diversity*, which has been endorsed by the Cal Poly Academic Senate Resolution AS-506-98/DTF:

“At the heart of a university is the responsibility for providing its students with a well-rounded education, an education that fosters their intellectual, personal and social growth. The ultimate product of universities is education in the broadest sense, including preparation for life in the working world.” In this regard, it is in the compelling interest of Cal Poly, the State, and the Nation to provide our students with an education that is rich with a diversity of ideas, perspectives, and experiences.”

“Cal Poly’s commitment to diversity signals an affirmation of the highest educational goals for this University, including mutual respect, civility, and engaged learning.”

## POLICIES ON THE RIGHTS OF INDIVIDUALS

Cal Poly is a community enriched by individual differences. The University is committed to respecting and protecting the rights of individuals. This section presents a summary of University non-discrimination policies and procedures for pursuing complaints under these policies. The office of Employment Equity, working with the Inclusive Excellence Council, has been designated to oversee and coordinate implementation of campus non-discrimination policies. Except where otherwise indicated, procedures for reporting incidents of discrimination can be found in “Reporting Guidelines.”

### Non-discrimination Policy

Cal Poly does not discriminate in admission or access to, or treatment or employment in, its programs and activities, including intercollegiate athletics. Cal Poly and its auxiliary organizations are committed to maintaining and implementing policies and procedures in compliance with applicable CSU, State, and federal nondiscrimination and affirmative action laws, regulations, and policies. Cal Poly supports an environment free of unlawful discrimination on the basis of:

- Race
- Color
- Ethnicity
- National Origin
- Age
- Religion
- Sex
- Sexual Orientation
- Gender Identity
- Marital Status
- Physical Disability
- Mental Disability
- Medical Condition
- Veteran Status (as defined by the Vietnam-Era Veterans' Readjustment Assistance Act of 1974, as amended)

## Federal, State and CSU Mandates

Cal Poly complies with the requirements of Title VI and Title VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Sections 504 and 508 of the Rehabilitation Act of 1973, the Americans with Disabilities Act of 1990 and other CSU, State, and federal laws, regulations, and policies prohibiting unlawful discrimination.

## Protection from Retaliation

It is critical that individuals not be deterred from reporting possible prohibited harassment. CSU policy [Executive Order 927] prohibits retaliation against individuals who have or are believed to have filed a discrimination complaint, opposed a discriminatory act, or participated in a discrimination investigation or proceeding.

## Reporting Guidelines

Inquiries regarding the application of these laws, regulations and policies to programs and activities of California Polytechnic State University, or individuals wishing to file a complaint alleging a violation of these policies, may contact the office of Employment Equity, Fisher Science (Bldg. 33), Rm 290, (805)-756-6770, <http://employeequity.calpoly.edu>, or other designated campus offices as indicated in the following administrative guidelines.

- \* Complaints from or about students alleging violations of these policies by other students may be directed to the office of the Vice President for Student Affairs, Administration Building (Bldg. 01), Room 209, (805) 756-1521; the office of the Dean of Students, Student Health Center (Bldg. 17), Room 113, (805) 756-0327; or the office of Student Rights and Responsibilities, Student Services Building (124), (805) 756-0327.
- \* Student disability-related complaints may be directed to the Disability Resource Center, Student Services Building (124), Room 119, (805) 756-1395.
- \* Students wishing to seek additional information or file a complaint not previously addressed should contact the office of Employment Equity, Fisher Science (Bldg. 33), Room 290, (805) 756-6770 for assistance.
- \* Complaints by or against employees who are covered by either collective bargaining agreements or CSU system-wide procedures shall be processed in accordance with the applicable collective bargaining agreement or system-wide procedures. Questions should be directed to the office of the Associate Vice President for Academic Personnel, Administration (Bldg. 01), Room 314, (805) 756-2844 for faculty matters; and the office of the Director of Human Resources, Administration (Bldg. 01), Rm 110, (805) 756-6564, for staff or management issues.
- \* Complaints from non-represented employees or Independent Contractors may be directed to the office of Employment Equity, Fisher Science (Bldg. 33), Room 290, (805) 756-6770.



- \* Complaints by or against employees of the Cal Poly Corporation must follow the Corporation's "Procedures for Resolving Harassment Complaints." Any such complaints should be directed to either her or his supervisor or the Advisor on Harassment Concerns, Corporation Building (15), (805) 756-1151. [www.calpolycorporation.org/docs/policies/pm207.pdf](http://www.calpolycorporation.org/docs/policies/pm207.pdf)
- \* Employees and students of Associated Students, Inc., comply with University policies. Employees of Associated Students, Inc., or others who believe that they have been discriminated against can file a complaint using the ASI "Policy Prohibiting Harassment." [www.asi.calpoly.edu/forms\\_and\\_policies](http://www.asi.calpoly.edu/forms_and_policies) (Policy Manuals, ASI Personnel Policy Manual)
- \* If an act of discrimination is alleged to have occurred over the campus's information resources infrastructure—telephones, computers, network, etc.—redress may be through Instructional Technology Service's "Responsible Use Policy." Initial inquiries regarding violations should be directed to the office of the Vice Provost and Chief Information Officer, (Bldg. 14), Room 113, (805) 756-5541.

Filing a complaint about discrimination with the University is not a prerequisite to filing a complaint with a federal or state agency.

### **ACADEMIC FREEDOM** (Updated 8/26/09)

Cal Poly recognizes and supports the principle of academic freedom, by which each instructional faculty member, researcher, librarian and counselor has the right to teach, to conduct research, and to publish material relevant to that faculty member's discipline, even when such material is controversial.

The University also guarantees to its faculty the same rights shared by all citizens, which include:

- \* the right to free expression,
- \* the right to assemble, and
- \* the right to criticize and seek revision of the institution's regulations.

At the same time, the faculty should recognize an equally binding obligation to perform their academic duties responsibly and to comply with the internal regulations of the University.

Each faculty member is expected to recognize the right of free expression of other members of the university community; intolerance and personal abuse are unacceptable.

Faculty shall not claim to be representing the University unless authorized to do so.

Cal Poly endorses the nationally recognized definition of academic freedom from the American Association of University Professors (AAUP): The 1940 *Statement of Principles on Academic Freedom and Tenure with 1970 Interpretative Notes*, as follows:

(a) Teachers<sup>1</sup> are entitled to full freedom in research and in the publication of results, subject to the adequate

performance of their other academic duties; but research, for pecuniary return, should be based upon an understanding with the authorities of the institution.

(b) Teachers are entitled to freedom in the classroom in discussing their subject, but they should be careful not to introduce into their teaching controversial subject matter which has no relation to the subject.<sup>2</sup> Limitations of academic freedom because of religious or other aims of the institution should be clearly stated in writing at the time of appointment.

(c) College and university teachers are citizens, members of a learned profession, and officers of an educational institution. When they speak or write as citizens, they should be free from institutional censorship or discipline, but their special position in the community imposes special obligations. As scholars and educational officers, they should remember that the public may judge their profession and institution by their utterances. Hence, they should at all times be accurate, should exercise appropriate restraints, should show respect for the opinions of others, and should make every effort to indicate they are not speaking for the institution.

## **STUDENT ACADEMIC RIGHTS & RESPONSIBILITIES**

### **Academic Rights**

The classroom (including laboratories, field trips, independent study, etc.) is the essential part of any university where freedom to learn should flourish. The instructor has the responsibility for the manner of instruction and the conduct of the classroom. The instructor should not act in any way that denies the rights of students as set forth below:

Students are free to take reasoned exception to the data or views offered in courses. It is the responsibility of the instructor to take every precaution to ensure that what is presented is factual. If the instructor's presentation is in the area of opinion, belief, or debatable fact, it is the instructor's responsibility to make this clear to the students. Students may be required to know thoroughly the particulars set forth by the instructor, but they are free to reserve personal judgment as to that which is presented in the classroom.

<sup>1</sup> The footnote from the 1940 Statement states: "The word 'teacher' as used in this document is understood to include the investigator who is attached to an academic institution without teaching duties." Reference: AAUP: The 1940 *Statement of Principles on Academic Freedom and Tenure with 1970 Interpretative Notes*, adopted by the Council of the American Association of University Professors in April 1970 and endorsed by the Fifty-sixth Annual Meeting as Association policy, [www.aaup.org/AAUP/pubsres/policydocs/contents/1940statement.htm](http://www.aaup.org/AAUP/pubsres/policydocs/contents/1940statement.htm)

<sup>2</sup> The footnote from the 1970 Interpretative Notes on the AAUP Statement reads: "The intent of this statement is not to discourage what is 'controversial.' Controversy is at the heart of free academic inquiry which the entire statement is designed to focus. The passage serves to underscore the need for teachers to avoid persistently intruding material which has no relation to the subject."

The student has the right to substantial presentations appropriate to the course. Unjustified failure of the instructor to meet or prepare for classes, which results in incompetent performance, is a legitimate ground for student complaints against the instructor.

The student has the right to a statement at the beginning of each quarter providing: instructor's name, office location, office telephone number, and office hours; texts and supplementary materials required for the course; purpose of the course; prerequisites; requirements for grading; frequency and types of tests; and other information to assure student's understanding of the nature and requirements of the course.

A **Fairness Board** has been established to hear grievances of students who believe their academic rights have been denied or violated. The process and procedure of evaluation in the course shall be the sole criterion of the Fairness Board. Students may contact the Academic Senate (756-1258) for clarification of the description and procedures for the Fairness Board and the appeal process for grade disputes. Students may also contact the Dean of Students (756-0327) for informal assistance with grade disputes.

### **Academic Responsibilities**

Students enrolled in a class are responsible for meeting standards of performance and conduct established by the University and the instructor. Students are responsible for registering and "adding" and "dropping" classes in a timely fashion, to ensure that others have an opportunity to take classes. Students are responsible for completing and submitting all class assignments, examinations, tests, projects, reports, etc., by scheduled due dates, or face penalties. If any problem arises regarding course work or attendance, the student is held responsible for initiating communication and contact with the instructor. In addition, students are held responsible for behavior and conduct adverse to the preservation of order as established by the University and the instructor. Students are responsible for meeting their degree requirements as provided in the university catalog.

### **Cheating and Plagiarism**

Cal Poly does not tolerate academic cheating or plagiarism in any form.

Learning to think and work independently is part of the educational process.

Cheating or plagiarism in any form is considered a serious violation of expected student behavior and may result in disciplinary action. All faculty and students are encouraged to review the formal policy on cheating and plagiarism (including definitions, sanctions, and appeal procedures) found in the Campus Administrative Manual, Section 684.

University policy can be summarized simply:

*As a student, you are responsible for your own work  
and you are responsible for your actions.*

## **USE AND RELEASE OF STUDENT INFORMATION**

[www.ess.calpoly.edu/records/stu\\_info/ferpa.htm](http://www.ess.calpoly.edu/records/stu_info/ferpa.htm)

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their educational records. This federal law applies to all schools that receive funding under most programs administered by the Department of Education. The primary rights afforded each student are the right to inspect and review his/her educational records, the right to seek to have the records amended, and the right to have some control over the disclosure of information from the records.

## **RESPONSIBLE USE OF INFORMATION TECHNOLOGY RESOURCES**

<http://security.calpoly.edu/policies/>

Information technology resources are provided to support the University's mission of education, research and service. To ensure that these shared and finite resources are used effectively to further the University's mission, each user has the responsibility to:

- use the resources appropriately and efficiently;
- respect the freedom and privacy of others;
- protect the stability and security of the resources; and
- understand and fully abide by established University policies and applicable public laws.

All students, faculty and staff are encouraged to review the policy, which covers authorized use/access, data security, confidentiality and privacy, network and system integrity, commercial use, copyright infringement, and more.

The full policy describes consequences of non-compliance and procedures for reporting and responding to complaints. It includes definitions and examples of responsible and irresponsible use. Information Technology Services (ITS) is responsible for policy oversight and compliance. For more information, call 805-756-2966 or [it-policy@calpoly.edu](mailto:it-policy@calpoly.edu).

## **E-MAIL -- AN OFFICIAL MEANS OF COMMUNICATION TO STUDENTS**

[www.email.calpoly.edu/policy/email-student-final.html](http://www.email.calpoly.edu/policy/email-student-final.html)

Campus policy permits colleges, departments and faculty to use electronic mail (e-mail) to send official communications to students, i.e., messages pertaining to the conduct of university business for academic or administrative purposes. Using e-mail for such purposes is at the discretion of the sender and in no way precludes the use of other communication methods. Official communications are sent to a student's university-assigned e-mail address ([username@calpoly.edu](mailto:username@calpoly.edu)).

Students are responsible for receiving and reading official e-mail communications in a timely manner and for taking action where appropriate. Redirecting university e-mail to a non-university e-mail address does not absolve students



from their responsibilities associated with official communications.

For more information about the policy and related standards and practices, including frequently asked questions, see: [www.email.calpoly.edu/policy/index.html](http://www.email.calpoly.edu/policy/index.html).

### **ACCESSIBILITY OF CAL POLY ELECTRONIC AND INFORMATION TECHNOLOGY RESOURCES**

<http://accessibility.calpoly.edu>

The Americans with Disabilities Act (ADA) provides that no qualified individual with a disability be denied access to or participation in services, programs, and activities at Cal Poly. This act applies to virtually all aspects of campus activities, including employment, teaching and learning, and services provided to the campus community.

It is the policy of the California State University to make information technology resources and services accessible to all CSU students, faculty, staff, and the general public regardless of disability status. Cal Poly is committed to ensuring that university information and services delivered electronically are made accessible and the needs of individual students and employees with disabilities are accommodated. For more information regarding Cal Poly plans and policies and related standards and practices related to accessibility, visit: <http://accessibility.calpoly.edu>

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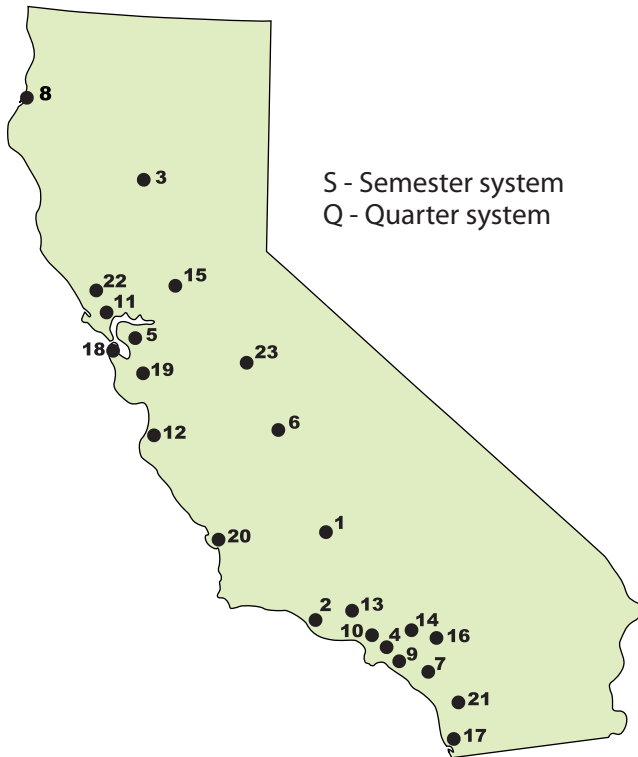
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**Graduate Admissions**

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Check out the admission website for the entire California State University: [www.csumentor.edu](http://www.csumentor.edu). You will find helpful hints, frequently asked questions, campus tours, and general information about all 23 campuses.



- S - Semester system  
Q - Quarter system
- 1 California State University, Bakersfield • Q  
9001 Stockdale Highway, Bakersfield, CA 93311-1022  
(661) 654-3036 • [www.csubak.edu](http://www.csubak.edu)
  - 2 California State University, Channel Islands • S  
One University Drive, Camarillo, CA 93012  
(805) 437-8500 • [www.csuci.edu](http://www.csuci.edu)
  - 3 California State University, Chico • S  
400 W. First Street, Chico, CA 95929-0722  
(530) 898-6321 • [www.csuchico.edu](http://www.csuchico.edu)
  - 4 California State University, Dominguez Hills • S  
1000 East Victoria Street, Carson, CA 90747  
(310) 243-3696 • [www.csudh.edu](http://www.csudh.edu)
  - 5 California State University, East Bay • Q  
25800 Carlos Bee Blvd., Hayward, CA 94542-3035  
(510) 885-2784 • [www.csueastbay.edu](http://www.csueastbay.edu)
  - 6 California State University, Fresno • S  
5150 North Maple Avenue, Fresno, CA 93740-0057  
(559) 278-2261 • [www.csufresno.edu](http://www.csufresno.edu)
  - 7 California State University, Fullerton • S  
800 N. State College Blvd., Fullerton, CA 92831-3599  
(714) 278-2300 • [www.fullerton.edu](http://www.fullerton.edu)
  - 8 Humboldt State University • S  
1 Harpst Street, Arcata, CA 95521-8299  
(707) 826-4402 • (866) 850-9556 • [www.humboldt.edu](http://www.humboldt.edu)
  - 9 California State University, Long Beach • S  
1250 Bellflower Blvd., Long Beach, CA 90840-0106  
(562) 985-5471 • [www.csulb.edu](http://www.csulb.edu)
  - 10 California State University, Los Angeles • Q  
5151 State University Drive, Los Angeles, CA 90032-8530  
(323) 343-2752 • [www.calstatela.edu](http://www.calstatela.edu)
  - 11 California Maritime Academy • S  
200 Maritime Academy Drive, Vallejo, CA 94590-8181  
(800) 561-1945 • [www.csum.edu](http://www.csum.edu)
  - 12 California State University, Monterey Bay • S  
100 Campus Center Drive, Seaside, CA 93955-8001  
(831) 582-3518 • [www.csumb.edu](http://www.csumb.edu)
  - 13 California State University, Northridge • S  
18111 Nordhoff Street, Northridge, CA 91330-8207  
(818) 677-3700 • [www.csun.edu](http://www.csun.edu)
  - 14 California State Polytechnic University, Pomona • Q  
3801 West Temple Avenue, Pomona, CA 91768-4003  
(909) 869-3210 • [www.csupomona.edu](http://www.csupomona.edu)
  - 15 California State University, Sacramento • S  
6000 J Street, Sacramento, CA 95819-6112  
(916) 278-3901 • [www.csus.edu](http://www.csus.edu)
  - 16 California State University, San Bernardino • Q  
5500 University Parkway, San Bernardino, CA 92407-2397  
(909) 537-5188 • [www.csusb.edu](http://www.csusb.edu)
  - 17 San Diego State University • S  
5500 Campanile Drive, San Diego, CA 92182-7455  
(619) 594-6336 • [www.sdsu.edu](http://www.sdsu.edu)
  - 18 San Francisco State University • S  
1600 Holloway Avenue, San Francisco, CA 94132-4002  
(415) 338-1113 • [www.sfsu.edu](http://www.sfsu.edu)
  - 19 San José State University • S  
One Washington Square, San José, CA 95192-0016  
(408) 283-7500 • [www.sjsu.edu](http://www.sjsu.edu)
  - 20 California Polytechnic State University, San Luis Obispo • Q  
San Luis Obispo, CA 93407  
(805) 756-2311 • [www.calpoly.edu](http://www.calpoly.edu)
  - 21 California State University, San Marcos • S  
Office of Admissions, 333 S. Twin Oaks Valley Road  
San Marcos, CA 92096-0001  
(760) 750-4848 • [www.csusm.edu](http://www.csusm.edu)
  - 22 Sonoma State University • S  
1801 East Cotati Avenue, Rohnert Park, CA 94928  
(707) 664-2778 • [www.sonoma.edu](http://www.sonoma.edu)
  - 23 California State University, Stanislaus • 4-1-4  
One University Circle, Turlock, CA 95382  
(209) 667-3070 • [www.csustan.edu](http://www.csustan.edu)

Note: Telephone numbers are to the campus admission office.

# Undergraduate Admissions

Office of Admissions, Recruitment & Financial Aid  
<http://admissions.calpoly.edu/>  
 Administration Building (01), Room 206  
 (805) 756-2311 Fax: (805) 756-5400  
 Tour Information Line: (805) 756-5734  
 email: [admissions@calpoly.edu](mailto:admissions@calpoly.edu)

## ADMISSION REQUIREMENTS

Admission to Cal Poly is competitive. Consequently, Cal Poly comprehensively reviews all applications as we look for students who have strong academic records and are active in and outside the classroom. Beyond the basic qualifications for the California State University, Cal Poly does not require a minimum standardized test score, class rank, or GPA. In fact, it is impossible to predict a candidate's chances of admission by looking at the academic record alone. That is why other factors for admission are considered, in an objective format.

The university community has also approved consideration for admission based on other factors deemed important to the campus. (*Correction, effective Summer 2009*)

## FIRST-TIME FRESHMAN FACTORS

When a freshman application is reviewed, the following are considered:

- The applicant's program of study in secondary school/college (the major to which application is made)
- Completion of CSU and Cal Poly program required coursework with a grade of C or better
- Academic performance in the applicant's classes (GPA)
- Standardized test scores
- The applicant's extra-curricular activities and work experience

## \*UPPER-DIVISION TRANSFER FACTORS

When an upper-division transfer application is reviewed, the following are considered:

- The applicant's intended program of study (the major to which application is made)
- Completion of CSU and Cal Poly program required coursework with a grade of C or better
- Completion of General Education and Intersegmental General Education Transfer Curriculum (IGETC)
- Academic performance in the applicant's classes (GPA)
- The applicant's extracurricular activities and work experience

\*Applicants have completed at least 60 semester or 90 quarter transferable units

Additionally, qualified freshman or transfer applicants to the majors of Art and Design and Music are invited to submit additional supplemental information after a secondary review of their application. Qualified Art and Design applicants are requested to submit a portfolio and qualified Music applicants are requested to audition either on tape or in person. Final selection for admission to Art and Design or Music is then determined by the major department.

*Please note:* All students must declare a major when submitting their application because, unlike most other universities, Cal Poly encourages all students to take at least one course each term in their major program of study, starting immediately on entry. Some students change their major after they have started at the University, but because competition for entry into most majors is strong, and because of Cal Poly's curriculum structure, transfer from one major to another cannot be guaranteed.

For a comprehensive look at Cal Poly's selection criteria, review the selection criteria *online* for the major, term and level (freshman or transfer) for which you are applying: <http://admissions.calpoly.edu/admiss/undergrad/index.html>

## Hardship Consideration

Cal Poly will provide additional consideration to place-bound, domiciled, upper-division transfer candidates who are not able to leave the local area and who have completed all lower-division and general education courses required for degree completion in their major. After having filed an on-time application for a fall term, and if not selected, qualified candidates can be evaluated for admission under the hardship consideration. To be reviewed for Hardship Consideration, contact the Admissions Office for detailed information.

## APPLICATION PROCEDURES

For admission consideration, Cal Poly, San Luis Obispo requires applicants to submit the online application through the CSUMentor website with a \$55 application fee that is both non-refundable and non-transferable. The application fee cannot be used to apply to another term.

Applicants should not submit additional information beyond the information gathered on the application unless requested to do so by the University.

Applicants are advised to submit complete and accurate information on the application for admission.

Failure to file complete, accurate, and authentic application documents may result in denial of admission, cancellation of academic credit, suspension, or expulsion (Section 41301 of Title 5, California Code of Regulations).

View detailed application information online: [http://admissions.calpoly.edu/undergrad/prospective\\_application\\_info.html](http://admissions.calpoly.edu/undergrad/prospective_application_info.html)

## CAL POLY APPLICATION FILING PERIODS

Cal Poly accepts domestic undergraduates (freshmen/transfers) for the Fall Quarter only.

**Freshmen Applicants** have two options under which they can apply:

1. The **“Regular Decision”** option is used by the vast majority of freshmen applicants and requires applicants to:

- Submit Cal Poly’s online application with the \$55.00 fee during the application filing period of October 1<sup>st</sup> to November 30<sup>th</sup>.

Please note: Applicants will receive notifications by April 1st and admitted applicants must accept or decline Cal Poly’s offer of admission by May 1<sup>st</sup>.

2. The **“Early Decision”** option allows qualified freshmen applicants to know, around mid-December, if Cal Poly will offer them admission to fall quarter. Applicants selected will have test scores on the higher end of the scale, are in the top 5-10% of their graduating class and have established strong academic records throughout their entire secondary education. This option requires applicants to:

- Submit Cal Poly’s online application with the \$55.00 fee during the application filing period of October 1 - October 31<sup>st</sup> (note: Cal Poly will use the ACT or SAT1 (math and critical reading only) scores you have at the time of application).

Please note: Applicants will receive notifications by mid-December and admitted applicants must accept or decline Cal Poly’s offer of admission by January 15<sup>th</sup>. Applicants not selected through this option will have their application reviewed through the regular admission program.

**Transfer Applicants** apply through the **“Regular Decision”** option which requires its applicants to:

- Submit Cal Poly’s online application with the \$55.00 fee during the application filing period of October 1<sup>st</sup> to November 30<sup>th</sup>.

Please note: Applicants will receive notifications by April 1st and admitted applicants must accept or decline Cal Poly’s offer of admission by May 1st.

**Any offer of admission to Cal Poly is conditional pending satisfactory compliance with the ‘Terms and Conditions’ of enrollment which are found online:**

[http://admissions.calpoly.edu/undergrad/reg\\_terms.html](http://admissions.calpoly.edu/undergrad/reg_terms.html)

## RETURNING STUDENTS

### Returning Students Seeking a Different Major

Students wishing to return to Cal Poly in a different major must file an online application for admission, including the application fee, by the same application deadlines as new students. They will compete equally with new applicants for the available transfer openings in the new major.

### Returning Students into Same Major

Matriculated students who have not registered for one or two consecutive quarters will be entitled to their registration priority without applying for readmission. Summer Quarter is a regular quarter and is counted in determining the length of absence. Matriculated students who have not registered for three consecutive quarters or more (counting Summer Quarter) and have not been on an approved leave of absence may return to the University without going through the competitive admissions process providing the following criteria are met:

1. The student must return in the same major.
2. The student must be in good standing (2.0 or better Cal Poly GPA) or have received permission to return from their Academic Dean.
3. A CSU paper application for readmission must be filed or postmarked before the applicable deadline date listed below. The application fee must accompany the application for readmission.

### Application Deadlines for Returning Students

Summer Quarter .....	April 1st
Fall Quarter .....	* <del>May 1st</del> July 1st <i>changed 5/5/09</i>
Winter Quarter .....	October 1st
Spring Quarter .....	February 1st

## OTHER INFORMATION

### Consistency with State Regulations

The philosophy of the Admissions Office is consonant with the mission of California Polytechnic State University, and is in accordance with Title 5, Chapter 1, Subchapter 3, of the California Code of Regulations. If unsure of these requirements, please view the Cal Poly Admissions website at [admissions.calpoly.edu](http://admissions.calpoly.edu) or call the Admissions Office (805-756-2311).

### Graduate Admission Requirements

For information regarding graduate admission, see the "Graduate Programs" section.

### Determination of Residence for Nonresident Tuition Purposes

Cal Poly’s Admissions Office determines the residence status of all new and returning students for nonresident tuition purposes. Please refer to the "Appendix" for detailed information.

\* This deadline may be adjusted for previously disqualified students who are on contract with their respective colleges.

# International Student Admissions

Office of Admissions, Recruitment & Financial Aid  
<http://admissions.calpoly.edu/admiss/international>  
 Administration Building (01), Room 206  
 (805) 756-2311 Fax: (805) 756-5400  
 email: [admissions@calpoly.edu](mailto:admissions@calpoly.edu)

## ADMISSION REQUIREMENTS

Cal Poly assesses the academic preparation of international students using factors such as academic performance, verification of English proficiency and financial resources. For this purpose, “international students” include those who hold U.S. temporary visas as students, exchange visitors, or those in other nonimmigrant classifications.

For admission consideration for an undergraduate or graduate program, applicants must have graduated from a secondary, higher secondary, or tertiary institution which is recognized by the respective country’s education ministry. A file completed by the deadline includes:

- official transcripts from all schools attended, showing evidence of graduation from secondary school and all coursework and any certificates or degrees received;
- confidential financial statement;
- health insurance;
- promissory note;
- International Education Background form;
- Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS).

All official documents must be submitted in the native language and accompanied by a certified English translation. International applicants may also be required to submit a fee for an international credential analysis from a specified agency if requested by the Admissions Office.

After all required forms and academic documents have been received, the University determines the candidate’s eligibility for admission and notifies the applicant of the results. International applicants admitted to Cal Poly receive a Certificate of Eligibility (I-20 form) which is necessary to obtain a student visa to enter the United States or for requesting permission from the U.S. Citizenship & Immigration Services (formerly INS) for transfer to Cal Poly from another U.S. school. Other requirements may be imposed by USCIS.

Applicants should note: the I-20 form is valid for enrollment only at Cal Poly for the quarter indicated, and

includes an expiration date. If it is necessary to change an application to another term, applicants must make the request to Cal Poly in writing and another application and application fee are required.

## TOEFL Requirement

All undergraduate applicants whose native language is not English must present a score of 550 or above on the Test of English as a Foreign Language (TOEFL) or a score of 7 or above on the International English Language Testing System (IELTS). Those opting to take the Computer Based Test of English as a Foreign Language must present a score of 213 or above or those opting to take the Internet Based Test must present a score of 80 or above. View detailed information online:

<http://admissions.calpoly.edu/admiss/international/toefl.html>

## APPLICATION PROCEDURES

International students apply online through CSUMentor ([www.csumentor.edu](http://www.csumentor.edu)) and should reference this webpage for more information:

[http://admissions.calpoly.edu/admiss/international/application\\_deadlines.html](http://admissions.calpoly.edu/admiss/international/application_deadlines.html)

## International Application Deadlines

Cal Poly uses separate requirements and application filing dates in the application process for international students. International students must also demonstrate that they have financial resources adequate to meet expenses at the University without resorting to unauthorized employment. Cal Poly’s file completion deadlines for international students are:

### Undergraduates

<i>Term</i>	<i>Application Filing Period</i>	<i>File Must Be Completed By:</i>
Fall	Oct 1 – Nov 30	April 1
* Winter	June 1 – June 30	Sept. 1

\*Transfer students with 60 or more transferable semester units only.

### Graduates

<i>Term</i>	<i>Application Filing Period</i>	<i>File Must Be Completed By:</i>
Fall	Oct 1 – Nov 30	April 1
Winter*	Oct 1 – June 30	Sept. 1



# Graduate Admissions

Research and Graduate Programs Office  
Math and Science Bldg. (38), Room 154  
805 756-1508 FAX 805 756-1725

## Application for Admission

An application for graduate studies may be obtained from the Admissions Office of any CSU campus. The application form and official transcripts should be sent directly to the Admissions Office at Cal Poly. An electronic version of the CSU graduate application is available on the World Wide Web at [www.csumentor.edu](http://www.csumentor.edu). The CSU Mentor system allows students to browse through general information about CSU's twenty-three campuses, view multimedia campus presentations, send and receive electronic responses to specific questions, and apply for admission and financial aid.

All graduate and post-baccalaureate applicants (e.g., joint PhD and EdD applicants, master's degree applicants, those seeking educational credentials, and holders of baccalaureate degrees interested in taking courses for personal or professional growth) must file a complete graduate application as described in the graduate and post-baccalaureate admission materials at [www.csumentor.edu](http://www.csumentor.edu).

Applicants who completed undergraduate degree requirements on a CSU campus and graduated the preceding term are also required to complete and submit an application and the \$55 nonrefundable application fee. Since applicants for post-baccalaureate programs may be limited to the choice of a single campus on each application, rerouting to alternative campuses or later change of campus choice is not guaranteed. To be assured of initial consideration by more than one campus, it is necessary to submit separate applications (including fees) to each. Applications submitted by way of [www.csumentor.edu](http://www.csumentor.edu) are expected unless submission of an electronic application is impossible.

The CSU advises prospective students that they must supply complete and accurate information on the application for admission, residence questionnaire, and financial aid forms. Further, applicants must submit authentic and certified transcripts of all previous academic work attempted. Transcripts must be official and sent directly from the issuing institution in a sealed envelope. Failure to file complete, accurate, and authentic application documents may result in denial of admission, cancellation of academic credit, suspension, or expulsion (Section 41301, Article 1.1, Title 5, *California Code of Regulations*).

All master's and credential applicants must submit the following documents to the Office of Admissions to establish their admission portfolio:

- Application for graduate admission
- \$55 application fee
- Certified transcripts from all schools attended

## Deadlines

Master's and credential applicants may file an application for admission at any time. In order to be considered for admission in the "targeted" quarter, the portfolio must be completed by the dates provided at the following websites:

Deadlines for graduate programs are available at [www.ess.calpoly.edu/admiss/grad/regular.html](http://www.ess.calpoly.edu/admiss/grad/regular.html).

Deadlines for credential programs are available at <http://coe.calpoly.edu>.

## Graduate and Post-Baccalaureate Admission Requirements

### Admission Requirements

Graduate and post-baccalaureate applicants may apply for a degree objective, a credential or certificate objective. Depending on the objective, the CSU considers an application for admission as follows:

- **General Requirements** -- The minimum requirements for admission to graduate and post-baccalaureate studies at a California State University campus are in accordance with university regulations as well as Title 5, chapter 1, subchapter 3 of the *California Code of Regulations*.

Specifically, a student shall:

- (1) have completed a four-year college course of study and hold an acceptable baccalaureate degree from an institution accredited by a regional accrediting association, or shall have completed equivalent academic preparation as determined by appropriate campus authorities;
- (2) be in good standing at the last college or university attended;
- (3) have attained a grade point average of at least 2.5 (A = 4.0) in the last 60 semester (90 quarter) units attempted or have earned a grade point average of at least 2.5 on the last degree completed by the candidate; and
- (4) satisfactorily meet the professional, personal, scholastic, and other standards for graduate study, including qualifying examinations, as appropriate campus authorities may prescribe. In unusual circumstances, a campus may make exceptions to these criteria.

- **Post-Baccalaureate Unclassified** – To enroll in graduate courses for professional or personal growth, a candidate must be admitted as a postbaccalaureate unclassified student. By meeting the minimum requirements, the

candidate is eligible for admission as a postbaccalaureate unclassified student. Some departments may restrict enrollment of unclassified students due to heavy enrollment pressure.

Admission in this status does not constitute admission to, or assurance of consideration for admission to, any graduate degree or credential program, and requires approval from the Dean of Research and Graduate Programs.

- **Post-Baccalaureate Classified**, e.g., admission to an education credential program -- Candidates who wish to enroll in a credential or certificate program are required to satisfy additional professional, personal, scholastic, and other standards, including qualifying examinations, prescribed by the campus.
- **Graduate Conditionally Classified** -- Candidates may be admitted to a graduate degree program in this category if, in the opinion of appropriate campus authority, deficiencies can be remedied by additional preparation.
- **Graduate Classified** -- To pursue a graduate degree, candidates are required to fulfill all of the professional, personal, scholastic, and other standards, including qualifying examinations, prescribed by the campus.

If your transcript is not received by the Admissions Office prior to the first day of what would be your second quarter, or if your degree was not awarded for a preceding term, you are required to reapply for a subsequent quarter. A second application and fee to a post-baccalaureate program are not accepted or processed until an official transcript is provided showing that your undergraduate degree has been awarded.

Unless proof of an undergraduate degree is provided by the registration date for your second quarter, you lose your registration priority.

Under special circumstances graduate coordinators may recommend admission of applicants who do not meet eligibility requirements. The Dean of Research and Graduate Programs acts on these recommendations.

### Residency Status Determination

The campus Admissions Office determines the residency status of all new and returning students for nonresident tuition purposes. Responses to the application for admission and, if necessary, other evidence furnished by the student are used in making this determination. A student who fails to submit adequate information to establish a right to classification as a California resident is classified as a nonresident. For detailed explanation please refer to Determination of Residence for Nonresident Tuition Purposes," page 492.

### International (Foreign) Student Admission Requirements

International master's and credential applicants must file an application for admission with the Office of Admissions. For this purpose, "foreign students" include those who hold U.S. temporary visas as students, exchange visitors, or in other non-immigrant classifications. The application may be filed at any time, but in order to be considered for admission in the targeted quarter the portfolio must be completed by the dates listed below.

	Application Deadline	File Completion Date
Fall Quarter	November 30	April 1 <sup>st</sup>
Winter Quarter	June 30	September 1 <sup>st</sup>

All master's and credential applicants must submit the following documents to establish their admission portfolio:

- Application form, Parts A and B
- \$55 application fee
- Certified transcripts from all schools attended, showing coursework. All official documents must be accompanied by a certified English translation from one of the following
  - Institute for International Education (IIE)
  - AMIDEAST
  - Saudi Arabian Education Mission
  - United States Embassy or Consulate
- Confidential financial statement
- Promissory note agreeing to purchase required health insurance
- International Educational Background form
- AACRAO credential analysis fee of \$75 in the form of a U.S. Postal Money Order or an International Money Order, made payable to "AACRAO" (American Association of Collegiate Registrars and Admissions Officers)
- Spouse/Dependent Declaration form

All graduate and post-baccalaureate applicants, regardless of citizenship, whose native language is not English and whose preparatory education was principally in a language other than English must demonstrate competence in English. Those who do not possess a bachelor's degree from a postsecondary institution where English is the principal language must take either the Test of English as a Foreign Language (TOEFL) or the International English Language Testing system (IELTS) exam.

The TOEFL must have been taken within the last two years with a minimum score of 550 (paper version), 213 (computerized version) or 80 (internet based). The minimum score for the IELTS is 6.0, although individual programs



may require higher scores. Applicants are advised to review program specific information.

The TOEFL or IELTS requirement is waived for applicants whose native language is English. For a list of countries please refer to the following website:

[www.ess.calpoly.edu/admiss/international/toefl.html](http://www.ess.calpoly.edu/admiss/international/toefl.html)

The Office of Admissions completes an initial portfolio review that includes verification of an equivalent B.A./B.S. degree, a determination of the appropriate level of study and a narrative evaluation of all work completed. Copies are included in the applicant's file.

The Office of Admissions notifies all applicants of the documents needed to complete their portfolios. Graduate coordinators may require additional documentation to assist them in determining an applicant's eligibility.

International applicants for graduate study can receive either conditional or classified admission. The graduate coordinators make all recommendations to the Director of Admissions for conditional and classified admissions to the graduate program

### **HEALTH SCREENING**

All new and readmitted students born after January 1, 1957 are notified of the requirement to present proof of measles and rubella immunizations (two MMRs). All students 18 years of age or younger on the first day of their first quarter of enrollment are required to present proof of immunization against hepatitis B. These are *not* admission requirements, but are required of students as conditions of enrollment in CSU. Proof of measles and rubella immunizations is also required for certain groups of enrolled students who have increased exposure to these diseases. See page 58 for more information.

# Fees & Expenses

[www.fees.calpoly.edu](http://www.fees.calpoly.edu)

The California State University (CSU) makes every effort to keep student costs to a minimum. Fees listed in published schedules or student accounts may need to be increased when public funding is inadequate. Therefore, CSU must reserve the right, even after initial fee payments are made, to increase or modify any listed fees, without notice, until the date when instruction for a particular semester or quarter has begun. All CSU listed fees should be regarded as **estimates** that are subject to change upon approval by the Board of Trustees. Please refer to [www.fees.calpoly.edu](http://www.fees.calpoly.edu) for complete information on fees, including on-campus housing, meal costs, and parking fees.

## Schedule of Fees

All regularly enrolled students, both undergraduate and graduate, pay registration fees determined by the number of units per quarter. Legal residents of California are not charged tuition. In addition to registration fees, nonresident and foreign students pay nonresident tuition. Mandatory systemwide fees are waived for those individuals who qualify for such exemption under the provisions of the California Education Code (see Student Fee Waivers).

## Registration Fees Per Quarter

Registration Fees are the **sum of two types of fees**:

1) **Campus-Wide Fees** that are payable irrespective of college, and 2) **Campus Academic Fees**, which vary by college/academic unit. Campus-wide fees include: State University Fee, Associated Students Fee, Health Facilities Fee, Instructionally Related Activities Fee, Health Services Fee, University Union Fee, and Campus Services Card Fee. Nonresident and foreign students are also charged per unit for nonresident tuition up to a prescribed maximum per year.

Cal Poly registration fees are due at the time of registration, and all prior term balances must be paid in full in order to register. Fees that are not paid by the fifth day following a student's registration become past due, and a registration hold is placed on the account that prevents adding or swapping classes. If registration fees are still past due as of the next published cancellation date, then the student may be canceled from all enrolled classes. Students who have accepted financial aid, have an approved third-party contract on file, or are receiving fee waivers are not subject to financial registration holds or class cancellation. Financial aid students whose awards are insufficient to pay fees in full are billed for the balance, and are unable to register for subsequent quarters until the balance has been paid.

## Refund of Mandatory Fees, Including Nonresident Tuition

Regulations governing the refund of mandatory fees, including nonresident tuition, for students enrolling at the

California State University are included in §41802 of Title 5, *California Code of Regulations*. For purposes of the refund policy, mandatory fees are defined as those system-wide fees and campus fees that are required to be paid in order to enroll in state-supported academic programs at the California State University. Refunds of fees and tuition charges for self-support programs at the California State University (courses offered through extended education) are governed by a separate policy established by the University.

In order to receive a full refund of mandatory fees, including nonresident tuition, a student must cancel registration or drop all courses prior to the first day of instruction for the term. Information on procedures and deadlines for canceling registration and dropping classes is available-online at [www.ess.calpoly.edu/\\_records](http://www.ess.calpoly.edu/_records).

For state-supported semesters, quarters, and non-standard terms or courses of four weeks or more, a student who withdraws during the term in accordance with the University's established procedures receives a refund of mandatory fees, including nonresident tuition, based on the portion of the term during which the student was enrolled. No student withdrawing after the 60 percent point in the term is entitled to a refund of any mandatory fees or nonresident tuition.

For state-supported semesters, quarters, and non-standard terms or courses of less than four (4) weeks, no refund of mandatory fees and nonresident tuition is made unless a student cancels registration or drops all classes prior to the first day in accordance with the University's established procedures and deadlines. Students receive a refund of mandatory fees, including nonresident tuition, under the following circumstances:

- The tuition and mandatory fees were assessed or collected in error;
- The course for which the tuition and mandatory fees were assessed or collected was cancelled by the University;
- The University makes a delayed decision that the student was not eligible to enroll in the term for which mandatory fees were assessed and collected and the delayed decision was not due to incomplete or inaccurate information provided by the student; or
- The student was activated for compulsory military service.

Students who are not entitled to a refund as described above may petition the University for a refund demonstrating exceptional circumstances, and the chief financial officer of the University may authorize a refund if he or she determines that the fees and tuition were not earned by the University. Information concerning any aspect of the refund of fees may be obtained from the Student Accounts Office.

## Fees and Debts Owed to the University

Should a student or former student fail to pay a fee or a debt owed to the institution, the institution may "withhold permission to register, to use facilities for which a fee is

authorized to be charged, to receive services, materials, food or merchandise, or any combination of the above from any person owing a debt" until the debt is paid (see Title 5, *California Code of Regulations*, Sections 42380 and 42381).

Prospective students who register for courses offered by the University are obligated for the payment of fees associated with registration for those courses. Failure to cancel registration in any course for an academic term prior to the first day of the academic term gives rise to an obligation to pay student fees including any tuition for the reservation of space in the course.

The institution may withhold permission to register or to receive official transcripts of grades or other services offered by the institution from anyone owing fees or another debt to the institution. The institution may also report the debt to a credit bureau, offset the amount due against any future state tax refunds due the student, refer the debt to an outside collection agency and/or charge the student actual and reasonable collection costs, including reasonable attorney fees if litigation is necessary, in collecting any amount not paid when due. If a person believes he or she does not owe all or part of an asserted unpaid obligation, that person may contact the campus business office. The business office, or another office on campus to which the business office may refer the person, will review all pertinent information provided by the person and available to the campus and will advise the person of its conclusions. (Updated 12/07/09)

### Credit Cards

Master Card, Discover Card, and American Express may be used for payment of registration fees, nonresident tuition, housing and certain other University fees using the web credit card system. The University also accepts electronic check payments, known as eCheck or ACH, using the web on-line payment systems. Details concerning the use of electronic checks and credit cards for fee payments may be obtained from the University website under [www.fees.calpoly.edu](http://www.fees.calpoly.edu). Credit cards may be used for the purchase of dining plans from the Cal Poly Corporation, theatre tickets from the Cal Poly Theatre Box Office, tickets for sports events from the Athletics Department, health services from the University Health Center, Bookstore purchases, payment of parking citations with University Police, and for Continuing Education program fees. Contact the individual service center for specific credit card information.

### Student Fee Waivers

The California Education Code includes provisions for the mandatory waiver of systemwide fees as follows:

- § 66025.3 – Qualifying children, spouses/registered domestic partners, or unmarried surviving spouses/registered domestic partners of a war period veteran of the U.S. military who is totally service-connected disabled or who died as a result of service-related causes; children of any veteran of the U.S. military who has a service-connected disability, was killed in action, or died of

a service-connected disability and meets specified income provisions; any dependents or surviving spouse/registered domestic partner who has not remarried of a member of the California National Guard who in the line of duty and in active service of the state was killed or became permanently disabled or died of a disability as a result of an event while in active service of the state; and undergraduate students who are the recipient of or the child of a recipient of a Congressional Medal of Honor and meet certain age and income restrictions;

- § 68075 (a) – An undergraduate student who is a member of the Armed Forces of the United States stationed in this state on active duty, except a member of the Armed Forces assigned for educational purposes to a state-supported institution of higher education, is entitled to resident classification only for the purpose of determining the amount of tuition and fees;
  - (b) A student seeking a graduate degree who is a member of the Armed Forces of the United States stationed in this state on active duty, except a member of the Armed Forces assigned for educational purposes to a state-supported institution of higher education, shall be entitled to resident classification only for the purpose of determining the amount of tuition and fees for more than two academic years, and shall thereafter be subject to Article 5 (commencing with Section 68060); (Updated 12/07/09)
- § 68120 – Children and surviving spouses/registered domestic partners of deceased public law enforcement or fire suppression employees who were California residents and who were killed in the course of active law enforcement or fire suppression duties (referred to as Alan Pattee Scholarships); and
- § 68121 – Students enrolled in an undergraduate program who are the surviving dependent of any individual killed in the September 11, 2001 terrorist attacks on the World Trade Center in New York City, the Pentagon building in Washington, D.C., or the crash of United Airlines Flight 93 in southwestern Pennsylvania, if the student meets the financial need requirements set forth in Section 69432.7 for the Cal Grant A Program and either the surviving dependent or the individual killed in the attacks was a resident of California on September 11, 2001.

Students who may qualify for these benefits should contact the Admissions Office for further information and/or an eligibility determination.

### Procedure for the Establishment or Abolishment of a Student Body Fee

The law governing the California State University provides that fees defined as mandatory, such as a *student body association fee* and a *student body center fee*, may be established. A *student body association fee* must be established upon a favorable vote of two-thirds of the students voting in an election held for this purpose (Ed. Code § 89300). A *student body center fee* may be established only after a fee referendum is held which approves by a two-thirds favorable vote the establishment of the fee (Ed. Code § 89304). The campus President may adjust the *student body association fee* only after the fee adjustment has been approved by a majority of students voting in a referendum established for that purpose (Ed. Code § 89300). The required fee shall be subject to referendum at any time upon the presentation of a petition to the campus President containing the signatures of 10 percent of the regularly enrolled students at the University. Once bonds are issued,

authority to set and adjust *student body center fees* is governed by provisions of the State University Revenue Bond Act of 1947, including, but not limited to, Ed. Code Sections 90012, 90027, and 90068. *Student body association fees* support a variety of cultural and recreational programs, child care centers, and special student support programs.

The process to establish and adjust other campus-based mandatory fees requires consideration by the campus fee advisory committee and a student referendum. The campus President may use alternative consultation mechanisms if he/she determines that a referendum is not the best mechanism to achieve appropriate and meaningful consultation. Results of the referendum and the fee committee review are advisory to the campus President. The President may adjust campus-based mandatory fees, but must request the Chancellor establish a new mandatory fee.

For more information or questions, please contact the Financial Manager, Financing and Treasury in the CSU Chancellor's Office, at (562) 951-4570.

# Financial Aid

## Financial Aid Office

Administration Bldg. (01), Room 212

(805) 756-2927; Fax (805) 756-7243

<http://www.ess.calpoly.edu/finaid>

The University has a variety of scholarships, grants, part-time employment opportunities and loans designed to assist students financially. Additional current information may be obtained by accessing the Financial Aid Office website.

The application for Financial Aid is called the Free Application for Federal Student Aid (FAFSA). The FAFSA is available on the Web at [www.fafsa.ed.gov](http://www.fafsa.ed.gov) or may be obtained from any university or college financial aid office or most high schools. Those who file the FAFSA by March 2 receive priority in the allocation of funds. All students are encouraged to file the FAFSA and qualified students are considered for scholarships.

## Typical Student Expenses

Following are the average expenses per quarter for the 2008-09 academic year for the California resident student attending Cal Poly. Charges for room and board are payable in advance or in quarterly installments. Nonresident students should be prepared to pay additional tuition and fees. For the 2008-09 school year nonresident tuition was an extra \$226 per unit. Please see the "Fees and Expenses" section for more information. All State fees are subject to change upon approval by the Board of Trustees of the California State University.

## University Estimated Expenses per Quarter

Registration fees .....	1,681
Room and board .....	3,123
Books and supplies .....	522
Personal and transportation .....	1,049
Estimated total per quarter .....	\$6,375

## Cancellation of Registration or Withdrawal from the Institution and Financial Aid

Students who find it necessary to cancel their registration or to withdraw from all classes after enrolling for any academic term *are required* to follow the University's official withdrawal procedures. Failure to follow formal University procedures may result in an obligation to pay fees, the assignment of failing grades in all courses and the need to apply for readmission before being permitted to enroll in another academic term. Information on canceling registration and withdrawal procedures is available from the Office of Academic Records, Administration Building, Room 222, 805-756-2531.

Students who receive financial aid funds *must consult* with the Financial Aid and Student Accounts Offices prior to withdrawing from the University regarding any refunds or

repayments of grant or loan assistance received for that academic term or payment period. If a recipient of student financial aid funds withdraws from the institution during an academic term or a payment period, the amount of grant or loan assistance received may be subject to federal, state and/or institutional return provisions.

## UNIVERSITY SCHOLARSHIPS

### General Information

Scholarships are awarded each year. Criteria include financial need, scholastic achievement, participation in school activities, community service, honors and organizational affiliations, and educational objectives. Some scholarships have additional requirements which relate to a concentration or field of study, geographic origin, class level, and project or design portfolios.

There are numerous scholarships available due to the generous support of individuals and corporations. Please refer to the Financial Aid web site for detailed information.

Generally, a student must have at least a 3.0 grade point average. Both undergraduate and graduate students enrolled full time in the spring term are considered for scholarships.

*Annual Deadline Date to Apply  
(Complete the FAFSA)  
for the following academic year:  
March 2*

### How to Apply

The Financial Aid Office website offers the latest information at [www.ess.calpoly.edu/finaid](http://www.ess.calpoly.edu/finaid). For need-based scholarships, completing the FAFSA is required. For priority consideration for financial aid programs and Cal Poly scholarships, complete the FAFSA by **March 2**.

### Scholarship Notifications

Scholarships are normally awarded during the spring and summer for the following academic year. During that time award offer notices are sent which include scholarship amount, disbursement and donor information. Awardees must accept on-line scholarship offers acknowledging program responsibilities and requirements. Recipients must be in good academic standing and maintain full-time enrollment while receiving a scholarship (continuing education and Open University units are excluded). Some scholarships require recipients to have earned at least one-half the value of the scholarship during the previous year.

Scholarships are awarded for an academic year and are typically disbursed in quarterly increments. Non-attendance results in cancellation or a prorated amount.

### Athletic Program Grants-In-Aid

Cal Poly athletic grants-in-aid are offered to selected students participating in intercollegiate athletics. Grants are renewable on a quarterly basis, the requisites for renewal being at the discretion of the University.



The grant-in-aid is subject to the financial limitations imposed by the National Collegiate Athletic Association and any conference of which the University is a member. Financial aid, scholarships, specific outside resources and employment are considered in determining compliance with these limitations. Additional information can be provided by the Athletic Department.

### Other Scholarships

In addition to University scholarships, awards from various private donors and organizations are available to assist students with University expenses. Interested students should make inquiries for such awards directly to sponsoring organizations. Currently, Cal Poly students are beneficiaries of several million dollars of outside scholarship assistance each year. Students should exercise caution in using scholarship search services; many sell information that is readily available at no cost. Other sources of scholarship funding may be available from:

- community organizations
- employers
- professional, career and trade associations

For valuable links visit the scholarship website at [www.ess.calpoly.edu/finaid/types\\_aid/scholarships.htm](http://www.ess.calpoly.edu/finaid/types_aid/scholarships.htm).

## GRANTS

**Federal Pell Grants** are designed to help undergraduates and teaching credential candidates pay for their education. The Pell Grant amount is determined by the Expected Family Contribution, the cost of education, full-time or part-time enrollment and terms of enrollment. To apply, complete the FAFSA by **March 2** for the upcoming year.

**Academic Competitiveness Grants (ACG)** are available to assist first and second year undergraduate students who show financial need and have completed a rigorous high school program. Students must be enrolled full-time, a U.S. Citizen, a Pell Grant recipient, and for second year recipients, have a GPA from their first year of at least 3.0. To apply, complete the FAFSA by **March 2** for the upcoming year..

### National Science and Mathematics Access to Retain

**Talent (SMART) Grants** are available to assist third and fourth year undergraduates pursuing a major in science (including physical, life, and computer sciences), mathematics, technology, engineering, or a critical foreign language, such as Arabic, Chinese, Korean, Japanese and Russian. Students must also be enrolled full-time, a U.S. Citizen, have a cumulative GPA of at least 3.0 and eligible for a Federal Pell Grant. To apply, complete the FAFSA by **March 2** for the upcoming year.

**Federal Supplemental Educational Opportunity Grant (SEOG)** is designed to assist undergraduate students who have substantial financial need. To apply, complete the FAFSA by **March 2** for the upcoming school year.

## CAL GRANTS

The California Student Aid Commission (CSAC) awards entitlement and competitive Cal Grants. To qualify, students

must be California residents. If applying for a Cal Grant for the first time, students must complete the FAFSA and a Cal Grant GPA verification form. Request the GPA Verification Form from your high school or college. To apply, complete the FAFSA and mail the GPA Verification Form to CSAC by **March 2**.

For the latest information on the Cal Grant program, visit the CSAC website at [www.csac.ca.gov](http://www.csac.ca.gov).

**Cal Grant A** is awarded to middle- and low-income undergraduates. New awards are limited to students who are freshmen, sophomores or juniors. Cal Grant A covers a portion of student registration fees and eligibility is tied to the cost of attendance. Cal Grant A may be renewed until completion of four years of college attendance. Recipients must continue to meet eligibility standards. Students may be eligible for an additional year of Cal Grant A at Cal Poly if enrolled in a designated five-year program or the teaching credential program.

**Cal Grant B** is awarded to low-income undergraduate students. First year recipients receive stipend only. Cal Grant B renewal recipients receive stipend plus a portion of registration fees. Eligibility is tied to the cost of attendance. Cal Grant B may be renewed until completion of four years of college attendance and students must meet eligibility standards. Students may be eligible for an additional year of Cal Grant B at Cal Poly if enrolled in a designated five-year program or the teaching credential program.

**State Educational Opportunity Program Grant (SEOP)** assists undergraduate students who have been admitted to the University through the Educational Opportunity Program (EOP). To apply, complete the FAFSA by **March 2** for the upcoming school year.

**State University Grant (SUG)** covers a portion of student registration fees. SUG is available to undergraduate and graduate students who are California residents and show financial need. To apply, complete the FAFSA by **March 2** for the upcoming year.

## EMPLOYMENT

**Federal Work-Study (FWS)** is a need-based program which provides part-time employment for students. Work-Study jobs assist students financially and may provide career related work experience. FWS positions are either on- or off-campus with approved departments/ organizations. Pay rates vary depending on job requirements and student skills. To receive priority consideration, complete the FAFSA by **March 2** for the upcoming school year.

## LOANS

Loans are for educational purposes only, with specific provisions for repayment. There are four types: Federal Perkins Loans, Federal Direct Student Loans (FDSL), Federal Parent Loans (PLUS), and Cal Poly Long-Term Educational Loans. Also available are small, short-term emergency loans.

**Federal Perkins Loan** is a five percent interest loan available to both undergraduate and graduate students. Annual amounts are based on students' need as determined by the FAFSA data. Repayment begins nine months after the student leaves school or ceases to be enrolled at least half-time. The government pays the interest while the student is in school and during the grace period. There are cancellation and deferment provisions. To apply, complete the FAFSA by **March 2** for the upcoming school year.

**Federal Subsidized Direct Loans** are available to students through the U.S. Department of Education. Annual amounts are based on the students' need as determined by the FAFSA and federal limits. The federal government pays the interest on the loan while the student is in school and there are deferment provisions. To apply, complete the FAFSA by **March 2** for the upcoming year.

**Federal Unsubsidized Direct Loans** are available for students who are ineligible for some or all of a subsidized Federal Direct Loan. With the exception of demonstrated financial need, borrowers must meet all eligibility criteria under the Federal Direct Loan program. Interest payments begin immediately after the loan is disbursed or the borrower may elect to defer payment and add the interest to the amount owed. An additional amount of Unsubsidized Direct Loan, above the Federal Subsidized Direct limit, may be available to independent students and to dependent students whose parents are denied a PLUS Loan.

**Federal Parent Loans (PLUS)** enable borrowers to obtain low interest loans for educational costs through the U.S. Department of Education. PLUS loan repayment begins when the loan is disbursed. To apply, complete the FAFSA.

**University Long-Term Educational Loans** are available to students who demonstrate long-term financial need. Some require written application, recommendations and interviews. The interest rate is four percent on the unpaid balance during repayment. Typically, interest accrues after the specified due date, graduation or withdrawal from the University. A one percent service charge is deducted from each loan disbursement.

**University Short-Term Emergency Loans** are designed to help students cope with unanticipated, educationally-related financial emergencies. Registration fees, rent, or utility bills are expenses that students should plan and are not considered emergencies as defined under this program. Full-time enrollment and a minimum 2.0 GPA are required. Each application is reviewed on a case-by-case basis. For further information, visit the Financial Aid Office website at [www.ess.calpoly.edu/finaid/types\\_aid/special\\_programs](http://www.ess.calpoly.edu/finaid/types_aid/special_programs), or stop by the office.

### **University Educational and Emergency Student Loans**

There are numerous loans available due to the generous support of individuals and corporations. Please refer to the Financial Aid web site for detailed information.

**Alternative or Private Loans** are offered by the private sector for the purpose of covering educational expenses and do not require students to demonstrate "financial need." Careful review of the interest rates, repayment options and qualification standards helps students determine which is the best loan suited for their needs. This type of loan is meant to be used **after** traditional financial aid eligibility has been exhausted or for students who do not qualify for traditional need based aid programs. Visit the Financial Aid Office website or stop by the office for more information.

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## Academic Requirements and Policies - 2009-11 Catalog

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# Academic Resources

## ACADEMIC ADVISING

[advising.calpoly.edu](http://advising.calpoly.edu) – This website includes links to most of the advising centers and services listed below.

Cal Poly is committed to providing a broad spectrum of advising resources to all students throughout their Cal Poly careers. Each college at Cal Poly determines how it interprets the university's policies on academic requirements. Academic advisors help students avoid time-consuming and costly mistakes so that they can graduate on time. Students who visit an advisor regularly are less stressed and more in control of their goals and plans.

### College Advising Centers

Agriculture, Food & Environmental Sciences .....	Contact Department Offices
Architecture & Environmental Design	
Advising Center .....	805-756-1325
Business Advising Center .....	805-756-2601
Engineering Advising Center .....	805-756-1461
Liberal Arts Advising Center .....	805-756-6200
Science and Mathematics Advising Center ..	805-756-2615

### Other Academic Advising Services

Academic Skills Center .....	805-756-1256
Admissions Office .....	805-756-2311
Athletic Advising .....	805-756-2762
Disability Resource Center .....	805-756-1395
Educational Opportunity Program .....	805-756-2301
Entry Level Mathematics (ELM, MAPE) .....	805-756-2268
General Education Program .....	805-756-2228
Graduate Programs .....	805-756-1508
Health Professions .....	805-756-2615
Student Academic Services .....	805-756-2301
Student Support Services .....	805-756-1395
Writing Skills Program (EPT, GWR) .....	805-756-2067

## BIOTECHNOLOGY PROGRAMS

Biotechnology is broadly defined as the application of modern technological advances, whether in genetics, chemistry, engineering, or other fields, to biological systems. Modern biotechnology has evolved over the last twenty years to exploit the power of molecular biology and genetic engineering technology to further develop microorganisms, as well as plants and animals, for improved manufacturing of biomedical and agricultural products.

Examples of today's biotechnology applications range from the production of human insulin in bacterial cells to the development and use of genetically engineered crops, animals, and microbial fermentation for the production of crop protection products as well as the use of microbes to help clean up the environment (bioremediation) or the use of computers to help decipher complex genetic information

(bioinformatics). Biotechnology is also used in the development of new technologies and therapies applied to health, nutrition, and the treatment of diseases in both human and non-human animals.

The biotechnology industry is highly interdisciplinary and involves people with backgrounds in biochemistry, biology, microbiology, agriculture, engineering, as well as business and law. For additional program information, please refer to the program's catalog description.

### College of Agriculture, Food and Environmental Sciences

Agricultural Systems Management, BS  
Animal Science, BS  
BioResource and Agricultural Engineering, BS  
Crop Science, BS  
Environmental Horticultural Science, BS  
Fruit Science, BS  
Soil Science, BS

### College of Engineering

Biomedical Engineering, BS, MS  
Civil and Environmental Engineering, MS  
Computer Science, BS, MS  
Engineering, MS  
Environmental Engineering, BS  
General Engineering, BS

### College of Science and Mathematics

Biochemistry, BS  
Biological Sciences, BS, MS, Minor  
Biotechnology Minor  
Microbiology, BS, Minor

### Biotechnology-Related Center and Institutes

The **Dairy Products Technology Center (DPTC)** conducts research that provides the scientific and technological basis for new and improved dairy food products and processes. Through research and outreach, undergraduate and graduate programs train students to enter careers in the dairy industry and allied fields. *Contact:* Dr. Rafael Jimenez-Flores, 805-756-6103, [mrjimenez@calpoly.edu](mailto:mrjimenez@calpoly.edu).

The **Environmental Biotechnology Institute (EBI)** focuses on advancing biotechnology research on the Central Coast. Faculty partnerships with major corporations and local laboratories carry out research efforts and offer learning experiences for students. Research projects include the study of microbial communities in the environment, genomics, bioremediation, fungal biotechnology, and microbial diversity and evolution. *Contact:* Dr. Raul Cano, 805-756-1358, [mrcano@calpoly.edu](mailto:mrcano@calpoly.edu) or Dr. Chris Kitts, 805-756-2949, [mckitts@calpoly.edu](mailto:mckitts@calpoly.edu).

The **Renewable Energy Institute**, a multidisciplinary institute involving the Colleges of Agriculture, Engineering and Architecture, offers research and teaching opportunities in the development of renewable energy sources including biomass, wind, passive- and active- solar energy. *Contact:* Margot McDonald, 805-756-1298, [mmcdonal@calpoly.edu](mailto:mmcdonal@calpoly.edu).

The **Advanced Technology Laboratory** (St. Jude Bioengineering Laboratory) symbolizes the dynamic partnership between academia, government and industry. Faculty and students pursue applied research projects such as bioinstrumentation, medical devices, biomaterials, micro-fluidics, biomems, tissue engineering, biomechanics, bioremediation, prosthetic robotics and microbial interaction with materials. *Contact:* Dr. Dan Walsh, 805-756-6400, [mdwalsh@calpoly.edu](mailto:mdwalsh@calpoly.edu).

### **CENTER FOR TEACHING AND LEARNING**

*Walt Bremer, Director, Center for Teaching and Learning*  
*Joe Grimes, Director, Faculty Professional Development*  
*Robert E. Kennedy Library (35) Room 209, 805 756-7002*  
[www.cctl.calpoly.edu](http://www.cctl.calpoly.edu)

The Center for Teaching and Learning (CTL) provides activities toward building community, resources, training and support for the preparation, development and enhancement of teacher-scholars at Cal Poly. The center strives to support, endorse, and improve teaching effectiveness and student learning; encourage scholarship of teaching and learning and other scholarly activities; communicate to all audiences the importance of teaching and learning; and serve as a catalyst for constructivist (learner-centered) learning.

The CTL faculty associates from all of the colleges and other staff members are responsible for coordinating specific events and activities. Current focus areas are: integrated support of improving pedagogy and using technology, teaching and learning workshops, learning communities, classroom visits, courses and seminars, new faculty/staff support, individual and group consultation services for faculty/staff, a quarterly newsletter, and a web site.

### **COMPUTING AT CAL POLY**

*Timothy J. Kearns, Vice Provost & CIO*  
*Information Technology Services (ITS)*  
*Frank E. Pilling Bldg. (14), 805 756-7000*  
<http://servicedesk.calpoly.edu>

Cal Poly's learn-by-doing environment is enhanced by electronic access to learning materials and resources, multimedia classrooms, distance learning and video-conferencing facilities, digital video editing systems, media and presentation equipment checkout, and open access student computing labs. Students frequently use computers in their courses, and are strongly encouraged to have access to a computer and the Internet in their residences.

Students, faculty, staff and others accessing Cal Poly's information technology resources agree to abide by the Responsible Use Policy and other policies at <http://security.calpoly.edu/policies/>.

When connecting to the university network, students are expected to comply with campus security standards. This includes ensuring that networked devices are protected against viruses, spyware, and other threats. Standard tools are available for students to use for this purpose.

### **ENDOWED CHAIRS AND PROFESSORS**

Cal Poly has received generous corporate donations and grants that have created endowed chairs and professorships and helped support new faculty positions. Endowment funds support faculty research and provide opportunities for students to become involved in research. Examples include the Arthur C. Edwards Endowed Chair of Polymers and Coatings, the Unocal Chair for Environmental Studies, and two Unocal Professors of Marine Science (College of Science and Mathematics); the J. G. Boswell Professorship (College of Agriculture, Food and Environmental Sciences); and a Joseph and Victoria Cotchett endowed professorship of educational technology (School of Education).

### **HEALTH PROFESSIONS PREPARATION**

*Health Professions Advising Center*  
 805 756-2615 Bldg. 53, Room 219  
<http://healthprofessions.calpoly.edu>

Cal Poly provides excellent preparation and resources for students interested in a career in the health professions. Information about professional school prerequisites, internships, research opportunities, health professions experience, and other requirements, is available at the Health Professions Advising Center.

**Choosing a Major.** There is no best major to prepare students for professional school as long as the prerequisite courses for the chosen profession are completed. A major should be chosen on the basis of interest. Professional schools are concerned with the overall quality and scope of the undergraduate work and not with the major course of study. Specific requirements vary for each professional school, so students should contact the schools directly.

### **Health Professions Peer Advising Program**

*Peer Advisors, 805 756-6510*

Health professions peer advisors are upper-division students who advise students regarding preparation for the health professions, including information about required coursework, gaining experience in health care, and application strategies.

### **INTERNATIONAL EDUCATION & PROGRAMS**

*John Battenburg, Director*  
 Bldg 38, Room 145, 805 756-1477  
<http://iep.calpoly.edu>

Cal Poly's International Education & Programs (IEP) offers many programs and services for both international students studying on campus and students preparing to study abroad. College graduates in the twenty-first century are citizens of a world in which communicating in other languages and understanding other cultures are requirements for successful careers. Many Cal Poly colleges and departments encourage students to pursue overseas study opportunities.

### **Study Abroad Programs**

Students interested in studying abroad should begin by coming to the Study Abroad office, Cal Poly's clearinghouse

for information on all study abroad programs. A resource center provides students with printed material and web resources on study abroad. A study abroad advisor is available to provide guidance and suggestions.

### **Study Abroad and Exchange Eligibility Requirements**

Students must be in good academic and disciplinary standing at Cal Poly in order to be eligible to participate in a study abroad or exchange program. In addition, students must meet the eligibility requirements of their chosen programs. Participants may not study abroad during their first quarter at Cal Poly. Students who are on Academic Probation or Disciplinary Probation ("See Student Conduct and Discipline" on page 63 for more information) at the time of application, or the term prior to studying abroad, must notify the Study Abroad Office. Normally, such students will be considered ineligible to participate in the program unless extenuating circumstances exist, and the Study Abroad Office gives its approval. Pre-approval for courses before departing for a term abroad is strongly recommended.

If a program is located in a country where there is a U.S. Department of State Travel Warning, Cal Poly will NOT provide the approval to participate in the program, nor provide approval for the transfer of credits.

### **The CSU International Programs**

Developing intercultural communication skills and international understanding among its students is a vital mission of the California State University (CSU). International Programs participants earn resident academic credit at their CSU campuses while they pursue full-time study at a host university or special study center abroad. The CSU International Programs serves the needs of students in over 100 designated academic majors. Affiliated with more than 70 recognized universities and institutions of higher education in 19 countries, it also offers a wide selection of study locales and learning environments.

Additional information about specific programs and answers to questions regarding the application materials may be obtained from the IP Coordinator at Cal Poly (38-106), or by visiting the following website:

[www.calstate.edu/ip](http://www.calstate.edu/ip).

### **Applications**

For the academic year overseas, applications must be submitted by February 1. Australia, New Zealand and South Africa are exceptions, having a deadline of May 1.

### **Cal Poly's Exchange Programs**

A number of Cal Poly colleges and departments have individual exchange agreements with a variety of universities around the world. Students in colleges or departments with exchange agreements have an opportunity for a low-cost, easily arranged study abroad experience within their own academic discipline. If students qualify for one of these exchanges, they pay Cal Poly tuition fees and can spend up to one year at an overseas university with all the

rights and privileges of regularly enrolled students. For an exchange to take place, there must also be students from the overseas university coming to study at Cal Poly. More information can be found by visiting

[http://iep.calpoly.edu/programs\\_study\\_abroad/exchanges.html](http://iep.calpoly.edu/programs_study_abroad/exchanges.html).

### **Exchange Programs in the United States**

National Student Exchange (NSE) Consortium ..... All Majors

### **Cal Poly Faculty-Led Programs**

In addition to The CSU International Programs and agreements for exchange programs, Cal Poly offers faculty-led study programs.

**Cal Poly at Sea.** Participants live and study with cadets from the California Maritime Academy (CMA) aboard their training ship, *The Golden Bear*. This 500-foot ex-Navy oceanographic vessel is a unique living laboratory that offers Cal Poly students two months of shipboard experience, classroom instruction, and an international educational experience. The chartered cruise rotates on a three-year cycle, each time visiting a different region of the Pacific during Spring Quarter.

**Australia Study Program.** A one quarter study program led by Cal Poly faculty at the University of Adelaide campus in Adelaide during Winter Quarter. The study program includes eight weeks of classes with field trips to nearby sites. The University of Adelaide is a stimulating place to study, combining the beauty of a historic campus, the friendly, accessible nature of Australian society, and the culture of an established university. Learn more by visiting <http://iep.calpoly.edu/facultyled/australiastudy>.

**Summer Study in London.** While the six-week program is planned primarily for general education experiences in the arts, humanities, and social sciences, the program draws students from all majors. Students take numerous field trips visiting London's concert halls, theaters, museums, cathedrals, and halls of government. The arts, theatre, nightlife, music, and literature are showcased in London. Learn more by visiting <http://iep.calpoly.edu/facultyled/londonstudy>.

**Thai Study and Internship Program.** The program is offered during Spring Quarter. An internship program with U.S. corporations, the American Embassy, and universities is also available for qualified seniors. Thailand retains a unique character and charm, with an unusual blend of ancient culture and modern industry. Students study in Chiang Mai, Nong Khai and Bangkok. Learn more by visiting <http://iep.calpoly.edu/facultyled/thaistudy>.

**Peru Study Program.** One of the most unique study abroad programs offered. The summer program offers students a chance to spend five weeks living in Cuzco, Peru. Students study Spanish and take Cal Poly general education courses that incorporate hands-on community-based development work. Excursions include trips to Machu Picchu, Lake Titicaca, and the Amazon rainforest. Learn more by visiting <http://iep.calpoly.edu/facultyled/perustudy>.



### Affiliation Agreements

Cal Poly has a university-wide affiliation agreement with **AustraLearn and AsiaLearn**. **AustraLearn: North American Center for Australia** provides direct enrollment study abroad opportunities in Australia, New Zealand, and Fiji. The 26 Australian and eight New Zealand universities that are working with AustraLearn have unique academic programs with the highest standard of service. AustraLearn serves as the liaison with the host universities and Cal Poly regarding credit transfer, financial aid, and academic issues. Learn more by visiting [www.australearn.org](http://www.australearn.org). **AsiaLearn** brings Asia within reach of students from all academic areas with opportunities for study abroad opportunities at excellent universities in mainland China, Hong Kong, Malaysia, Singapore, and South Korea. Learn more by visiting [www.asialearn.org](http://www.asialearn.org).

Cal Poly's newest affiliation agreement is with **Cultural Experiences Abroad (CEA)**, which was founded in 1996 to provide international education opportunities for U.S. and Canadian college students of all language levels and majors. CEA sends thousands of students on study abroad programs at 36 universities in 15 countries. Learn more by visiting [www.GoWithCEA.com](http://www.GoWithCEA.com).

Cal Poly has a university-wide affiliation agreement with **Danish Institute For Study Abroad (DIS)** that provides students from any major with the option of enrolling in any of the following academic tracks offered for a semester or summer program: Architecture & Design, European Politics and Society, International Business & Economics, Biotechnology and Biomedicine, and Psychology and Child Development. Learn more by visiting [www.dis.dk](http://www.dis.dk).

Since its establishment in 1998, the **Foundation for International Education (FIE)** in London has set high standards in offering study abroad, internship, and service-learning programs. FIE provides academic and student support services within fifteen-week Fall and Spring semester programs. Students are immersed in the arts and humanities in London where theatre, music, history, and literature are showcased. Learn more by visiting [www.fie.org.uk](http://www.fie.org.uk).

Cal Poly joins 29 member and associated universities that cooperate within the **University Studies Abroad Consortium (USAC)**. USAC has provided quality programs for over 25 years and currently offers 38 study abroad programs at host universities in 24 countries ranging from summer, semester, and year-long programs. USAC offers two types of programs: (1) the language specialty programs focus on language immersion and cultural studies (beginning through advanced language tracks) and (2) partnership programs offer direct enrollment in partner universities offering a full curriculum of studies. Learn more by visiting [www.usac.unr.edu](http://www.usac.unr.edu).

### International Students and Scholars

International Students and Scholars (ISS) offers a variety of comprehensive programs designed to assist international

students and scholars as they pursue their academic goals. ISS is committed to creating an academic environment that supports and emphasizes international and cross-cultural understanding.

ISS provides individual immigration advising for international students and visiting faculty and researchers to facilitate compliance with immigration regulations. This includes providing information on maintaining visa status, timely application processing, transfer of schools, extensions, change of status and employment authorization. Cal Poly is a SEVIS-Certified School which provides electronic updates to the U.S. Citizenship & Immigration Services and the Department of State. Updates include quarterly enrollment, change of address, dates of study, and major, as required by immigration law.

Monthly informational programs are offered on various inter-cultural topics to spur discussion and provide a broad-based educational experience. These meetings are open to the entire Cal Poly and San Luis Obispo community. Workshops on employment, residency, and work visas are also presented throughout the academic year.

ISS offers the program, "Holistic Approach to Cross-Cultural Adaptation and Reentry." The main objective is to increase cross-cultural understanding of all segments of the university community with the goal of bringing about more globally aware and committed citizens of the world.

### LIBRARY SERVICES

*Michael D. Miller, Dean*

*Robert E. Kennedy Library (Bldg 35)*

*805-756-2598 (Hours); 756 -2029 (Circulation)*

[lib.calpoly.edu](http://lib.calpoly.edu)

The Kennedy Library supports Cal Poly's mission by selecting and delivering quality information in all formats, by fostering active learning environments, by promoting the skills that are needed for student success, by enriching the experience of academic community within and across the colleges, and by collecting and preserving unique collections. The Library features a 24-hour study space, a technology-rich collaborative environment with ample student seating and a café. The Library is engaged in planning a major addition to the existing building that will offer greatly expanded student collaboration spaces, electronic presentation rooms, and a Center for Inclusive Excellence bringing together a variety of student and University groups.

### Services

The Kennedy Library is open until 2 am Sunday through Thursday and opens at 7 am on weekdays. The Library offers a full suite of traditional and digital library services, including print and electronic course reserves, an active interlibrary borrowing service that offers rapid access to over 7 million titles held in California libraries; reference assistance both on-demand at service desks and through instant messaging 24 hours a day; and consultative and instructional services delivered by expert library faculty based in each of Cal Poly's colleges.

## Instruction

Kennedy librarians are active partners with faculty in helping students develop lifelong learning skills. Librarians work directly with faculty to ensure that students have the opportunity to practice the specialized information skills that contribute to student success in their majors. Kennedy librarians teach these skills in nearly 400 courses each year and provide web-based resources to supplement in-class teaching.

## Technology

In partnership with campus Information Technology Services, the Library offers a high-speed free wireless network, laptops available for check-out; 300 open computing workstations, all equipped with standard and specialized software that includes Geographic Information Systems and statistical packages. Other media and computing facilities include adaptive software and hardware and access to international broadcasting via satellite. Oversized and specialty (CAD) printing services and scanners are also available. Student technicians provide on-demand assistance to technology users.

**Adaptive Technology.** Through its partnership with the Disability Resource Center, the Kennedy Library offers voice-activated computers, screen reading and enlarging programs, a Braille printer, closed circuit television (print enlarger), and text to audio conversion. All Library computers are equipped with Zoom Text screen enlarging software.

## Collections

**Print and Electronic Resources.** The Kennedy Library offers a print collection of nearly 3.5 million items, including books, journals, senior projects, master's theses, government documents, maps, archives, and manuscripts. The Library also licenses more than 7000 electronic resources, including major indexes and full text databases from scholarly publishers such as Springer and Elsevier; a growing collection of electronic books; and electronic images and other media. Electronic resources are available anytime and anywhere on campus, and are available off campus using simple authentication.

**Special Collections and University Archives.** The Kennedy Library's Special Collections include more than a hundred unique collections in many formats, including manuscripts, correspondence, business records, architectural drawings, photographs and negatives, and audio and videotape. Collection strengths include architectural records and drawings, fine printing and graphic arts, and local and California history. Among its holdings are the Julia Morgan papers, the Manzanar Collection, and the Moore Collection of Underground Comix. The University Archives houses materials that document the history, growth and development of Cal Poly, including campus records, publications, photographs, plans, blueprints, and ephemera dating from the founding of the university in 1901 to the present.

**DigitalCommons@Cal Poly.** One of the first Institutional Repositories in the California State University system, DigitalCommons promotes discovery, research, cross-disciplinary collaboration and instruction by digitally collecting, preserving and providing access to scholarly work created at Cal Poly, including major student work. The repository also provides access to relevant documents created by administrative offices, departments and programs at Cal Poly. Members of the Cal Poly academic community are invited to contribute completed scholarship for long-term preservation and worldwide electronic accessibility through the DigitalCommons.

## Facilities

Featuring ample natural light, an open-air atrium, and study balconies; five floors with 20+ collaboration rooms, including a dedicated graduate student study room, over 1400 student seats, 300 computer workstations, on-site printing and copying services and an on-site café, the Kennedy Library is visited over 1.25 million times a year and has been regularly voted "Best Study Spot" at Cal Poly for many years.

## Partners

The Kennedy Library is proud to partner with program units that support student learning. Among these partners located in the Library are the Academic Skills Center; the Center for Teaching and Learning; Julian's Café and Patisserie; the Peace Corps; Pony Prints; and the University Honors Program.

## PREFACE: Cal Poly's Shared Reading Program

*Patricia Ponce, Coordinator*

805 756-1380

[www.preface.calpoly.edu](http://www.preface.calpoly.edu)

PREFACE provides students the opportunity to read and discuss a meaningful book at the university level without the formal course structure (no grades). New students and the campus community read the book selection over the summer. In the fall, they join small group discussions and share a common intellectual experience. Campus-wide activities related to the book, such as a visit by the author, lectures and movie screening continue over the course of an academic year. Faculty, staff, administrators, and community members volunteer their time to facilitate the discussion groups.

## RESEARCH AND PROJECT INVOLVEMENT

*Susan Opava, Dean, Research and Graduate Programs  
Bldg. 38, Room 154, 805 756-1508*

Faculty actively seek grants and contracts for research and development activities. These sponsored projects enhance the educational program by bringing to the campus state-of-the-art equipment and financial support for undergraduate and graduate student research. Students who wish to become involved in significant applied research and development activities on the leading edge of their disciplines are encouraged to contact faculty members in

their programs who have ongoing projects, to explore becoming part of the project team.

## SERVICE LEARNING AND CIVIC ENGAGEMENT

*Student Life, University Union, Bldg 65, Room 217,  
805 756-6749, [www.studentlife.calpoly.edu/csv](http://www.studentlife.calpoly.edu/csv) and  
[www.civic.calpoly.edu](http://www.civic.calpoly.edu)*

Service learning provides students an opportunity to participate in a structured learning experience that combines service to the community with explicit learning objectives, preparation, reflection, and evaluation. Students enrolled in service learning courses provide direct service in areas identified by the community. The students learn about the context in which the service is provided, the connection between the service and their academic coursework, and their roles as citizens. Each quarter, hundreds of students participate in service learning classes and volunteer to provide thousands of hours of service to homeless shelters, low-income families, youth, and disabled individuals.

Service learning workshops are offered quarterly through the Center for Teaching and Learning to support faculty development of service learning classes. As part of the strategic plan supported by the Chancellor's Office of Community Service Learning, Cal Poly is working towards extending the influence and resources of the University beyond the campus through quality service learning opportunities.

Each year, the University President awards the President's Community Service Award to outstanding students, clubs, and faculty.

## STUDENT LEARNING ASSESSMENT

Cal Poly has adopted University Learning Objectives (ULOs) which specify what all students who complete an undergraduate or graduate program at the institution should know or be able to do (see page 6). Academic programs are designed to provide students with opportunities to achieve the ULOs. Other opportunities for learning are provided outside the classroom in multiple venues, such as internships, residence hall programming, and co- and extra-curricular activities.

To determine the effectiveness of the educational opportunities that Cal Poly provides, various groups of students are asked to participate in learning assessments at the programmatic and university levels. These efforts provide a measure of students' progress and achievement of the ULOs from their first year through their senior year (or graduate student years). The assessments may include the review -- using standardized rubrics -- of students' assignments, exams, projects, or theses, as well as surveys and other methods.

While grades measure student progress in individual courses, programmatic- and university-level assessments provide information on the effectiveness of educational opportunities for the student body as a whole. The

information is intended primarily as the basis for improving these opportunities, although it may also be used for accountability purposes (e.g., for documenting educational effectiveness to accreditation agencies).

**Students at Cal Poly should expect that their academic work may be used for assessment purposes.**

## SUSTAINABILITY PRACTICES

President Baker signed the Talloires Declaration, a 10-point action plan in April 2004. This plan commits Cal Poly to sustainability and environmental literacy in teaching, theory, and practice, and is summarized below.

1. **Increase Awareness of Environmentally Sustainable Development:** In partnership with Focus the Nation, in 2008 and 2009, Cal Poly students coordinated teach-ins focusing on climate change, green jobs, and sustainable solutions. Also, in 2008, over 80 Cal Poly stakeholders participated in Sustainability by Design Retreat. Five action items emerged that encompass the student experience, educational and experiential opportunities, faculty development, and institutional support.
2. **Create an Institutional Culture of Sustainability:** In 2008, the University adopted a new mission statement that includes a commitment to valuing "free inquiry, cultural and intellectual diversity, mutual respect, civic engagement, and social and environmental responsibility."
3. **Educate for Environmentally Responsible Citizenship:** At Cal Poly, literacy in sustainability begins with a student's first on-campus experience through presentations and modeled sustainable activities such as zero waste meals. Students may elect to fulfill general education and major requirements by enrolling in courses that focus in sustainability. Over 170 courses are available to fulfill GE and major requirements (see [suscat.calpoly.edu](http://suscat.calpoly.edu)). For students wishing to specialize in a specific aspect of sustainability, there are currently five minors.
4. **Foster Environmental Literacy For All:** All faculty are encouraged to incorporate sustainability into their courses.
5. **Practice Institutional Ecology:** Cal Poly has taken significant steps to reduce its environmental footprint. The University has appointed a full time Sustainability Manager in Facility Services, who has identified ways to reduce the campus' energy consumption by almost 5%, and save over 8 million gallons of water per year. LEED certification is being achieved in all new buildings as well as selected retrofits.
6. **Involve All Stakeholders:** Cal Poly has reached out to others interested in learning how to contribute to a sustainable future. Cal Poly hosted the statewide 2008 UC/CSU/CCC Sustainability Conference, attended by

some 1,100 people. The Graphic Communication Institute at Cal Poly partnered with SustainCommWorld in 2008 and 2009 to host the Business of Green Media Conference at Cal Poly. Cal Poly also hosted the 2008 Fall Workshop for the West Coast Region of Engineers Without Borders.

**7. Collaborate for Interdisciplinary Approaches:**

Several of the UNIV courses (university-level, co-taught by faculty from different colleges) address a wide range of sustainability issues. Numerous senior projects and courses reach across academic disciplines to engage students in learn-by doing projects that address issues of sustainability and of meeting the needs of those less fortunate.

**8. Enhance Capacity of Primary and Secondary Schools:**

As part of the Sustainable Agriculture Resource Consortium, the Organic Garden hosts weekly tours and a children's garden for K-6<sup>th</sup> grade students during the growing season.

**9. Broaden Service and Outreach Nationally and Internationally:**

Empower Poly Coalition serves as the center for student engagement and unifies the voice of over 24 sustainability-related clubs and groups on campus.

**10. Maintain the Movement:** Cal Poly became the 13th California campus to found a chapter of the Alliance to Save Energy's "Green Campus Program". The Academic Senate Sustainability Committee was established in 2006 and has supported numerous sustainability activities on campus.

It is easy to see why campus constituents unofficially considered 2008 Cal Poly's Year of Sustainability. To top off the year, our efforts were recognized for leadership in sustainability by the National Wildlife Federation, and the College Sustainability Scorecard.

## UNIVERSITY HONORS PROGRAM

*Sema Alptekin, Director*

*Robert E. Kennedy Library, Bldg. 35, Room 510*  
805 756-7029; [www.honors.calpoly.edu](http://www.honors.calpoly.edu)

The University Honors Program provides academically motivated students with the opportunity to develop their potential by fully exploring the resources at Cal Poly. Intellectual creativity, civic engagement, and research are the hallmarks of the program. In particular, it builds relationships among all colleges on campus and seeks to educate students in the connections between the disciplines, from engineering to English, agriculture to art, or business to biology. Honors students have the opportunity to enjoy a varied educational experience, including courses in specially designed honors seminars as well as undergraduate research opportunities.

Following Cal Poly's distinctive "hands-on" approach to education, students are encouraged to participate in community projects and international programs to enhance their global awareness. Most Honors courses offer smaller class sizes, where students work closely with faculty in a challenging, stimulating and supportive learning environment. Analytical and interpretive study is encouraged and communication skills, written and oral, are developed. Most courses fulfill graduation requirements.

## WRITING SKILLS PROGRAM

*Mary Kay Harrington, Director*

*Bldg 10, Room 130, 805 756-2067*

[www.calpoly.edu/~wrtskills](http://www.calpoly.edu/~wrtskills)

The Writing Skills Program provides a free, one-on-one tutoring center in the University Writing Lab and assists Cal Poly students with any writing task. The CSU system-wide Graduation Writing Requirement (GWR) is administered by this office, including the upper-division Writing Proficiency Examination (WPE). The Writing Skills Office oversees the placement of students into appropriate writing courses based on their English Placement Test scores.



# Support Services

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## ALUMNI ASSOCIATION

### *Alumni Relations*

*Albert B. Smith Alumni and Conference Center*  
805 756-2586

Cal Poly's Alumni Association (CPAA) provides a link between alumni and their alma mater by providing a variety of programs and services including newsletters, e-mail updates, continuing education opportunities, travel programs, POLY REPS (a student ambassador group), GOLD programs for Graduates Of the Last Decade, Homecoming and a host of regional events and activities both in the state of California and beyond.

The CPAA is governed by a volunteer Board of Directors. The Office of Alumni Relations coordinates the activities of the association. With nearly 30 alumni chapters, the association sponsors alumni events in numerous locations throughout the state of California and assists special interest alumni chapters such as FANS, Graphic Communication, Rugby, ENVE and WOW.

Members of the CPAA enjoy unique benefits such as access to all CSU libraries, access to Cal Poly recreational facilities, group insurance programs, SLO merchant discounts, and special invitations and member pricing for alumni events.

## CAL POLY CORPORATION

*Corporation Administration Bldg. (15); 805 756-1131*

The Cal Poly Corporation is a separate, but closely linked auxiliary organization serving the University across several key support functions:

- Retail Operations – El Corral Bookstore, Cal Poly Downtown, Campus Dining, and Poly Prints
- Business Services – Sponsored Research and Grants, Conferences and Workshops
- Advancement Support – Gifts, Endowment and Trust Management Services
- Student Aid to Instruction – University Graphic Systems and Student Enterprise Projects
- Technology Transfer and Innovation – Financial Support and Administration

A Board of Directors comprising faculty, students, community leaders and university administrators oversees Cal Poly Corporation operations.

## PERFORMING ARTS CENTER

*Ticket hotline: 805 756-2787,*

*Toll-free in California: 888 233-2787*

*Administrative office: 805 756-7222; [www.pacslo.org/](http://www.pacslo.org/)*

The Christopher Cohan Center is the result of a partnership and cooperation between Cal Poly, the City of San Luis Obispo, and the community's Foundation for the Performing

Arts Center. Located on the campus, it features three performance venues: Sidney J. Harman Hall, Philips Electronics Recital Hall, and the Pavilion.

The Cohan Center and the 500-seat Spanos Theatre comprise the Performing Arts Center San Luis Obispo. The Center accommodates all types of cultural events, from student and local performances to major touring artists, including the annual summer Mozart Festival.

## UNIVERSITY ADVANCEMENT

*Administration Bldg. (01), Room 413*

*805 756-1445, [www.giving.calpoly.edu](http://www.giving.calpoly.edu)*

The University's advancement effort is designed to enhance the overall external relations of the Cal Poly campus, including the key areas of alumni relations, development and public, government and community affairs.

Advancement staff help secure private support for the benefit of students through collaborative efforts with key volunteers and the Cal Poly Foundation Board of Directors. Comprised of 20 prominent friends and supporters, many who personally give to Cal Poly, this board spearheads the advancement effort to ensure that Cal Poly continues as a first-class, first-choice higher educational experience.

Generous gifts from alumni, friends, parents, industry partners and foundations help provide the unique education that Cal Poly offers to its students. Supported resources include scholarships, on-campus technology and student programs.

Cal Poly is fortunate to have built up the largest endowment in the CSU system and consistently is one of the most productive campuses of its type in garnering philanthropic commitments from generous individuals and corporations.

Private support is increasingly important to Cal Poly, making it possible for the many centers of excellence around the campus to grow and prosper. For more information about Cal Poly's advancement program please visit [www.giving.calpoly.edu](http://www.giving.calpoly.edu).

## UNIVERSITY POLICE

*Building 74, 805 756-2281*

*[www.Police.calpoly.edu](http://www.Police.calpoly.edu)*

Cal Poly's Police Department is a full service police agency certified by the California Department of Justice. It has the same responsibilities and authorities as municipal, county or other state law enforcement agencies and has state-wide authority. It includes a 9-1-1 emergency dispatch center.

**Parking**, a major function of the University Police, includes the management of 7,750 parking spaces, three parking structures, parking and event planning and traffic flow.

**Commuter and Access Services** provide resources for alternative transportation in partnership with local transit, regional RideShare, and bicycle organizations. The Escort Van Service provides free transportation for students, faculty and staff on campus and close vicinity of Cal Poly during evening hours.

# Student Affairs

*Office of the Vice President for Student Affairs  
Administration Building (01) Room 209  
805 756-1521*

The Office of the Vice President for Student Affairs oversees a division that provides services, leadership training, and learning experiences for all Cal Poly students. Through advocacy, program development, and serving as a liaison to student organizations on behalf of the University, Student Affairs is the key link to student life on campus. Dedicated to student learning, Student Affairs staff mentor students, encourage personal development, and support important initiatives to enhance retention and matriculation of students.

## Mission Statement

The mission of the Student Affairs Division is to cultivate student learning and success. Together with the University, the Student Affairs Division is committed to the principle of integrating Student Affairs programs and services into the student's total learning environment, in and out of the classroom, and fostering within each student respect and responsibility for self and members of the greater community.

Delivery of programs and services is influenced by an ongoing assessment of student needs, the campus climate and established outcomes. It is guided by:

- The scholastic achievements of our students;
- The residential nature of our campus;
- The high staff/faculty-to-student ratio of our departments;
- The selective standards of our admissions, which draw students from around the state; and
- The learn-by-doing focus of our curricular and co-curricular activities.

The mission is carried out through teaching and personal instruction, advisement and counseling, community service learning, internships and experiential education, organized programming, and services. The mission is achieved through the following programs and services:

- Associated Students, Inc.
- Career Services
- Dean of Students
- Disability Resource Center
- Health and Counseling Services
- Office of Student Rights and Responsibilities
- Parent Program
- Student Academic Services
- Student Life and Leadership
- Testing Services
- University Housing

## ASSOCIATED STUDENTS, INC. (ASI)

*University Union (65), Room 212, 805 756-1281*

### Mission Statement

The mission of Associated Students, Inc. is to enrich the quality of student life and to complement the educational mission of Cal Poly through shared governance, student employment, student advocacy and a broad spectrum of programming, services and opportunities for leadership and social interaction.

### Vision Statement

Associated Students, Inc. will be every student's connection to the ultimate college experience.

### ASI Student Government

*University Union (65), Room 202, 805 756-1291*

Leadership opportunities are open to all interested students. This includes the elected College Council representatives who form the Board of Directors and appointed positions on the University Union Advisory Board and the ASI Executive Cabinet. ASI student leaders represent the student body on community, campus and regional committees.

Three student officers guide the organization: the ASI President, Chair of the Board, and Chair of the University Union Advisory Board. These officers and the Board of Directors are elected in spring quarter, and they are the recognized representatives of Cal Poly students. The ASI Chief of Staff is an appointed leader who guides the ASI Executive Cabinet in supporting the goals of the ASI President.

The Board of Directors oversees the policy development of ASI, an \$11 million nonprofit corporation. ASI collects quarterly fees, commercial revenue and grants, which support a wide range of campus clubs as well as student programs and services.

## PROGRAMS AND SERVICES OF ASI

ASI operates a wide variety of programs and services in four facilities, the Julian A. McPhee University Union, Orfalea Family and ASI Children's Center, Recreation Center, Cal Poly Sports Complex, and the Chumash Challenge Ropes Course.

### ASI Business Office

*University Union (65), Room 212, 805 756-1281*

The ASI Business Office provides internal business services to all ASI programs and services, including administrative support, fiscal services, human resources, project management, and information technology.

## JULIAN A. MCPHEE UNIVERSITY UNION (UU)

**Information Desk:** *Second Floor Lobby, University Union (65), 805 756-1154 (Voice or TDD)*

The Julian A. McPhee University Union is a central place for students, faculty, staff, alumni and guests to meet, relax and exchange ideas. Facilities include: UU Plaza, UU Epicenter, two student lounges: Bishop's Lounge and San Luis Lounge, UU Gallery, ASI Events, Poly Escapes, ASI

Craft Center, Mustang Lanes, BackStage Pizza, Starbucks, SESLOC Credit Union, Student Life & Leadership, Student Community Services, Multicultural Center, Women's Center, ASI Student Government Office, Chumash Auditorium and UU Reservations.

### **UU Epicenter**

*University Union (65), Room 203, 805 756-5807*

The UU Epicenter is students' one-stop shop for "Events, Programs and Ideas." Students can obtain information, materials and resources on the following programs and services: ASI Events, Cal Poly Rose Float, ASI Craft Center, UU Gallery, Club Services, Poly Escapes and the Chumash Challenge High Ropes Course.

The UU Epicenter provides services to Cal Poly clubs, sport clubs and independent student organizations.

### **Cal Poly Clubs**

There are close to 300 active clubs and organizations affording students the opportunity to become active in campus life. Clubs include academic and professional organizations, hobby-interest clubs, honor societies, service clubs, residential groups, multicultural organizations and spiritually based groups.

A complete list of all clubs on campus, meeting dates, locations and contact information can be found on the ASI website at [www.asi.calpoly.edu/static/join\\_club](http://www.asi.calpoly.edu/static/join_club).

ASI has created club funding programs to support clubs and organizations, including those that enhance cultural activities, community services and campus-wide education efforts.

### **ASI Events**

*University Union (65), Room 203, 805 756-1112*

ASI Events provides on-campus entertainment programming in four different program areas: UU Gallery, concerts, Concerts in the Plaza (formerly UU Hour) and special events. These programs, in addition to our multicultural events and celebrations, comedy, artistic expression, education programs and speaker forums on social issues, have been identified to meet the diverse needs of a comprehensive university.

### **UU Gallery**

*University Union (65), Room 203, 805 756-5807*

The UU Gallery is located in the UU Epicenter and is designed to give students and community members the opportunity to showcase artwork with exhibits of painting, photography, sculpting and more.

### **ASI Craft Center**

*University Union (65), Room 111, 805 756-1266*

The ASI Craft Center offers a wide variety of fun, non-academic craft classes and workshops. The facility includes a ceramics area, bike repair room, woodworking power tools, glass bead-making lab, poster-making tables with pens and paper, and a retail store.

### **Poly Escapes**

*University Union (65), Room 112, 805 756-1287*

For more than 30 years ASI's Poly Escapes has been sponsoring outdoor trips and programs with students at the core of its leadership program. With a zest for spontaneous adventure and the desire to explore the unknown, Cal Poly students have looked to Poly Escapes to take them on "once in a lifetime adventures." Poly Escapes provides trip coordination, educational experiences, a climbing wall, resource library and roughly 20 trips each fall, winter and spring. Students may also rent equipment such as tents, sleeping bags, backpacks, cross-country skis, surfboards and ice cream makers at reasonable prices.

### **Cal Poly Rose Float**

*University Union (65), Room 209, 805 756-1268*

One of the most exciting activities on the Cal Poly campus is building the annual Rose Parade float. Since 1949, a team of students at the Cal Poly San Luis Obispo and Pomona campuses has produced floats annually. For more than 50 consecutive years, students from all academic majors have enjoyed the thrill of watching a float they designed, built and decorated make its way down Colorado Boulevard on New Year's Day in the Tournament of Roses Parade.

Not only is the Cal Poly float a one-of-a-kind venture for college students, it is also an opportunity for students to develop new innovations such as computer-controlled animation, hydraulics systems for movement, and more.

### **ASI CHILDREN'S PROGRAMS**

*Orfalea Family and ASI Children's Center (133), 805 756-1267*

The Orfalea Family and ASI Children's Center is a nationally accredited program providing quality early care and education services to children from 4 months to 6 years old. Student parents are given first priority for enrollment. Subsidized childcare is available for low-income student parents.

The ASI Children's Programs' philosophy is based on the belief that young children thrive in an environment that promotes understanding of themselves, others and the world around them. Teachers focus on facilitating children's development in the social-emotional, cognitive and physical domains. Activities are designed to meet the children's individual and age-appropriate needs. With the understanding that children learn through play, caregivers encourage them to explore, discover and have fun. Emphasis is placed on teaching children how to problem-solve and make appropriate choices, while learning to interact within a group setting.

### **ASI RECREATIONAL SPORTS**

*Recreation Center (43)*

*805 756-1366 (Main), 805-756-PLAY (Hotline)*

[www.asi.calpoly.edu/get\\_active](http://www.asi.calpoly.edu/get_active)

ASI Recreational Sports offers opportunities for all students to participate in aquatics, exercise and instructional classes, intramural sports, informal recreation and special events.

Registered Cal Poly students have free access to the Recreation Center, which is open seven days a week. Facilities include two sand volleyball courts, a 7,000-square-foot weight room, a 6,500-square-foot fitness room, nine racquetball courts, an Olympic-sized swimming pool and four indoor basketball courts.

ASI's Recreational Sports Program employs more than 160 students each year. Student and full-time staff members are available to assist with any questions or concerns about Recreational Sports programs.

### **Rec Sports Programs:**

**Aquatics** classes are designed for all levels of swimmers, from beginning to masters. Scuba courses, stroke clinics and lifeguard training are just a few of the classes offered.

**Chumash Challenge** is a unique experiential education program that empowers groups and individuals through initiatives and problem solving activities using team building and High Ropes workshops. Cal Poly clubs, class labs and organizations as well as local schools, county government agencies, youth-at-risk groups and local businesses are all active participants of Chumash Challenge. Located in the hills of Stenner Canyon, it is a place of self-discovery where the "challenge by choice" philosophy is followed and participants are not pressured to move beyond their comfort zone. Group cooperation, leadership skills, decision-making skills, positive risk-taking, trust and self-confidence are all part of the Chumash Challenge experience. Call 756-2628 for more information.

**Fitness and Instructional** programs are designed for individuals to acquire new skills in a relaxed and enjoyable setting. Programs offered include an extensive aerobic schedule, spin classes, martial arts, pilates and yoga. Nationally certified personal trainers are on staff to assist in meeting fitness goals.

**Informal Recreation** provides non-structured opportunities to participate in a variety of activities such as swimming, cardiovascular exercise, free weight and weight machines, basketball, volleyball, racquetball and indoor soccer.

**Intramural Sports** provides a variety of structured sports leagues and tournaments in a safe, recreationally competitive environment. The program is open to all Cal Poly students and also to faculty, staff and alumni who are current members of the Recreation Center. Popular sports include: basketball, flag football, soccer, softball and volleyball.

## **CAREER SERVICES**

*Student Services (124), Room 114, 805 756-2501*  
[www.careerservices.calpoly.edu](http://www.careerservices.calpoly.edu)

This centralized service is available to all students and alumni of the University. In conjunction with the seven academic colleges, Career Services assists students with exploring, formulating and implementing career plans. Career Services actively promotes and supports effective

professional relationships between the University and employers.

### **Career Counseling**

Through individual appointments and group workshops, students are guided through the exploration and formation of personal career plans. Students considering a change of major are particularly encouraged to utilize Career Services so that they may become better informed about career options. With the assistance of department staff, students may take advantage of interest inventories; utilize computerized career guidance systems, review current literature on career profiles, trends and work environments; attend career fairs, employer/industry information sessions, and career-related events. Students are offered the opportunity to network with company representatives.

### **Student Employment**

Student employment opportunities are available to all currently-enrolled students. Positions are centralized on-line through *Mustang Jobs* through the On-Campus Interview Program or Job Listing Service. This includes local part-time jobs (on campus and off campus), Co-op, internships, summer, and seasonal jobs. These types of jobs can support a student's future career direction, as well as allow them to earn money for college expenses.

### **Cooperative Education**

Cooperative Education is a joint partnership between employers, Career Services and Cal Poly's academic programs. Students are able to secure professional-level work experience related to their majors, obtain professional contacts in industry, affirm career goals, obtain marketable skills, develop self-confidence, and integrate what is learned in the classroom within the world of work. Co-op assignments are primarily full-time paid positions, three to six months in duration, offered to junior- and senior-level students. Students earn academic credit for their participation.

### **Career Employment and Graduate School Services**

Through workshops and individual advisement, students are guided through the job search or graduate school application process, which includes clarifying the career objectives; identifying, researching and contacting potential employers and graduate programs; preparing resumes and personal statements; and preparing for interviews.

Employer contacts may be generated through *Mustang Jobs* (on-campus interview program, job listings) and job fairs, as well as professional directories and publications geared toward the hiring of new college graduates.

Students are encouraged to take advantage of the Career Resource Center, which contains a variety of career resources, annual reports, salary trend information, alumni network files, and student workstations allowing Internet research and computer-assisted career exploration programs.



## DEAN OF STUDENTS

*Health Services Bldg. (27), Room 188, 805 756-0327*

The Dean of Students Office provides leadership to support student success, strengthen campus community relations, and provide the initiatives for future student-centered programs that foster the development of the student academically, socially and ethically.

The Dean of Students supports student learning and service through:

- helping students manage academic and nonacademic situations;
- consulting extensively with faculty and staff on behalf of student concerns;
- interpreting and assisting with understanding campus policies and procedures;
- consulting with student clubs and organizations to foster a healthy student life;
- cultivating a caring, supportive campus and community environment; and
- assisting with parent concerns regarding campus life and policies.

Students with questions or concerns are encouraged to stop by or contact the office. The staff answers questions, advocates when appropriate, investigates student complaints of discrimination, and directs students to the appropriate campus or community resource as needed.

## DISABILITY RESOURCE CENTER

*Student Services (124), Room 119,*

*805 756-1395, voice or tty*

The Disability Resource Center's mission is to assist in creating an accessible university community where students with disabilities have an equal opportunity to fully participate in all aspects of the educational environment. The Center cooperates through partnerships with students, faculty, and staff to cultivate student learning and success.

Students wishing to use disability-related services and accommodations complete an Application for Services, submit disability documentation, and then meet with an access specialist who determines eligibility and accommodations. Advance planning is strongly encouraged.

For detailed information please see [www.drc.calpoly.edu](http://www.drc.calpoly.edu).

## HEALTH AND COUNSELING SERVICES

*Student Health Center (27), 805 756-1211*

The goal of Health and Counseling Services is to support the physical and psychological well-being of all students attending Cal Poly. A variety of services are offered for students including outpatient care, individual counseling, a pharmacy, and health education programs. Health and Counseling Services assists students by minimizing class time lost due to illness, injury, or personal problems.

## Health Services

*Student Health Center (27), 805 756-1211*

The following services are available to all students as part of the health services fee:

- **Outpatient medical services** are available, year-round, Monday through Friday, 8:00 a.m. to 4:30 p.m. except Wednesday, 9:00 a.m. to 4:30 p.m., and includes primary physician and nursing services, men's/women's health care, laboratory and routine x-ray procedures.
- **Health education** programs on nutrition, Educational Resources On Sexuality (EROS), and Thoughtful Lifestyle Choices (TLC) are provided by staff professionals and students trained as peer health educators. Programs include nutrition counseling, alcohol and drug awareness, sexuality and lifestyle wellness.
- **Additional health services** are also available at a low cost and include pharmacy items (prescription and over-the-counter items), lab tests when specimens are sent off campus for processing, immunizations, orthopedic supplies and optometry.

**Major medical insurance** coverage for off-campus services is strongly recommended. Students are encouraged to have their own coverage for major medical, surgical and emergency expenses. **Due to a shortage of doctors in the community in certain specialty areas, students requiring specialty medical care are encouraged to call for appointments with local specialists well in advance.**

## Counseling Services

*Student Health Center (27), 805 756-2511*

Counseling Services offers individual and group counseling, crisis intervention, education and outreach, and internship training. Counselors are available to assist with the normal adjustments of academic and social life; personal issues such as confidence and self-esteem, stress management, body image and sexuality; as well as more serious personal concerns such as depression, anxiety, alcohol and drug abuse.

## OFFICE OF STUDENT RIGHTS AND RESPONSIBILITIES

*Student Services (124), 805 756-2794*

[www.osrr.calpoly.edu](http://www.osrr.calpoly.edu)

The Office of Student Rights and Responsibilities administers the California State University Standards for Student Conduct. This office ensures a fair and impartial administration of the disciplinary process, while educating students about their responsibilities and protecting the rights of all members of the university community. The Office addresses student behavioral problems in a developmental and educational manner with the goal of fostering the ethical development and personal integrity of students. The Standards for Student Conduct and disciplinary process are available at [www.osrr.calpoly.edu](http://www.osrr.calpoly.edu).

## **PARENT PROGRAM**

*Health Center (27), Room 113*

*Parent Helpline: 805 756-6700*

*[www.parent.calpoly.edu](http://www.parent.calpoly.edu)*

*e-mail: [calpolyparent@calpoly.edu](mailto:calpolyparent@calpoly.edu)*

The Cal Poly Parent Program is dedicated to helping families effectively support their students' transition and success and providing opportunities for them to stay connected to the university community. All of the Parent Program's services are designed to serve as resources for parents and families as they discover the best way to support their sons or daughters, while also enabling their students' independence and personal responsibility.

Parents are encouraged to sign up for the Parent E-newsletter. This monthly service provides links to University news and important dates, and features timely tips and articles on relevant topics.

The University's Parent Program Advisory Council serves in an advisory capacity to the Parent Program and offers the Cal Poly parent community experienced parent perspectives and avenues for involvement. In addition, the Parent Program welcomes parents at orientation events, hosts an annual Parents' Weekend, and encourages support of Cal Poly and its programs through the Cal Poly Fund.

## **STUDENT ACADEMIC SERVICES**

*Hillcrest (81), 805 756-2301*

Student Academic Services (SAS) offers comprehensive programs that directly support academic excellence. Program services include academic and personal advising, admissions and transition services, new student first year seminars, supplemental workshops and study group assistance. Academic advisors work with each of the seven academic colleges to provide academic and personal advising assistance to students with class scheduling, assessment of academic skills, graduation planning, career clarification and related learning and study skills.

Supplemental workshops and study sessions are available for key content courses in first- and second-year curricula.

An additional emphasis of SAS is to offer support to students from backgrounds that have been traditionally underrepresented in the California State University System. The goal of SAS is to ensure that all students have equal opportunity to achieve academic success and graduation. Student Academic Services incorporates the following:

### **Academic Skills Center**

*Kennedy Library (35), Room 112, 805 756-1256*

The Academic Skills Center (ASC) offers a wide variety of retention programs and campus support services, including study skills seminars, study sessions and tutor referral services.

## **College Bound**

*Hillcrest (81), 805 756-2301*

The purpose of EOP College Bound is to motivate and assist in the preparation of students from low-income, first-generation college families for application and entrance to Cal Poly or another post-secondary institution of their choice. The program offers various educational outreach strategies to high school students.

## **Connections for Academic Success**

*University Union (65), Room 217A, 805 756-6774*

The mission of Connections for Academic Success (CAS) is two-fold: to help increase the retention of new students by providing services in support of their academic success, and, through outreach efforts, provide educationally and/or economically disadvantaged students with information about Cal Poly and support their preparation for admission. CAS provides academic advising and referrals to other advising resources; assistance with obtaining tutoring and study session contacts; assisting students with identifying and overcoming obstacles to their academic success; and connecting students with other campus resources.

## **Educational Opportunity Program (EOP)**

*Hillcrest (81), 805 756-2301*

EOP provides admissions and academic support programs for low-income, historically disadvantaged students. EOP offers academic and personal advising, study sessions, academic orientation courses, career and post-graduate advising, and referrals to campus resources.

## **Educational Talent Search**

*Hillcrest (81), 805 756-2301*

Educational Talent Search (ETS) is a federally funded program designed to assist participants in reaching their academic potential. Cal Poly's program assists middle and high school students who meet federal low-income guidelines and may be the first in their family to attend college. The services of ETS support those offered through guidance offices at selected campuses in San Luis Obispo and Santa Barbara Counties. While the staff is employed at Cal Poly, San Luis Obispo, the program is not used as a recruitment tool for the University; participants receive assistance in applying to any college, university or other qualified post-secondary institution.

## **Partners Program**

*University Union (65), Room 217A, 805 756-6774*

The Partners Program is a recruitment and access feeder program which collaborates with a select number of California high schools. The University has established formal partnerships with high schools throughout the state. For those student who enroll at Cal Poly, the Connections for Academic Success program (CAS) collaborates with the Admissions Office, University Housing, College Advising Centers, as well as faculty and staff, to provide support to enable students to make successful transitions from high school to Cal Poly.

The program is designed to assist students with acquiring information about support services such as tutoring, employment and academic advising; become knowledgeable about academic policies and procedures relevant to their majors; access financial aid resources; and understand how to register for classes.

### **Student Support Services**

*Student Services (124), Room 119, 805 756-1395*

The purpose of this federally funded program is to provide support services to low-income, first-generation or disabled college students to enhance their academic skills, increase their retention and graduation rates, and facilitate their entrance into graduate and professional school programs.

### **Summer Institute**

*Hillcrest (81), 805 756-2301*

Summer Institute (SI) is an academic scholars' program held annually at Cal Poly. Selected newly admitted freshman students have the opportunity to participate in this three-to-five-week residential program geared at helping make a successful transition from high school to the more rigorous Cal Poly environment.

### **Upward Bound**

*Hillcrest (81), 805 756-2301*

Upward Bound (UB) is a federally funded program which provides a college preparatory program for low-income and/or potential first-generation college students. This program motivates and academically prepares local high school students for college. The academic program and residential summer school session at Cal Poly offer tutoring, career advisement and supplemental instruction, as well as cultural and recreational activities.

## **STUDENT LIFE AND LEADERSHIP**

*University Union (65), Room 217, 805 756-2476*

[www.studentlife.calpoly.edu](http://www.studentlife.calpoly.edu)

Student Life and Leadership offers opportunities to develop leadership skills, contribute to the community, experience diversity, participate in group dynamics, and mentor new students. Its mission is to advance and encourage the learning and personal development of students, and its programs are integrated into the student's total learning environment.

### **Clubs and Organizations**

Student clubs and organizations provide opportunities for the enhancement of academic, cultural, social, and recreational aspects of student life through participation in group activities and programs. Being part of a campus club or organization can greatly enrich the student experience at Cal Poly.

### **Commencement**

Commencement ceremonies are coordinated by Student Life and Leadership staff, in collaboration with the Commencement Committee, and are held each December and June.

## **Community Service Programs**

The **Community CENTER** at Cal Poly represents the University's commitment to community involvement and civic engagement. It is dedicated to helping each individual, as well as student clubs, find meaningful and satisfying service experiences through both volunteer service and service related to academic learning.

**Student Community Services** provides volunteer service programs that address a variety of social issues, concerning children, homeless individuals, mentally disabled adults, seniors, animals, and the environment. Each year, thousands of students participate in service activities. Annual events include Make a Difference day, WOW Day of Service, Hunger Awareness Week, Homeless Awareness Week, Change the Status Quo Conference, Martin Luther King, Jr. Day of Service, and César Chávez Day of Service.

**Service-learning courses** integrate community service with course curriculum to enhance learning outcomes. Each quarter, hundreds of students are involved in community service as part of their academic coursework. The Community CENTER provides support for faculty and students in developing and implementing service learning.

The Community CENTER assists the University in recognizing students for outstanding service in a variety of ways. Each year, the University President awards the President's Community Service Award to outstanding students, clubs, and faculty. Students can have their service hours noted on their official university transcripts.

### **Greek Organizations**

There are 34 fraternities, sororities, and cultural Greek organizations affiliated with Cal Poly. Many of the social sororities and fraternities own or lease housing near the campus. Some provide lodging and meals for their members and pledges.

### **Multicultural Center**

The mission of the Multicultural Center (MCC) is to promote an environment where diversity is respected and celebrated, and alliances are built regardless of ethnic/racial membership or sexual orientation. The mission serves to complement the University's philosophy that affirms all students' identities and which enhances the quality of university life for all students. The Center's mission strives to prepare all students to become culturally competent citizens in a global society.

### **Orientation Programs**

**Open House** encompasses many activities showcasing the excellence of Cal Poly and the surrounding community. An event preview is hosted on Thursday night at the popular Farmers' Market, and on Friday, conditionally admitted students and their supporters are invited to campus. On Saturday, campus is open to the public with many events, including the Poly Royal parade, open ceremonies, kids'

fair, and an exciting club booth and activity area with more than 200 student clubs participating.

**Student Orientation, Advising and Resources (SOAR)** is an academic advising session that helps new students and their families learn how to navigate the Cal Poly environment. The University invites new students to participate in SOAR to get connected to information specific to the students' majors and to prepare them to register for classes. Families and students learn about available resources and what to expect during their time at Cal Poly.

The **Week of Welcome (WOW)** orientation program is coordinated by staff and operated by students, for students, with a peer-helping method that creates a combination of excitement, learning, and new experiences for new students and their families in a fun, comfortable atmosphere. First-year and transfer students are placed in small groups that participate in activities introducing them to the campus and community for the week prior to fall classes.

The WOW experience is designed to assist new students with a successful academic, social and emotional transition to university life. Parent orientation programs provide parents with an opportunity to celebrate their student's transition as well as have their own questions and concerns addressed during Family Orientation Weekend. During this weekend, programs are also provided for first-year students, transfer students, non-traditional students, and parents and younger siblings of new students.

WOW also hosts the parents' Coffee House during Open House, summer advising sessions for parents, non-traditional student orientation day, and welcome activities for new students starting during winter and summer quarters. WOW is an exciting environment in which to meet new people, become familiar with Cal Poly and San Luis Obispo, and prepare to start a college career.

### **Pride Alliance: LGBT (lesbian, gay, bisexual, transgender) Center**

The LGBT Center is a resource center for the entire campus community. Its mission is to provide programming, networking and resources that raise awareness and educate students of diverse backgrounds about LGBT and related issues. The center's Ally Training program prepares members of the campus community to support and be sensitive to the needs of LGBT people.

### **SAFER (Sexual Assault-Free Environment Resources)**

SAFER's mission is to promote a caring, empowered campus community where people understand what constitutes sexual assault; understand the harmful effects of sexual assault; are motivated to intervene to prevent sexual assault; know how to reduce the risk of sexual assault for themselves and others; know who to call and what to do should they or someone else experience sexual assault; and

agree that all sexual activities should be consensual and based on respect and equality.

### **Sport Club Program**

The Sport Club program offers the campus community a wide variety of competition, instruction, and development in the form of 16 sport clubs and related activities. The program currently has approximately 535 members and features a competitive level above the traditional intramural program. The members compete against clubs from other universities, improve their skills through instruction, and develop leadership skills through the management of their organizations. Students of all skill levels are encouraged to participate.

### **Women's Programs and Services**

The mission of Women's Programs and Services is to create and sustain a university environment that promotes the personal, educational and professional growth of women. Students, faculty and staff work together in The Women's Center to create activities and programs which highlight women's achievements and concerns. Programs are planned and produced in collaboration with diverse campus and community groups.

## **TESTING SERVICES**

*Student Services (124), Room 121, 805 756-1551*

Testing Services administers standardized tests of admission, placement and certification, such as the PRAXIS Series, Law School Admission Test, and Medical College Admission Test, and coordinates the administration of the CSU English Placement (EPT) and Entry Level Math (ELM) test programs. Testing Services provides general proctoring services to the campus community, and operates an ETS Computer-Based Testing Center that offers such tests as the GRE, TOEFL and PPST.

## **UNIVERSITY HOUSING**

*Building 031, 805 756-1226*

Living on-campus can be a unique and rewarding experience. For the majority of first-year students, it is the first experience in a shared community living environment. Learning in the classroom is extended into on-campus residence halls and apartments through the "Living/Learning," "Connections," and "Transitions" Programs.

Returning students and new transfers have an opportunity to live in on-campus apartments in an environment which provides programmatic support with the goal of retention and academic success.

All students participate in a variety of social interactions and share the same community with diverse groups of individuals. Residents are provided with an environment that educates, challenges and supports their development. Activities are coordinated by hall staff and residents. Most students make lifelong friends while residing on campus.



## Staff

Community programs and activities are administered by full-time live-in professionals (Coordinators of Student Development), who are available to assist residents with counseling, crisis intervention, general referrals, and judicial actions. The Coordinators also supervise front desk services and the Resident Advisors/ Community Advisors.

Resident Advisors and Community Advisors, known as RAs, and CAs, are typically upper-division students who understand the challenges faced by new students and try to make living on campus a positive and memorable experience for all residents. The RAs and CAs are trained in advising, event planning, and crisis intervention to assist students through their first year.

## Residential Life Programs

### Living/Learning Halls

The Living/Learning Residence Halls are for freshmen and are centered around Cal Poly's academic colleges. Faculty, administrators, and alumni meet with the students in an informal setting. The programming focuses on four fundamental areas: academic development and support, personal development, professional affiliation, and leadership development. This provides many advantages for residents including direct faculty contact, study groups, and events relating to the student's major and career planning.

### The Connections Program

The "Connections" Halls offer freshmen programs that support student transition into the residence hall community and University. This program is designed to provide incoming freshmen with the information, resources and support needed to be personally and academically successful at Cal Poly. Participating students have the opportunity to get involved with leadership, community service and social activities in the halls.

### The "Transitions" Program

"Transitions" offers programs and activities in the on-campus Cerro Vista Apartments for first year and transfer students who are comfortable and experienced with a more independent lifestyle. Students living here are expected to be independent and have abilities and experience to live and cook on their own. The Honors Community is located within the Cerro Vista Apartments.

### The "Sophomore Success" Program

The Poly Canyon Village Apartments and the "Sophomore Success" Program are offered to returning residents through a lottery process. Student programming and activities support retention and overall academic success.

## Community Involvement

Student representatives are elected in fall term to serve on governing boards in each of the halls and apartments. Participants contribute to their hall's community by planning social, recreational, and educational events, and by voicing student-related concerns. Networks in community services,

recreational sports and multicultural issues provide additional opportunities for student involvement.

## ResNet

All on-campus rooms have access to the Cal Poly Network and the Internet. Cal Poly ResNet is the on-campus housing network that provides dedicated high-speed connections 24 hours a day. The ResNet Office provides this and other computing support programs for on-campus residents.

## Applying for On-Campus Housing

[www.housing.calpoly.edu](http://www.housing.calpoly.edu)

Information about the on-campus housing program and timeline to apply can be found at the Housing web site. Housing is offered to university-admitted students; however, spaces are limited. On-campus housing is secured on a first-come/first-served payment basis and cannot be guaranteed to all incoming freshmen due to the variance of new students admitted each year. Conditionally admitted students who have accepted their offers of admission submit housing applications via an online process through the [my.calpoly.edu](http://my.calpoly.edu) portal, printing the Housing License Agreement, and submitting payments to Cal Poly.

## Living Expenses for Students in Campus Residence Halls and Apartments (Subject to Change)

All Housing fees are payable in advance. Quarterly installment plans are available. All fees listed below reflect 2008-09 prices and are subject to change:

Residence Hall Rooms – Double Occupancy (academic year license) .....	\$5,233
Residence Hall Meal Plan (mandatory) .....	\$4,137
Apartments – Private Rooms (academic year license) .....	\$700/month (approx.)

## Off-Campus Housing Resources

[www.housing.calpoly.edu](http://www.housing.calpoly.edu)

The Housing Office maintains information regarding the rental of off-campus houses and apartments, and an extensive list of private and shared rooms. Information is available at the Housing website. The University does not inspect, approve or disapprove of any housing offered through these rental resources.

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# *The California State University*

The individual California State Colleges were brought together as a system by the Donahoe Higher Education Act of 1960. In 1972, the system became the California State University and Colleges and in 1982 the system became the California State University. Today the campuses of the CSU include comprehensive and polytechnic universities and, since July 1995, the California Maritime Academy, a specialized campus.

The oldest campus—San José State University—was founded in 1857 and became the first institution of public higher education in California. The newest—CSU Channel Islands—opened in fall 2002 with freshmen arriving in fall 2003.

Responsibility for the California State University is vested in the Board of Trustees, whose members are appointed by the Governor. The Trustees appoint the Chancellor, who is the chief executive officer of the system, and the Presidents, who are the chief executive officers of the respective campuses.

The Trustees, the Chancellor, and the Presidents develop systemwide policy, with implementation at the campus level taking place through broadly based consultative procedures. The Academic Senate of the California State University, made up of elected representatives of the faculty from each campus, recommends academic policy to the Board of Trustees through the Chancellor.

Academic excellence has been achieved by the CSU through a distinguished faculty, whose primary responsibility is superior teaching. While each campus in the system has its own unique geographic and curricular character, all campuses, as multipurpose institutions, offer undergraduate and graduate instruction for professional and occupational goals as well as broad liberal education. All campuses require for graduation a basic program of "General Education Requirements" regardless of the type of bachelor's degree or major field selected by the student.

The CSU offers more than 1,800 bachelor's and master's degree programs in some 357 subject areas. Many of these programs are offered so that students can complete all upper-division and graduate requirements by part-time, late afternoon, and evening study. In addition, a variety of teaching and credential programs are available. A number of doctoral degrees are offered jointly with the University of California and with private institutions in California. In 2005, the CSU was authorized to independently offer education doctorate (Ed.D.) programs, and a total of 10 CSU campuses currently have Ed.D. programs.

Enrollment in fall 2008 totaled 450,000 students, who were taught by some 24,000 faculty. The system awards about half

of the bachelor's degrees and a third of the master's degrees granted in California. Nearly 2.5 million students have graduated from CSU campuses since 1961.

## **Trustees of the California State University**

### **Ex Officio Trustees**

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Governor of California  
State Capitol, Sacramento 95814

The Honorable John Garamendi  
Lieutenant Governor of California  
State Capitol, Sacramento 95814

The Honorable Karen Bass  
Speaker of the Assembly  
State Capitol, Sacramento 95814

The Honorable Jack O'Connell  
State Superintendent of Public Instruction  
721 Capitol Mall, Sacramento 95814

Dr. Charles B. Reed  
Chancellor of the California State University  
401 Golden Shore, Long Beach 90802-4210

### **Officers of the Trustees**

The Honorable Arnold Schwarzenegger, President  
Jeffrey L. Bleich, Chair  
Herbert L. Carter, Vice Chair  
Christine Helwick, Secretary  
Dr. Benjamin F. Quillian, Treasurer

### **Appointed Trustees**

*Appointments are for a term of eight years, except student, alumni, and faculty trustees, whose terms are for two years. Terms expire in the year in parentheses. Names are listed alphabetically.*

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Jeffrey L. Bleich (2010)	Linda A. Lang (2017)
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Carol R. Chandler (2012)	Peter Mehas (2015)
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Melinda Guzman (2012)	
William Hauck (2009)	

### **Correspondence with Trustees should be sent to:**

c/o Trustees Secretariat  
The California State University  
401 Golden Shore  
Long Beach, CA 90802-4210

**OFFICE OF THE CHANCELLOR**

The California State University  
401 Golden Shore  
Long Beach, California 90802-4210  
(562) 951-4000

Dr. Charles B. Reed.....Chancellor – CSU System  
Dr. Jeri Echeverria.....Executive Vice Chancellor and Chief Academic Officer  
Dr. Benjamin F. Quillian.....Executive Vice Chancellor and Chief Financial Officer  
Ms. Gail Brooks.....Vice Chancellor, Human Resources  
Ms. Christine Helwick.....General Counsel  
Mr. Garrett Ashley.....Vice Chancellor, University Relations and Advancement

**CAMPUSES—THE CALIFORNIA STATE UNIVERSITY****California State University, Bakersfield**

9001 Stockdale Highway, Bakersfield, CA 93311-1022  
Dr. Horace Mitchell, President  
(661) 654-2782 [www.csub.edu](http://www.csub.edu)

**California State University, Channel Islands**

One University Drive, Camarillo, CA 93012  
Dr. Richard Rush, President  
(805) 437-8400 [www.csuci.edu](http://www.csuci.edu)

**California State University, Chico**

400 West First Street, Chico, CA 95929-0150  
Dr. Paul J. Zingg, President  
(530) 898-4636 [www.csuchico.edu](http://www.csuchico.edu)

**California State University, Dominguez Hills**

1000 East Victoria Street, Carson, CA 90747-0005  
Dr. Mildred Garcia, President  
(310) 243-3301 [www.csudh.edu](http://www.csudh.edu)

**California State University, East Bay**

25800 Carlos Bee Boulevard, Hayward, CA 94542  
Dr. Mohammad Qayoumi, President  
(510) 885-3000 [www.csueastbay.edu](http://www.csueastbay.edu)

**California State University, Fresno**

5241 North Maple Avenue, Fresno, CA 93740  
Dr. John D. Welty, President  
(559) 278-4240 [www.csufresno.edu](http://www.csufresno.edu)

**California State University, Fullerton**

800 N. State College Boulevard, Fullerton, CA 92831-3599  
Dr. Milton A. Gordon, President  
(657) 278-2011 [www.fullerton.edu](http://www.fullerton.edu)

**Humboldt State University**

Arcata, CA 95521-8299  
Dr. Rollin C. Richmond, President  
(707) 826-3011, [www.humboldt.edu](http://www.humboldt.edu)

**California State University, Long Beach**

1250 Bellflower Boulevard, Long Beach, CA 90840-0115  
Dr. F. King Alexander, President  
(562) 985-4111 [www.csulb.edu](http://www.csulb.edu)

**California State University, Los Angeles**

5151 State University Drive, Los Angeles, CA 90032  
Dr. James M. Rosser, President  
(323) 343-3000 [www.calstatela.edu](http://www.calstatela.edu)

**California Maritime Academy**

200 Maritime Academy Drive, Vallejo, CA 94590  
Dr. William B. Eisenhardt, President  
(707) 654-1000 [www.csum.edu](http://www.csum.edu)

**California State University, Monterey Bay**

100 Campus Center, Seaside, CA 93955-8001  
Dr. Dianne Harrison, President  
(831) 582-3330 [www.csumb.edu](http://www.csumb.edu)

**California State University, Northridge**

18111 Nordhoff Street, Northridge, CA 91330  
Dr. Jolene Koester, President  
(818) 677-1200 [www.csun.edu](http://www.csun.edu)

**California State Polytechnic University, Pomona**

3801 West Temple Avenue, Pomona, CA 91768  
Dr. J. Michael Ortiz, President  
(909) 869-7659 [www.csupomona.edu](http://www.csupomona.edu)

**California State University, Sacramento**

6000 J Street, Sacramento, CA 95819  
Dr. Alexander Gonzalez, President  
(916) 278-6011 [www.csus.edu](http://www.csus.edu)

**California State University, San Bernardino**

5500 University Parkway, San Bernardino, CA 92407-2393  
Dr. Albert K. Karnig, President  
(909) 537-5000 [www.csusb.edu](http://www.csusb.edu)

**San Diego State University**

5500 Campanile Drive, San Diego, CA 92182  
Dr. Stephen L. Weber, President  
(619) 594-5200 [www.sdsu.edu](http://www.sdsu.edu)

**San Francisco State University**

1600 Holloway Avenue, San Francisco, CA 94132  
Dr. Robert A. Corrigan, President  
(415) 338-1111 [www.sfsu.edu](http://www.sfsu.edu)

**San José State University**

One Washington Square, San Jose, CA 95192-0001  
Mr. Jon Whitmore, President  
(408) 924-1000 [www.sjsu.edu](http://www.sjsu.edu)

**California Polytechnic State University, San Luis Obispo**

One Grand Avenue  
San Luis Obispo, CA 93407  
Dr. Warren J. Baker, President  
(805) 756-1111 [www.calpoly.edu](http://www.calpoly.edu)

**California State University, San Marcos**

333 S. Twin Oaks Valley Road  
San Marcos, CA 92096-0001  
Dr. Karen S. Haynes, President  
(760) 750-4000 [www.csusm.edu](http://www.csusm.edu)

**Sonoma State University**

1801 East Cotati Avenue, Rohnert Park, CA 94928-3609  
Dr. Ruben Armiñana, President  
(707) 664-2880 [www.sonoma.edu](http://www.sonoma.edu)

**California State University, Stanislaus**

One University Circle, Turlock, CA 95382-0299  
Dr. Hamid Shirvani, President  
(209) 667-3122 [www.csustan.edu](http://www.csustan.edu)

# University Administration

For most current information, please consult  
[www.president.calpoly.edu](http://www.president.calpoly.edu) (see “Additional Links”).

## OFFICE OF THE PRESIDENT

President .....	Warren J. Baker
Chief of Staff .....	Daniel Howard-Greene
Executive Assistant.....	Kimberly C. Uytewaal
Senior Advisor to the President for Special Agricultural and Federal Initiatives .....	Joseph J. Jen
University Executive for Research and External Support .....	William W. Durgin
University Legal Counsel .....	Carlos Córdova

## ACADEMIC AFFAIRS

Provost and Vice President for Academic Affairs .....	Robert D. Koob
Vice Provost/Chief Information Officer for Information Technology Services, .....	Timothy J. Kearns
Vice Provost for Programs and Planning .....	Erling Smith
Dean, Cal Poly Continuing Education .....	Dennis R. Parks
Dean, Library Services .....	Michael D. Miller
Dean, Research and Graduate Programs.....	Susan C. Opava
Associate Vice President for Academic Personnel .....	Michael H. Suess
Associate Vice President for Inclusive Excellence, Director of Ombuds Services .....	W. David Conn
Assistant Vice Provost for Systems and Resource Management.....	Kimi M. Ikeda
Registrar, Office of the Registrar.....	Cem Sunata
Assistant Vice President for Admissions, Recruitment and Financial Aid.....	James L. Maraviglia

## Colleges

College of Agriculture, Food and Environmental Science, Dean .....	David J. Wehner
College of Architecture and Environmental Design, Dean .....	R. Thomas Jones
Orfalea College of Business, Dean .....	David P. Christy
College of Engineering, Dean .....	Mohammad Noori
College of Liberal Arts, Dean .....	Linda H. Halisky
College of Science and Mathematics, Dean .....	Philip S. Bailey

## ADMINISTRATION AND FINANCE

Vice President for Administration and Finance .....	Lawrence R. Kelley
Associate Vice President for Commercial Services .....	Bonnie D. Murphy
Associate Vice President for Finance .....	Richard R. Ramirez
Assistant Vice President for Administration and Finance.....	Karen Webb

## STUDENT AFFAIRS

Vice President for Student Affairs.....	Cornel N. Morton
Associate Vice President .....	Denise M. Campbell
Associate Vice President .....	Preston C. Allen
Associated Students, Inc., Executive Director ....	Rick Johnson
Dean of Students .....	Jean DeCosta

## UNIVERSITY ADVANCEMENT

Vice President, University Advancement.....	Sandra G. Ogren
Associate Vice President/Chief Development Officer .....	Michael D. McCall
Associate Vice President for Operations and Finance .....	Robert D. Stets
Associate Vice President for Strategic Communications .....	Joseph “Chip” M. Visci

## AUXILIARY ORGANIZATIONS

### Associated Students, Inc.

Executive Director .....	Rick Johnson
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### Cal Poly Corporation

Executive Director.....	Bonnie D. Murphy
Director Emeritus .....	Al Amaral
Associate Executive Director .....	James Reinhart

## CAL POLY CHIEF EXECUTIVE OFFICERS

Cal Poly has been guided by the following chief executive officers:

Leroy Anderson.....	1902 to 1908
Leroy Burns Smith .....	1908 to 1914
Robert W. Ryder .....	1914 to 1921
Nicholas Ricciardi .....	1921 to 1924
Margaret Chase (acting) .....	1924
Benjamin Ray Crandall .....	1924 to 1933
Julian A. McPhee .....	1933 to 1966
Dale W. Andrews (acting).....	1966 to 1967
Robert E. Kennedy .....	1967 to 1979
Dale W. Andrews (acting).....	1979
Warren J. Baker.....	1979 to Present

## FACULTY AND STAFF EMERITI

The faculty and staff, who have served at least fifteen years of full-time meritorious service at Cal Poly, are awarded emeritus status. A complete list of emeriti is available at:

[www.academic-personnel.calpoly.edu/pdf/Emeriti\\_List.pdf](http://www.academic-personnel.calpoly.edu/pdf/Emeriti_List.pdf). The University appreciates its emeriti members’ contributions to the Cal Poly community.

## DISTINGUISHED TEACHER AWARD RECIPIENTS

In 1963 the University instituted a program of recognizing outstanding teaching efforts through the Distinguished Teacher Awards. Selections for this honor are based upon recommendations of the Academic Senate committee which follows the procedure of soliciting nominations from students and colleagues. Evaluations and recommendations of the nominees are based upon an in-depth review by the committee, including classroom visitations. Recipients of the Distinguished Teacher Awards and their departments are listed below.

1963–64	Robert E. Holmquist, Physics John L. Merriam, Agricultural Engineering
1964–65	Joy O. Richardson, Mechanical Engineering Milo E. Whitson, Mathematics
1965–66	A. Norman Cruikshanks, Social Sciences Richard F. Johnson, Animal Husbandry George R. Mach, Mathematics
1966–67	Robert W. Adamson, Mechanical Engineering Kenneth G. Fuller, Mathematics William D. Curtis, Psychology

- 1967–68 Rodney G. Keif, Environmental Engineering  
David M. Grant, English  
Wesley S. Ward, Architecture
- 1968–69 Robert M. Johnson, Mechanical Engineering  
Bruce Kennelly, Chemistry  
Alice E. Roberts, Education
- 1969–70 Donald W. Hensel, History  
David H. Montgomery, Biological Sciences  
Philip H. Overmeyer, Business Administration  
Willard M. Pederson, English  
Omer K. Whipple, Chemistry
- 1970–71 Robert L. Cleath, Speech  
Kenneth E. Schwartz, Architecture  
Hewitt G. Wight, Chemistry
- 1971–72 Stuart E. Larsen, Aeronautical Engineering  
Barton C. Olsen, History  
Ronald L. Ritschard, Biological Sciences  
Joseph N. Weatherby, Political Science (Social Sciences)
- 1972–73 Lyle G. McNeal, Animal Science  
Charles W. Quinlan, Architecture  
James E. Simmons, English
- 1973–74 William J. Phaklides, Engineering Technology  
Louis D. Pippin, Education  
Duane O. Seaberg, Agricultural Management
- 1974–75 Peter Jankay, Biological Sciences  
Josephine S. Stearns, Child Development  
George J. Suchand, Social Sciences
- 1975–76 James Hayes, Journalism  
William V. Johnson, Music  
Erna Knapp, Art
- 1976–77 Harry L. Fierstine, Biological Sciences  
Grant D. Venerable II, Chemistry  
Ralph M. Warten, Mathematics
- 1977–78 Timothy M. Barnes, History  
Donald P. Grant, Architecture and Environmental Design  
John C. Syer, Political Science
- 1978–79 Pat Pendse, Biological Sciences  
Dane Jones, Chemistry  
Adelaide Harmon-Elliott, Mathematics
- 1979–80 David J. Keil, Biological Sciences  
Thomas Ruehr, Soil Science  
Stephen Weinstein, Mathematics  
Michael D. Zohns, Ornamental Horticulture
- 1980–81 Sarah E. Burroughs, Food Science and Nutrition (Child Development and Home Economics)  
Christina Orr-Cahall, Art  
Kendrick W. Walker, Philosophy
- 1981–82 Christina A. Bailey, Chemistry  
Kenneth E. Ozawa, Physics  
Thomas L. Richards, Biological Sciences
- 1982–83 James Bermann, Agricultural Engineering  
Donald J. Koberg, Architecture  
Jack D. Wilson, Aeronautical and Mechanical Engineering
- 1983–84 Euel W. Kennedy, Mathematics  
William L. Preston, Social Sciences  
Michael J. Wenzl, English
- 1984–85 Robert S. Cichowski, Chemistry  
Harvey C. Greenwald, Mathematics  
Max E. Riedlsperger, History
- 1985–86 Edward H. Baker, Mechanical Engineering  
Sue McBride, Education  
Phillip K. Ruggles, Graphic Communication
- 1986–87 Boyd W. Johnson, Mathematics  
Craig H. Russell, Music  
Calvin H. Wilvert, Social Sciences
- 1987–88 James R. Mueller, Mathematics  
Ronald S. Mullisen, Mechanical Engineering  
Robert G. Reynolds, Art and Design
- 1988–89 Stephen W. Ball, Philosophy  
George Cotkin, History  
Abraham B. Shani, Management
- 1989–90 Lloyd N. Beecher, History  
Talmage E. Scriven, Philosophy  
Jan W. Simek, Chemistry
- 1990–91 Jay L. Devore, Statistics  
Linda H. Halisky, English  
Ann Morgan, Psychology  
James L. Webb, Physical Education & Recreation Admin.
- 1991–92 Mary E. Pedersen, Food Science and Nutrition  
John Snetsinger, History  
W. Fred Stultz, Psychology and Human Dev.
- 1992–93 Susan Duffy, Speech Communication  
Donald K. Maas, University Center for Teacher Education  
Charles M. Slem, Psychology and Human Development
- 1993–94 William T. Little, Foreign Languages and Literatures  
Steven R. Marx, English  
Raymond M. Nakamura, Physical Education & Kinesiology
- 1994–95 Ronald F. Brown, Physics  
Lee B. Burgunder, Business Administration  
Nancy Lucas, English
- 1995–96 David Keeling, Chemistry and Biochemistry  
John Russell, Music  
Richard Simon, English
- 1996–97 Leonard Davidman, University Center for Teacher Education  
Al Landwehr, English  
Robert Thompson, Agribusiness
- 1997–98 John Culver, Political Science  
Jay S. DeNatale, Civil and Environmental Engineering  
David R. Henry, Speech Communication
- 1998–99 Colette Frayne, Global Strategy and Law  
Carol MacCurdy, English  
Leonard Myers, Computer Science
- 1999–00 J. Michael Geringer, Global Strategy and Law  
Brent G. Hallock, Soil Science  
Clinton A. Staley, Computer Science
- 2000–01 Sky Bergman, Art and Design  
Phillip M. Doub, Agribusiness  
William Martinez, Jr., Modern Languages and Literatures
- 2001–02 Kevin Clark, English  
Alyson McLamore, Music  
Mark Zohns, BioResource and Agricultural Engineering
- 2002–03 Alvin De Jong, Biological Sciences  
Bernard Duffy, Speech Communication  
Linda Vanasupa, Materials Engineering
- 2003–04 Mathew Moelter, Physics  
Robert Smidt, Statistics  
Nanine A. Van Draanen, Physics
- 2004–05 Fred DePiero, Electrical Engineering  
John Hampsey, English  
David Headrick, Horticulture and Crop Science
- 2005–06 Mary Armstrong, English  
Michael Miller, Art and Design  
Yarrow Nelson, Civil and Environmental Engineering
- 2006–07 William Fitzhenry, English  
Elena Levine Keeling, Biological Sciences  
Donald H. Ryujin, Psychology and Child Development
- 2007–08 Michael Fahs, Communications Studies  
Michael Lucas, Architecture  
Charles Miller, Accounting

**DISTINGUISHED SCHOLARSHIP AWARD**

In 2003-04 Cal Poly instituted an award program to recognize faculty in the areas of distinguished research, creative activity, and professional development. Nominations are solicited from the faculty, students, and alumni, and the Academic Senate's research and professional development committee, a group of eleven, selects the recipients. The recipients of the award and their departments are listed below:

2003– 04	Charles Burt, BioResource and Agricultural Engineering
	Joanne Ruggles, Art and Design
2004– 05	Estelle Basor, Mathematics
	Rami Shani, Management
2005– 06	Daniel Biezad, Aerospace Engineering
	Andrew Morris, History
2006– 07	Mark A. Moline, Biological Sciences
	Craig H. Russell, Music
2007– 08	Terry Jones, Social Sciences
	Michael Marlow, Economics

**OUTSTANDING FACULTY ADVISOR AWARD**

In 2001-02 the University instituted a program of recognizing outstanding achievement by a faculty member in the area of student advising. Nominations are solicited from the faculty and staff and students. Recipients' names will be displayed on a perpetual plaque. The recipients of the Outstanding Faculty Advisor Award and their departments are listed as follows:

2001– 02	Kathryn Rummell, English
2002– 03	Jack Robison, Accounting
2003– 04	William Preston, Social Sciences
2004– 05	Lorraine Donegan, Graphic Communication
2005– 06	Taufik, Electrical Engineering
2006– 07	Abraham Lynn, Architectural Engineering
2007– 08	Cynthia Moyer, Recreation, Parks and Tourism Administration

**PROVOST'S LEADERSHIP AWARD FOR PARTNERSHIP IN PHILANTHROPY**

This award was established in 2006 to recognize current or former faculty member's superior achievement in fundraising.

2006	Allan J. Hauck, Construction Management
	James A. Rodger, Construction Management
2007	Andrew J. Thulin, Animal Sciences
2008	Harvey Robert Levenson, Graphic Communication

**OUTSTANDING STAFF EMPLOYEE AWARD**

The 1972-73 academic year saw the inception of the Outstanding Staff Employee Award. This honor is bestowed upon permanent, full-time employees of the University, Foundation, or Associated Students, Inc. who are in at least their third year of employment at Cal Poly. In order to be considered for this award, an employee should be truly dedicated and loyal; exhibit expertise in job performance; demonstrate a willingness to assist others enthusiastically; take initiative in making his or her department more efficient and productive; maintain an excellent relationship with co-workers, faculty, and students; and make contributions to both the University and the community. Nominations are solicited from staff employees, faculty members, and department or division heads. Selection of the awardees is made by a committee of former recipients of the award. Outstanding Staff Employees Award recipients are listed here as follows.

1972–73	Everette Dorrough	1990–91	Barbara Ciesielski
1973–74	Vic Allen		Harriet Clendenen
	Florence Hauge		Harriet Ross
	Lionel Middlecamp	1991–92	Wanda Bolt
	Jim Neelands		Pam Parsons
1974–75	Robert Baldridge		Joe Risser
	John Lee	1992–93	Rosemary Bowker
	Gerry Wagner		Deborah L. Brothwell
	Arthur Young		Andy McMeans
1975–76	Merriam Erickson	1993–94	Connie Davis
	Viola Hughes		Jim McLaughlin
	Mary Johnson		Richard Tibbetts
	Boyd Wettlaufer	1994–95	Francesca Fairbrother
1976–77	Trudy Beck		Joyce Kalicicki
	Stella Nuncio		Lorraine Ridgeway
1977–78	Luther Bertrando	1995–96	George Enriquez
	Pauline Shaffer		Cynthia Jelinek
	Joanna DeRosier		Carol Montgomery
1978–79	Harold Miller	1996–97	Kristina Pena
	Doris Anderson		Don Shemenske
	Richard Tartaglia		Judy Swanson
	Frank Lebens	1997–98	Richard Equinoa
1979–80	Dale Lackore		Pat Harris
	Steven Riddell		Nettie Steels
	Joan Roberts	1998–99	Darrell Blankenship
1980–81	Joan Cirone		Delores Estrada
	Farlin Halsey		Rosemary Wagner
	Irene Lund	1999–00	Bonnie Krupp
1981–82	James Neal		Druci Reese
	Connie Jonte		Ellen Stier
	Frank Kassak	2000–01	Donna Amos
1982–83	Barbara Lund		Stacey Breitenbach
	Larry Grimes		Joyce Haratani
	Norman Johnson	2001–02	Margaret Booker
1983–84	Jerald (Louie) Budoff		Judy Drake
	Walter Clark		Jimmy Ray Motley
	Gail Simmons	2002–03	Sue Bethel
1984–85	Alfred W. Amaral		Jim Gerhardt
	Ethel Spry		Bonnie Long
	Kathleen Lamoree	2003–04	Carol Erickson
1985–86	James Landreth		Lori La Vine
	Geraldine Montgomery		Bob Pinkin
	Vicki Stover	2004–05	Sharon Arnold
1986–87	Lee Brown		Prisila Johnson
	Gary Ketcham		Dan Mull
	French Morgan	2005–06	Larry Coolidge
1987–88	Lynette Klooster		Alice Gold
	Judi Pinkerton		Mary Whiteford
	Nancy Raetz	2006–07	Michele Abba
1988–89	Debbie Arseneau		Peggy Smith Andersen
	June Powell		Joyce McAlexander
	Jacque Rossi	2007–08	Carson Crain
1989–90	Grace Arvidson		Ben Johnson
	Janet Carlstrom		Emanuel Vieira
	Ronald Christensen		

# Faculty and Staff

(Number in parentheses indicates year of appointment)

Listed as of March 2009.

- ABERCROMBY, KIRA J. (2008) ..... Aerospace Engineering  
B.S., University of California, Los Angeles, 1994; M.S., University of Colorado,  
Boulder, 1998; Ph.D., 2000. Assistant Professor.
- ADAMS, NIKKI L. (2002) ..... Biological Sciences  
B.A., University of California, Santa Barbara, 1988; M.S., University of Maine,  
1995; Ph.D., 2000. Associate Professor.
- ADAN, ELIZABETH (2007) ..... Art and Design  
B.A., University of California, Davis, 1993; M.F.A., University of California,  
Santa Barbara, 1997; M.A., University of California, Berkeley, 2000; Ph.D.,  
University of California, Santa Barbara, 2006. Assistant Professor.
- AGBO, SAMUEL O. (1991) ..... Electrical Engineering  
B.Sc., University of Nigeria, 1975; M.S.E., University of Michigan, 1978; Ph.D.,  
University of Houston, 1984. Professor.
- AGRONSKY, STEVEN J. (1981) ..... Mathematics  
B.A., University of California, Santa Barbara, 1970; M.S., 1972; Ph.D., 1974.  
Professor.
- AHERN, JAMES J. (1980) ..... Agribusiness  
B.S., California State Polytechnic College, Pomona, 1971; M.S., University of  
Maryland, 1973; Ph.D., 1980. Professor.
- AHLGREN, WILLIAM L. (1999) ..... Electrical Engineering  
S.B., Massachusetts Institute of Technology, 1975; M.S., University of Arizona,  
1977; Ph.D., University of Southern California, 1981. Associate Professor.
- AIKEN, DONNA (1995) ..... College of Engineering  
B.A., California Polytechnic State University, San Luis Obispo, 1988. Director,  
Alumni and Donor Relations.
- ALLEN, PRESTON C. (1993) ..... Student Affairs  
B.A., Michigan State University, 1980; M.S., California State University,  
Fullerton, 1989. Associate Vice President for Student Affairs, and Executive  
Director, Housing.
- ALLEN, REGULUS L. (2006) ..... English  
B.A., University of California, Los Angeles, 1994; M.A., 2000; Ph.D., 2006.  
Assistant Professor.
- ALLEN, TERESA (2001) ..... Journalism  
B.A., University of Washington at Seattle, 1976; M.A., University of Colorado at  
Boulder, 1993; additional graduate study. Professor.
- ALLEN-BARKER, JENNIFER C. (2007) ..... Disability Resource Center  
B.S., San Jose State University, 1981. Access Specialist (Visual Impairments).
- ALEXANDER, ERIC (2006) ..... Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 2001. Coordinator  
- Fitness.
- ALPTEKIN, SEMA E. (1994) ..... Industrial and Manufacturing  
Engineering, Academic Programs  
B.Sc., Istanbul Technical University, Istanbul, 1973; M.Sc., 1975; Ph.D., 1981.  
Professor; Director, University Honors Program.
- AMSPACHER, WILLIAM H. (1985) ..... Agribusiness  
B.S., Clemson University, 1978; M.S., 1980; Ph.D. University of California,  
Davis, 1988. Professor.
- ANDERSON, BING (2004) ..... Finance  
B.Eng., University of Science and Technology of China, 1993; M.A., University  
of Chicago, 1996; M.S., Stanford University, 2000; Ph.D., 2002. Associate  
Professor.
- ANDERSON, SHARON (2008) ..... Information Technology Services  
B.S., California Polytechnic State University, San Luis Obispo, 1987; M.S.,  
Carnegie Mellon University, 1993. Director, Administrative Computing Services.
- ANDRE, BARBARA R. (1973) ..... International Education and Programs  
B.A., Humboldt State College, 1969; M.A., California State Polytechnic College,  
1971; Ed.D., University of San Francisco, 1986. Associate Director, International  
Student Services and Programs.
- APPEL, CHRISTOPHER S. (2002) ..... Earth and Soil Sciences  
B.S., California Polytechnic State University, San Luis Obispo, 1995; M.S., 1998;  
Ph.D., University of Florida, 2001. Associate Professor.
- ARAKAKI, DEAN Y. (2001) ..... Electrical Engineering  
B.S., California State Polytechnic University, Pomona, 1984; M.B.A., California  
State University, Long Beach, 1989; M.S., 1992; Ph.D., Penn State University,  
2000. Associate Professor.
- ARCENEUX, CRAIG (2001) ..... Political Science  
B.A., California State University, Fullerton, 1989; M.A., Ohio State University,  
1991; Ph.D., University of California, Riverside, 1997. Associate Professor.
- ARCHER, GRAHAM C. (2002) ..... Architectural Engineering  
B.A.Sc., University of Waterloo, Canada, 1985; M.A.Sc., 1986; Ph.D., University  
of California, Berkeley, 1996. Associate Professor. Professional Engineer,  
Ontario.
- ARENS, ROBERT M. (2005) ..... Architecture  
B.S., University of Michigan, 1981; M.Arch., 1984. Associate Professor.  
Registered Architect, Michigan.
- ARRIVÉE, DAVID A. (2004) ..... Music  
B.A., Princeton University, 1993; M.M., Boston University, 1995; D.M.A.,  
Northwestern University, 2004. Assistant Professor.
- ARMSTRONG, MARY A. (2000) ..... English, Women's and Gender Studies  
B.A., College of the Holy Cross, 1987; M.A., Duke University, 1989; Ph.D., 1995.  
Associate Professor.
- ARVIZU-RODRIGUEZ, MARIA (1987) ..... Student Academic Services  
B.S., California Polytechnic State University, San Luis Obispo, 1987. Academic  
Advisor/Instructor; Coordinator, Supplemental Workshops in Science.
- ASPLUND, RICHARD (1999) ..... Orfalea College of Business  
B.S., California Polytechnic State University, San Luis Obispo, 1960; M.A., 1992.  
Director of Computer Lab.
- AUBOURG, VICKIE (1997) ..... College of Architecture and Environmental Design  
B.A., Montclair University, 1968; M.S., Pratt Institute, 1972; M.A., University of  
California, Davis, 1986. Media Resource Center Coordinator.
- AVAKIAN, GREGORY (2000) ..... Associated Students, Incorporated  
B.S., California State University, Long Beach, 1992. Assistant Director,  
Recreational Sports.
- AVILA, MARY-ALICE (2000) ..... Administration and Finance  
B.Arch., California Polytechnic State University, San Luis Obispo, 1976. Licensed  
Architect, California; Certified Construction Specifier. Project Manager, Facilities  
Planning and Capital Projects.
- AXELROTH, ELIE (1984) ..... Health and Counseling Services  
B.A., State University of New York, Albany, 1976; M.A., University of Maryland,  
1978; Psy.D., University of Denver, 1983. Psychologist.
- AZEVEDO, JOHN (2001) ..... Intercollegiate Athletics  
B.A., California State University, Bakersfield, 1982. Head Coach, Wrestling.
- BAILEY, CHRISTINA ANNE (1978) ..... Chemistry and Biochemistry  
B.S., College of Saint Elizabeth, New Jersey, 1964; Ph.D., Purdue University,  
1970. Professor Emeritus and Department Chair.
- BAILEY, PHILIP S. (1969) ..... College of Science and Mathematics, Chemistry and  
Biochemistry  
B.S., University of Texas, 1964; Ph.D., Purdue University, 1969. Dean and  
Professor.
- BAKER, CHRIS (2001) ..... Intercollegiate Athletics  
B.S., California Polytechnic State University, San Luis Obispo, 1997. Associate  
Athletic Director of Advancement.
- BAKER, WARREN J. (1979) ..... President  
B.S., University of Notre Dame, 1960; M.S., 1962; Ph.D., University of New  
Mexico, 1966. President.
- BALL, STEPHEN W. (1983) ..... Philosophy  
B.A., Purdue University, 1972; M.A., University of Michigan, 1973; Ph.D., 1978.  
Professor.



- BALTIMORE, CRAIG V. (2001)..... Architectural Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1986; M.S., Duke University, 1996; Ph.D., 1998. Associate Professor. Registered Structural Engineer and Professional Engineer, California.
- BANGS, KAREN R. (2006)..... College of Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1986; M.B.A., University of California, Irvine, 1991. Director, Women's Engineering Program.
- BARATA, ANTONIO G. (1985)..... Music  
B.A., Towson State University, 1977; M.M., Northwestern University, 1979; D.M.A., University of Illinois, 1985. Professor.
- BARBER, CLIFFORD S. (1986)..... Industrial Technology  
B.A., California Polytechnic State University, San Luis Obispo, 1982; M.A., 1986; Ed.D., University of Southern California, 1999. Licensed General Contractor. Associate Professor.
- BARCLAY, KENNETH B. (1979)..... Student Life and Leadership  
B.A., Bowling Green State University, 1967; M.A., University of Massachusetts, 1969; Ph.D., Kent State University, 1975. Director.
- BARLOW, PHILIP L. (2006)..... Construction Management  
B.S., California Polytechnic State University, San Luis Obispo, 1987; M.B.A., Golden Gate University, 1993. Assistant Professor. Licensed General Contractor, Licensed Broker.
- BASOR, ESTELLE L. (1976)..... Mathematics  
B.A., University of California, Santa Cruz, 1969; Ph.D., 1975. Professor Emeritus.
- BASS, BEVERLY J. (2008)..... Landscape Architecture  
B.F.A., East Carolina University, 1982; M.L.A., University of Arizona, 2003. Assistant Professor. LEED Accredited Professional. Certified Arborist.
- BATTENBURG, JOHN (1989)..... English, Academic Programs  
B.A., Andrews University, 1982; M.A., Ohio University, 1984; Ph.D., Purdue University, 1989. Professor; Director, International Education and Programs.
- BECKER, JENNIFER L. (2008)..... Social Sciences  
B.A., San Francisco State University, 1998; M.A., Florida International University, 2001; Ph.D., 2008. Assistant Professor.
- BELLARDO, JOHN M. (2006)..... Computer Science  
B.S., California Polytechnic State University, San Luis Obispo, 1999; M.S., University of California, San Diego, 2001; Ph.D., 2006. Assistant Professor.
- BENADIBA, MARC F. (2002)..... Administration and Finance  
B.S., California Polytechnic State University, San Luis Obispo, 1990. Assistant Director for Payroll Services, Fiscal Services. Certified Public Accountant.
- BENEDICT, WILLIAM R. (1990)..... Architecture  
B.Arch., Kansas State University, 1967; M.Arch., University of Texas at Austin, 1989. Associate Professor.
- BENNETT, PENNY K. (2000)..... College of Liberal Arts, Graphic Communication  
B.S., Ferris State University, 1986; M.E., University of Nevada, Las Vegas, 1992; Ph.D., University of Idaho, 2002. Associate Professor and Special Assistant to the Dean for Student Success.
- BENSKY, THOMAS J. (2002)..... Physics  
B.S., California State University, Northridge, 1992; Ph.D., University of Virginia, 1998. Associate Professor.
- BERBER-JIMENEZ, LOLA (1995)..... Liberal Studies  
B.S., Universidad LaSalle, 1983; Ph.D., University of California, Davis, 1990. Department Chair.
- BERG, LORRAINE M. (1983)..... Health and Counseling Services  
R.N., Cuesta College, 1975; N.P. Family Planning, San Jose State University, 1982. Nurse Practitioner.
- BERGMAN, ANYA (2003)..... College of Science and Mathematics  
B.A., California State University, Chico, 2001; M.A., California Polytechnic State University, San Luis Obispo, 2003. Academic Advisor.
- BERGMAN, SKY (1995)..... Art and Design  
B.S., University of South Florida, 1987; M.F.A., University of California, Santa Barbara, 1991. Professor and Department Chair.
- BERNARD, THOMAS J. (2008)..... Theatre and Dance  
B.A., University of Minnesota, 1991; M.F.A., Northern Illinois University, 1995. Assistant Professor.
- BERNER, LOUISE A. (1987)..... Food Science and Nutrition  
B.S., Pennsylvania State University, 1979; M.S., Cornell University, 1982; Ph.D., 1986. Professor.
- BERNING, LEANNE M. (1990)..... Dairy Science  
B.S., California Polytechnic State University, San Luis Obispo, 1982; M.S., University of Wisconsin, 1985; Ph.D., University of Maryland, 1990. Professor.
- BERRIO, MARGARET M. (1989)..... Psychology and Child Development  
B.Mus., Oberlin College, 1964; M.A., Southern Illinois University, 1967; M.S., Tufts University, 1972; Ph.D., Indiana University, 1974. Professor Emeritus.
- BESEL, RICHARD D. (2007)..... Communication Studies  
B.A., North Central College, 1999; M.A., University of Illinois, Chicago, 2001; Ph.D., University of Illinois, Champaign/Urbana, 2007. Assistant Professor.
- BICKEL, CHRISTOPHER (2008)..... Social Sciences  
B.A., Indiana University, 1997; M.A., University of California, Santa Barbara, 2004. Assistant Professor.
- BIEZAD, DANIEL J. (1990)..... Aerospace Engineering  
B.S., Illinois Institute of Technology, 1966; M.S., Air Force Institute of Technology, 1972; Ph.D., Purdue University, 1984. Professor. Registered Professional Engineer, Ohio.
- BIRDSONG, CHARLES B. (2003)..... Mechanical Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1991; M.S., Michigan State University, 1996; Ph.D., 1999. Associate Professor.
- BISTLINE, GREG (2006)..... Intercollegiate Athletics  
B.S., University of Missouri, 1976, 1977; M.S., 1981. Associate Athletics Director, Major Gifts.
- BIXLER, XENIA E. (2007)..... Research and Graduate Programs  
B.S., University of Maryland, 1981; M.S., University of Southern California, 1983. Grants Development Director.
- BLACK, MICHAEL W. (2001)..... Biological Sciences  
B.S., Southwest Missouri State, 1993; Ph.D., Stanford University, 1999. Associate Professor.
- BLANK, JASON M. (2009)..... Biological Sciences  
B.S., Duke University, 1996; Ph.D., Stanford University, 2006. Assistant Professor.
- BLAU, JNAN A. (2008)..... Communication Studies  
B.S., Arizona State University West, 1999; M.S., Southern Illinois University, 2002; Ph.D., 2007. Assistant Professor.
- BLUM, MICHAEL L. (1981) (1984)..... Graphic Communication  
B.A., University of California, Los Angeles, 1971; M.S., Rochester Institute of Technology, 1979. Professor.
- BOHR, GREGORY S. (2005)..... Social Sciences  
B.A., Arizona State University, Berkeley, 1993; M.A., San Diego State University, 1997; Ph.D., Louisiana State University, 2004. Assistant Professor.
- BOMSTAD, LINDA (1994)..... Philosophy  
B.A., University of California, Davis, 1974; M.A., 1976; Ph.D., 1982. Professor Emeritus.
- BONINI, VINCENT (2008)..... Mathematics  
B.A., University of California, Santa Cruz, 2000; M.A., 2001; Ph.D., 2006. Assistant Professor.
- BORIN, NORM. A. (1992)..... Marketing  
B.S., University of California, Davis, 1981; M.B.A., California State University, Sacramento, 1987; Ph.D., University of Virginia, Charlottesville, 1992. Professor.
- BORZELLINO, JOSEPH E. (2001)..... Mathematics  
B.S., University of California, Irvine, 1987; M.A., University of California, Los Angeles, 1989; Ph.D., 1992. Associate Professor.
- BOSE, TANUSHREE (2008)..... Food Science and Nutrition  
Bachelor of Pharmacy, Rajiv Gandhi University of Health Sciences, 2001; Ph.D., the University of Texas at Austin, 2007. Assistant Professor.
- BOSWELL, MICHAEL R. (1998)..... City and Regional Planning  
B.A., University of Central Florida, 1989; M.S.P., Florida State University, Tallahassee, 1991; Ph.D., 2000. Associate Professor.
- BRADY, PAMALEE (1998)..... Architectural Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1979; M.S., University of California, Berkeley, 1980; Ph.D., University of Illinois, Urbana-Champaign, 2004. Associate Professor. Registered Civil Engineer, California.
- BRAGG, MARTIN E. (1995)..... Health and Counseling Services  
B.A., Indiana University, Bloomington, 1971; M.A., University of California, Los Angeles, 1972; Ph.D., 1979. Director.

- BRAMMEIER, MEREDITH (2001)..... Music  
B.A., Princeton University, 1992; M.M., Eastman School of Music, 1995; D.M.A.,  
University of Southern California, 2000. Associate Professor.
- BRANCART, VICTOR N. (1994)..... Administration and Finance  
B.A., California State University, Fullerton, 1989; M.A., California Polytechnic  
State University, San Luis Obispo, 2000. Enterprise Initiatives Analyst, Budget  
and Analytic Business Services.
- BRAR, NAVJIT (1998)..... University Library  
B.A., Government College for Girls, India, 1981; M.L.S., Panjab University,  
India, 1983; M.A., 1985; M.L.S., San Jose State University, 1992. Librarian,  
Library Assessment and Lifelong Learning..
- BRAUN, DAVID B. (1996)..... Electrical Engineering, Computer Engineering  
B.S., Stanford University, 1985; M.S., 1986; Ph.D. University of California, Santa  
Barbara, 1991. Professor.
- BRAUNINGER, ANDREA L. (1986)..... Health and Counseling Services  
A.B., San Jose State College, 1966; M.D., University of Southern California,  
1971; Medical Internship, University of Florida, 1972. Physician.
- BREAM, HUGH (2000)..... Intercollegiate Athletics  
B.S., California Polytechnic State University, 1980; M.S., 1982. Head Coach,  
Women's Tennis.
- BREITENBACH, JEROME R. (1986)..... Electrical Engineering  
B.S., California State Polytechnic University, Pomona, 1977; M.S., California  
Institute of Technology, 1978; Ph.D., University of California, Los Angeles, 1983.  
Professor.
- BREITENBACH, STACEY M. (1981)..... College of Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1989; M.A., 1994.  
Assistant Dean.
- BREMER, WALTER D. (1981)..... Landscape Architecture  
B.F.A., Mankato State University, 1973; M.L.A., Utah State University, 1977.  
Professor and Director, Center for Teaching and Learning.
- BRIZENDINE, CAROL (2003)..... Associated Students, Incorporated  
B.A., Western Illinois University, 1997. Coordinator – Human Resources.
- BROOKS, EVERETTE (2006)..... Student Life and Leadership  
B.S., Park University, 1996; M.B.A., Long Island University, 1999. Coordinator,  
Sport Clubs.
- BROOM, MICHELLE (2001)..... Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 1996. Coordinator  
- Public Relations.
- BROTHWELL, DEBBIE L. (1976)..... Administration and Finance  
B.A., California Polytechnic State University, San Luis Obispo, 1976. Associate  
Director, Budget and Analytic Business Services.
- BROWN, D. KENNETH (2007)..... Philosophy  
B.A., University of California, Irvine, 1992; M.A., Claremont Graduate  
University, 1998; Ph.D., University of California, Irvine, 2006. Assistant  
Professor.
- BROWN, J. WYATT (1990)..... Horticulture and Crop Science  
B.S., Louisiana State University, 1978; M.S., 1985; Ph.D., Cornell University,  
1990. Professor. Pest Control Advisor, California.
- BROWN, JOHANNA B. (1969–1973) (1974)..... University Library  
B.A., Saint Mary's College, 1966; M.L.S., State University of New York at  
Geneseo, 1967. Head, Collection Management.
- BROWN, ROBERT J. (1969)..... Biological Sciences  
B.S., California State College, Los Angeles, 1964; M.S., Arizona State University,  
1967; Ph.D., University of Toronto, Canada, 1972. Professor Emeritus.
- BROWN, RONALD F. (1974)..... Physics  
B.A., University of California, Riverside, 1962; M.A., 1964; Ph.D., 1968.  
Professor Emeritus.
- BRUCE, LISA K. (2008)..... Financial Aid  
B.A. California Polytechnic State University, San Luis Obispo, 1998; M.A., 2005.  
Financial Aid Counselor.
- BRUMMETT, DWAYNE (2001)..... Associated Students, Incorporated  
B.A., University of California, Santa Barbara, 1986. Director of Business Services.
- BUCKALEW, W. CHRIS (1990)..... Computer Science  
B.S., North Texas State University, 1980; M.S., 1982; M.S., 1984; Ph.D.,  
University of Texas, 1990. Professor.
- BUFFA, ANTHONY J. (1970)..... Physics  
B.S., Rensselaer Polytechnic Institute, 1964; M.S., University of Illinois, 1966;  
Ph.D., 1969. Professor Emeritus.
- BURD, MATTHEW A. (2003)..... Animal Science  
B.S., University of Wisconsin–Madison, 1987; M.S., San Jose State University,  
1991; D.V.M., University of California, Davis, 1996. Associate Professor.
- BURGOA, BENALI (2006)..... BioResource and Agricultural Engineering  
B.S., Universidad de Panama, Panama, 1979; M.S., University of Florida,  
Gainesville, 1984; Ph.D., 1989; M.S., California Polytechnic State University, San  
Luis Obispo, 2003. Associate Professor.
- BURGUNDER, LEE B. (1983)..... Accounting  
B.A., Dartmouth College, 1977; M.B.A., Stanford University, 1981; J.D., 1981.  
Professor.
- BURN, SHAWN MEGHAN (1990)..... Psychology and Child Development, and  
Women's and Gender Studies  
B.S., Virginia Commonwealth University, 1982; M.A., The Claremont Graduate  
University, 1984; Ph.D., 1988. Professor and Interim Department Chair, Women's  
and Gender Studies.
- BURT, CHARLES M. (1978)..... BioResource and Agricultural Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1973; M.S., Utah  
State University, 1975; Ph.D., 1983. Professor. Registered Civil Engineer and  
Agricultural Engineer, California. Registered Professional Engineer, Utah.
- BUSH, SETH (2005)..... Chemistry and Biochemistry  
B.S., Reed College, 1994; Ph.D., University of California, Berkeley, 1999.  
Assistant Professor.
- BUSSELEN, HARRY J., JR. (1975)..... Psychology and Child Development  
B.S., California State College, Sacramento, 1959; M.S., 1962; Ph.D., Florida State  
University, 1970; additional graduate study, University of Oregon. Professor  
Emeritus.
- CABRINHA, MARK (2003)..... Architecture  
B.Arch., California Polytechnic State University, San Luis Obispo, 1995; M.Arch.,  
University of Illinois, 2001. Assistant Professor. Registered Architect, Illinois.
- CAI, XIAOWEI (2008)..... Agribusiness  
B.S., M.S., Nanjing Agricultural University, 2001; M.S., Ph.D., University of  
Wisconsin, 2009. Assistant Professor.
- CALDWELL, ROSLYN M. (2007)..... Psychology and Child Development  
B.A., University of California, Irvine, 1995; M.A., University of California, Santa  
Barbara, 1997; Ph.D., 2000. Assistant Professor.
- CALL, LEWIS W. (1996)..... History  
B.A., University of California, San Diego, 1990; M.A., University of California,  
Irvine, 1992; Ph.D., 1996. Assistant Professor.
- CALLERO, JOE (2009)..... Intercollegiate Athletics  
B.A., Central Washington University, 1986; M.A., Seattle University, 1991. Head  
Coach, Men's Basketball.
- CAMP, CHARLES D. (2007)..... Mathematics  
B.A., University of California, San Diego, 1989; Ph.D., California Institute of  
Technology, 2004. Assistant Professor.
- CAMPBELL, BRAD (2007)..... English  
B.A., St. Mary's College of California, 1997; M.A., University of Illinois at  
Urbana-Champaign, 1999; Ph.D., 2007. Assistant Professor.
- CAMPBELL, DENISE (1995)..... Student Affairs  
B.A., University of California, Irvine, 1977; M.A., American University, Washing-  
ton, D.C. 1979; Ph.D., Claremont Graduate University. Associate Vice President.
- CAMPBELL, RENODA (2006)..... Student Life and Leadership  
B.A., Loyola Marymount University, 1985; M.Ed., California Polytechnic State  
University, San Luis Obispo, 2005. Coordinator, Multicultural Programs.
- CANNON, STACY (2001)..... University Advancement  
B.A., University of Colorado at Boulder, 1994; M.B.A., University of Denver,  
1998. Director, Planned Giving and Endowments.
- CANO, RAÚL J. (1974)..... Biological Sciences  
B.S., Eastern Washington State College, 1970; M.S., 1972; Ph.D., University of  
Montana, 1974. Professor Emeritus.
- CANTU, R. DAVID (1980)..... College of Engineering  
B.S., California State Polytechnic College, 1969; M.S., California Polytechnic  
State University, San Luis Obispo, 1974; M.A., 1975. Director, MESA  
Engineering Program.

- CARDINAL, KRISTEN O'HALLORAN (2007)..... Biomedical and General Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 2003; Ph.D., University of Arizona, 2007. Assistant Professor.
- CARDINAL, TREVOR (2007)..... Biomedical and General Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 2003; Ph.D., University of Arizona, 2007. Assistant Professor.
- CARLTON, MATTHEW A. (1999) ..... Statistics  
B.A., University of California, Berkeley, 1994; M.A., University of California, Los Angeles, 1996; Ph.D., 1999. Associate Professor.
- CARR, CHRIS A. (1998) ..... Orfalea College of Business, Accounting  
B.A., University of Nebraska, 1987; M.A., University of California, Los Angeles, 1998; J.D., Santa Clara University, 1990. Associate Dean and Professor.
- CARR, JANICE L. (1983) ..... Accounting  
B.S., California State University, Northridge, 1971; M.S., 1975; Ph.D., Arizona State University, 1985. Professor. Certified Public Accountant.
- CARROLL, JENNIFER (2006) ..... Chemistry and Biochemistry  
B.S., Sonoma State University, 1996; Ph.D., University of California, Santa Cruz, 2001. Assistant Professor.
- CARTER, CASSIE (2008)..... College of Science and Mathematics  
B.A., California State University, Northridge, 1985; Ph.D., University of Southern California, 2006. Director of Advancement.
- CARTTER, MARLENE A. (1985-88) (1993)..... Academic Affairs  
B.A., California State University, Los Angeles, 1976; M.A., California Polytechnic State University, San Luis Obispo, 2001. Compliance Officer.
- CARTWRIGHT, LIONEL SCOTT (2001)..... Intercollegiate Athletics  
B.S., California State University, Fullerton, 1980. Head Coach, M/W Golf.
- CASEY, GLEN R. (1982) ..... School of Education  
B.S., Chico State College, 1966; M.S., California Polytechnic State University, San Luis Obispo, 1979; Ed.D., Oklahoma State University, Stillwater, 1987. Professor.
- CAVALETTO, RICHARD A. (1990)..... BioResource and Agricultural Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1981; M.S., University of California, Davis, 1983; Ph.D., 1987. Professor and Department Head. Registered Mechanical Engineer, California.
- CAWLEY, FRANK (1996) ..... Cal Poly Corporation  
B.A., St. Patrick's College, 1969; M.A., 1971; M.Div., St. Patrick's Seminary, 1971. Director, El Corral Bookstore.
- CENSULLO, ALBERT C. (1974) ..... Chemistry and Biochemistry  
B.S., Villanova University, 1969; Ph.D., Pennsylvania State University, 1975. Professor Emeritus.
- CERF, DOUGLAS C. (1990)..... Accounting  
B.S., University of California, Berkeley, 1978; M.A., University of California, Davis, 1987; Ph.D., 1991. Professor and Area Chair.
- CHADWELL, CHARLES (2003)..... Civil and Environmental Engineering  
B.S., University of California, Berkeley, 1997; Ph.D., 2003. Assistant Professor. Registered Professional Engineer, California.
- CHANCE, BETH L. (1999) ..... Statistics  
B.S., Harvey Mudd College, 1990; M.S., Ph.D., Cornell University, 1994. Professor.
- CHANDLER, DAWN E. (2006) ..... Management  
B.S., California State University, Chico, 1993; M.B.A., San Jose State University, 1997; D.B.A., Boston University, 2006. Assistant Professor.
- CHANG, YI-HSIANG ISAAC (2007)..... Industrial Technology  
B.S., Tatung Institute of Technology, 1990; M.S., Carnegie Mellon University, 1993; M.S., Purdue University, 2004; Ph.D., 2007. Assistant Professor.
- CHAPMAN, ARTHUR J. (1972) ..... Architecture  
B.S., B.Arch., California State Polytechnic College, 1970; M.S., Pennsylvania State University, 1971; additional graduate study, University of California, Los Angeles. Professor.
- CHATZIOANOU, ALYPIOS E. (1992)..... Civil and Environmental Engineering, Liberal Arts and Engineering Studies  
B.S., Athens Polytechnic, 1980; M.S., University of California, Berkeley, 1982; Ph.D., 1989. Professor and Co-Director, Liberal Arts and Engineering Studies. Registered Professional Engineer, Greece.
- CHEN, JOHN (2008) ..... Mechanical Engineering  
B.S. University of Virginia, 1984; M.S., Stanford University, 1987; Ph.D., 1991. Associate Professor.
- CHEN, KATHERINE C. (1999) ..... Materials Engineering  
B.S., B.A., Michigan State University, 1990; Ph.D., Massachusetts Institute of Technology, 1996. Professor.
- CHIPPING, DAVID H. (1971) ..... Physics  
B.S., Cambridge University, England, 1965; M.S., Stanford University, 1967; Ph.D., 1970. Professor Emeritus.
- CHOBOTER, PAUL F. (2005) ..... Mathematics  
B.Sc., Simon Fraser University, 1995; M.Sc., McGill University, 1997; Ph.D., University of Alberta, 2002. Assistant Professor.
- CHOI, DON H. (2003) ..... Architecture  
A.B., Princeton University, 1988; M.Arch., Rice University, 1993; Ph.D., U.C. Berkeley, 2003. Assistant Professor.
- CHRISTIANSEN, JODI (2006) ..... Physics  
B.A., Harvey Mudd College, 1985; M.S., University of Wisconsin, Madison, 1988; Ph.D., 1993. Assistant Professor.
- CHRISTY, DAVID P. (2004) ..... Orfalea College of Business  
B.S., University of Dayton, 1972; M.Ed., University of Georgia, 1979; Ph.D., 1984. Dean.
- CIROVIC, MICHAEL M. (1968) ..... Electrical Engineering  
B.E., New York University, 1965; M.S., 1968. Professor Emeritus.
- CLAGUE, DAVID (2007) ..... Biomedical and General Engineering  
B.S., University of California, Santa Barbara, 1987; M.S., University of California, Davis, 1993; Ph.D., 1997. Assistant Professor.
- CLARK, CHRISTOPHER M. (2007) ..... Computer Science, Computer Engineering  
B.S., Queen's University, 1995; M.S., University of Toronto, 1998; Ph.D., Stanford University, 2004. Assistant Professor.
- CLARK, KEVIN (1988) ..... English  
B.A., University of Florida, 1972; M.A., 1979; Ph.D., University of California, Davis, 1986. Professor.
- CLARK, M. MILES (2006) ..... College of Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1995. Web Administrator.
- CLARK, NANCY A. (2000) ..... Associated Students, Incorporated  
B.A., Washington State University, 1982; M.S., 1990. Coordinator – Outdoor Recreation.
- CLARK, ROBERT (1998) ..... Kinesiology  
B.S., California Polytechnic State University, San Luis Obispo, 1992; M.S., Louisiana State University, 1996; Ph.D., 1998. Associate Professor.
- CLARK, SARAH (2006) ..... Disability Resource Center  
B.S., California Polytechnic State University, San Luis Obispo, 2002; M.A., 2004. Access Specialist (ADHD, Asperger's and PSY).
- CLAYTON, ROBERT (2007) ..... Health and Counseling Services  
B.A., New College of Florida, 1987; J.D., College of William and Mary, 1994; Psy.D., George Washington University, 2008. Counselor.
- CLAY, GARY R. (1995) ..... Landscape Architecture  
B.L.A., Utah State University, 1974; M.L.A., University of Illinois, 1986; Ph.D., University of Arizona, 1996. Professor.
- CLEMENTS, JOHN (2005) ..... Computer Science  
B.A., Princeton University, 1996; M.S., Rice University, 2001; Ph.D., Northeastern University, 2005. Assistant Professor.
- CLIFT, LISA R. (2002) ..... Health and Counseling Services  
B.S., Montana State University, Bozeman, 1987. Clinical Laboratory Scientist.
- CODY, MARTHA (2008) ..... Academic Personnel  
B.A., University of California, Santa Barbara, 1985; J.D., Golden Gate University School of Law, 2004. Member of the California Bar. Director, Employment Equity.
- COGET, JEAN-FRANCOIS AXEL HUGUES (2006) ..... Management  
M.B.A., HEC School of Management, Paris, France, 1998; Ph.D., University of California, Los Angeles, 2004. Assistant Professor.
- COLEMAN, JAMES W. (1973) ..... Social Sciences  
B.A., California State University, Northridge, 1969; M.A., University of California, Santa Barbara, 1971; Ph.D., 1975. Professor.

- COLVARD, ANTHONY (1999) ..... Associated Students, Incorporated  
B.S., California State University, Fresno, 1987. Coordinator - Information Technology.
- COLVIN, KURT (1999) ..... Industrial and Manufacturing Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1991; M.S., Oregon State University, 1997; Ph.D., 1999. Associate Professor. Registered Professional Engineer, California.
- CONDON, JENNY (2004) ..... Intercollegiate Athletics  
B.S., Iowa State University, 1991. Head Coach, Softball.
- CONE, ALISON (1994) ..... Intercollegiate Athletics  
B.S., Washington State University, 1975; M.A., Cal State Dominguez Hills, 1990. Director of Athletics.
- CONN, W. DAVID (1999) ..... Inclusive Excellence, Ombuds Services,  
City and Regional Planning  
B.A., Oxford University, 1968; M.A., 1972; D.Phil., 1973. Associate Vice President for Inclusive Excellence, Director of Ombuds Services, and Professor.
- CONNOR, DAREN (1993) ..... Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 1990; MA, 2004. Assistant Director for Programs.
- CONOVER, MARK (1996) ..... Intercollegiate Athletics  
B.S., Humboldt State University, 1983; M.S., California Polytechnic State University, San Luis Obispo, 1989. Head Coach, Cross Country.
- CONWAY, JAMES R. (1969) ..... Communication Studies  
B.A., California State College, Los Angeles, 1966; M.A., 1968; Ph.D., University of Southern California, 1977. Professor.
- COOPER, KEVIN (2005) ..... Graphic Communication  
B.S., California Polytechnic State University, San Luis Obispo, 1980; M.B.A., University of Southern California, 1990. Assistant Professor.
- COOPER, SUSAN M. (2006) ..... Mathematics  
B.Sc., University of Regina, 1998; M.Sc., Queen's University, 2000; Ph.D., 2005. Assistant Professor.
- CÓRDOVA, CARLOS (1994) ..... Office of the President  
B.A., Loyola-Marymount University, 1980; M.A., University of California, Santa Barbara, 1982; J.D., University of California, Los Angeles, 1985. Member of the California Bar. University Legal Counsel.
- COSTANZO, PHILIP (2007) ..... Chemistry and Biochemistry  
B.S., Carnegie Mellon University, 2001; Ph.D., University of California, Davis, 2005. Assistant Professor.
- COSTELLO, MICHAEL J. (1999) ..... Horticulture and Crop Science  
B.S., California Polytechnic State University, San Luis Obispo, 1981; Ph.D., University of California, Berkeley, 1992. Associate Professor. Pest Control Advisor.
- COTA, HAROLD M. (1966) ..... Civil and Environmental Engineering  
B.S., University of California, Berkeley, 1959; M.S., Northwestern University, 1960; Ph.D., University of Oklahoma, 1966. Professor Emeritus. Registered Professional Engineer, California; Diplomat of the Academy of Environmental Engineers.
- COTKIN, GEORGE (1980) ..... History  
B.A., Brooklyn College (C.U.N.Y.), 1972; M.A., Ohio State University, 1974; Ph.D., 1978. Professor.
- CRAIN, CARSON (1989) ..... College of Liberal Arts  
B.A., California Polytechnic State University, San Luis Obispo, 1972. Administrative Operations Analyst.
- CRAWFORD, TERRY (1992) ..... Intercollegiate Athletics  
B.S., University of Tennessee, 1970; M.S., 1972. Director of Track and Field.
- CROCKETT, ROBERT (2003) ..... Biomedical and General Engineering  
B.S., University of California, Berkeley, 1989; M.B.A., Pepperdine University, 1992; Ph.D., University of Arizona, 1997. Associate Professor and General Engineering Program Director.
- CROZIER, ALEX (1992) ..... Intercollegiate Athletics  
B.S., California Polytechnic State University, San Luis Obispo, 1984. Head Coach, Women's Soccer.
- CURCIO, KARA (2008) ..... University Housing  
B.S., University of Pittsburgh, 2002; M.A., Indiana University of Pennsylvania, 2004. Learning Community Coordinator.
- CURRO, MICHELLE (2005) ..... Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 2005. Coordinator – ASI Programs.
- DALY, JAMES C. (1972) ..... Statistics  
B.S., Gonzaga University, 1966; Ph.D., Oregon State University, 1973. Professor Emeritus.
- DANDEKAR, HEMALATA (2009) ..... City and Regional Planning  
B.Arch., University of Bombay, India, 1967; M.Arch., University of Michigan, 1969; Ph.D., University of California, Los Angeles, 1978. Professor and Department Head. Registered Architect, California.
- DANES, JEFFREY E. (1986) ..... Marketing  
B.A., San Jose State University, 1972; M.A., 1974; Ph.D., Michigan State University, 1976. Professor.
- DANG, LI (2007) ..... Accounting  
Ph.D., Drexel University, 2004. Associate Professor.
- DANIELS, DENISE H. (2003) ..... Psychology and Child Development  
B.A., University of California, Santa Barbara, 1982; M.A., Pacific Oaks College, 1983; Ph.D., University of California, Los Angeles, 1992. Associate Professor.
- D'ACQUISTO, JOSH (2002) ..... Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 1995. Coordinator – Rose Float.
- DAUGHERTY, M. STEVEN (1988) ..... Animal Science  
B.S., New Mexico State University, 1977; M.S., Colorado State University, 1979; Ph.D., New Mexico State University, 1984. Professor.
- DAVIES, THOMAS H. (1983) ..... Music  
B.M.E., Bowling Green State University, 1975; M.A., 1977; D.M.A., University of Southern California, 1983. Professor.
- D'AVIGNON, INDIA (2007) ..... Music  
B.M.E., Wittenberg University, 1974; M.A., The Ohio State University, 1980. Associate Professor.
- DAVIS, DONNA (1984) ..... Student Academic Services  
B.A., California Polytechnic State University, San Luis Obispo, 1976; M.A. 1977. Academic Advisor/Instructor; Coordinator, Connections for Academic Success.
- DAVIS, GERALD E. (2001) ..... Health and Counseling Services  
R.Ph., Drake University, 1961. Pharmacist.
- DAVIS, STEVEN C. (1987) ..... Kinesiology  
B.S., University of California, Davis, 1979; M.S., San Diego State University, 1983; Ph.D., Pennsylvania State University, 1986. Professor.
- DAVOL, ANDREW I. (1999) ..... Mechanical Engineering  
B.S.M.E., California Polytechnic State University, San Luis Obispo, 1987; M.S.M.E., University of California, San Diego, 1993; Ph.D., 1998. Professor and Department Chair. Registered Professional Engineer, California.
- DeCOSTA, JEAN (1994) ..... Dean of Students  
B.A., San Francisco State University, 1972; M.S., California Polytechnic State University, San Luis Obispo, 1986; Ph.D., Fielding Institute, 1993. Dean of Students.
- De HAHN, HENRI T. (2006) ..... Architecture  
Baccalaureat Scientifique, Collège Saint-Michel, Switzerland, 1979; M.Arch., Ecole Polytechnic Fédérale de Lausanne, Switzerland, 1979. Professor and Department Head.
- De JONG, ALVIN A. (1973) ..... Biological Sciences  
B.S., Seattle Pacific College, 1965; Ph.D., Washington State University, 1972. Professor Emeritus.
- DEKHTYAR, ALEXANDER (2007) ..... Computer Science  
Ph.D., University of Maryland College Park, 2000. Associate Professor.
- De LAY, ANN M. (2008) ..... Agricultural Education and Communication  
B.S., California State University, Fresno, 1997; M.S., California Polytechnic State University, San Luis Obispo, 2002; Ph.D., University of Florida, 2008. Assistant Professor.
- DELMORE, ROBERT J., JR. (2003) ..... Animal Science  
B.S., California Polytechnic State University, San Luis Obispo, 1991; M.S., University of Nebraska, 1993; Ph.D., Colorado State University, 1998. Associate Professor.

- DEL RIO, VICENTE (2001)..... City and Regional Planning  
B.Arch., Universidade Federal do Rio de Janeiro, 1978; M.U.R.P., Universidade do Estado do Rio de Janeiro, 1979; M.A., Oxford Polytechnic, 1981; Ph.D., Universidade de São Paulo, 1991. Professor.
- DeNALE, JAY S. (1988) ..... Civil and Environmental Engineering  
B.S., University of California, Davis, 1977; M.S., 1979; Ph.D., 1983. Professor.  
Registered Professional Engineer, California.
- DEN HARTOG, CHRISTOPHER (2006) ..... Political Science  
B.A., University of California, San Diego, 1996; Ph.D., 2004. Assistant Professor.
- DEN OTTER, RONALD (2005) ..... Political Science  
B.A., University of California, Davis, 1989; J.D., University of Pennsylvania, 1992; Ph.D., University of California, Los Angeles, 2003. Assistant Professor.
- DePIERO, FRED W., (1996) .... College of Engineering, Electrical Engineering, and  
Computer Engineering  
B.S., Michigan State University, 1985; M.S., 1987; Ph.D., University of Tennessee, 1996. Professor and Associate Dean.
- DERELIAN, DORIS (2004).....Food Science and Nutrition  
B.S., California State University, Fresno, 1966; M.S., University of California, Davis, 1973; Ph.D., University of California, Los Angeles, 1993; J.D., University of California, Davis, 2001. Professor and Department Head. Registered Dietitian.
- DERICKSON, DENNIS (2005) ..... Electrical Engineering  
B.S., South Dakota State University, 1981; M.S., University of Wisconsin–Madison, 1988; Ph.D., University of California, Santa Barbara, 1992. Assistant Professor.
- DETURRIS, DIANNE J. (1998) ..... Aerospace Engineering  
B.S., Georgia Institute of Technology, 1984; M.S., Pennsylvania State University, 1986; Ph.D., Virginia Polytechnic Institute and State University, 1992. Professor.
- DETWEILER, ROBERT C. (1998) ..... History  
B.A., Humboldt State University, 1960; M.A., San Francisco State University, 1968; Ph.D., University of Washington, 1968. Trustee Professor.
- DEVORE, JAY L. (1977).....Statistics  
B.S., University of California, Berkeley, 1966; M.S., Stanford University, 1968; Ph.D., 1971; additional graduate study, Sheffield University, England. Professor Emeritus.
- DIASSEMI, MANOCHER (2003) ..... Industrial Technology  
B.S., University of Science and Technology, Tehran, 1977; M.S., University of Wisconsin–Milwaukee, 1990; Ph.D., 1994. Associate Professor.
- DICUS, CHRISTOPHER A. (2001) ..... Natural Resources Management  
B.S., Louisiana Tech University, 1992; M.S., Utah State University, 1995; Ph.D., Louisiana State University, 2000. Associate Professor.
- DIETTERICK, BRIAN C. (1994) ..... Natural Resources Management  
B.A., University of Pennsylvania, 1980; M.S., University of Arizona, 1982; Ph.D., Penn State University, 1994. Professor.
- DISANTO, THOMAS L. (2003)..... Architecture  
M.Arch., California State Polytechnic University, Pomona, 1989; B.Arch, 1997; Ecole D'Architecture De Paris, La Defense, 1999. Assistant Professor.
- DOBSON, JOHN (1990) ..... Finance  
B.A., University of Lancaster, England, 1979; M.A., University of South Carolina, 1981; Ph.D., 1988. Professor.
- DOERFLER, JAMES A. (2005) ..... Architecture  
B.A., University of Hartford, 1981; M.Arch., Syracuse University of Architecture, 1985. Associate Professor. Registered Architect, New York, Australia.
- DOI, JIMMY A. (2003) ..... Statistics  
B.A., California State University, Northridge, 1995; M.S., North Carolina State University, 1998; Ph.D., 2003. Assistant Professor.
- DOLAN, DALE S.L. (2009) ..... Electrical Engineering  
B.S., University of Toronto, Ontario, Canada, 2003; M.S., 2005; Ph.D., 2008. Assistant Professor.
- DOMINGUES, ANTHONY (1985) ..... Admissions, Recruitment and Financial Aid  
B.S., California Polytechnic State University, San Luis Obispo, 1979. Senior Assistant Director.
- DOMINGUEZ, ROJEAN Y. (1994) ..... Health and Counseling Services  
B.S., Central Michigan University, 1972; M.P.H., University of Michigan, 1997. Health Educator.
- DONEGAN, LORRAINE D. (2002) ..... Graphic Communication  
B.S., California Polytechnic State University, San Luis Obispo, 1997; M.A., 2001. Associate Professor.
- DONG, KEVIN J. (2001) ..... Architectural Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1986; M.S., University of California, Berkeley, 1988. Associate Professor. Registered Structural Engineer and Professional Engineer, California.
- DOUB, PHILLIP M. (1985) ..... Agribusiness  
B.S., California State Polytechnic College, 1966; M.B.A., College of William and Mary, 1971. Professor.
- DOVE, DANIEL (2005) ..... Art and Design  
B.F.A., University of Texas at Austin, 1994; M.F.A., Yale University, 1996. Assistant Professor.
- DUERK, DONNA P. (1981) ..... Architecture  
B.Arch., North Carolina State University, 1971; B.A., 1972; M.Arch.A.S., Massachusetts Institute of Technology, 1980. Professor Emeritus. Registered Architect, Texas.
- DUFFY, BERNARD K. (1988) ..... Communication Studies  
B.A., San Jose State College, 1970; M.A., 1971; Ph.D., University of Pittsburgh, 1976. Professor.
- DUFFY, SUSAN (1988) ..... Theatre and Dance  
B.A., Seton Hill College, 1973; M.A., University of Pittsburgh, 1974; Ph.D., 1979. Professor.
- DUFFY, TREY (2006) ..... Disability Resource Center  
B.A., California State University, Hayward, 1980; M.Ed., San Jose State University, 1984. Director.
- DUGAN, TIMOTHY J. (1999) ..... Theatre and Dance  
B.A., California State University, Sacramento, 1993; M.F.A., Temple University, 1996. Associate Professor and Department Chair.
- DUKE, JULIETTE (2004) ..... University Housing  
B.S., Barry University, 1997; M.Ed., University of South Florida, 2001. Learning Community Coordinator.
- DURGIN, WILLIAM W. (2006) ..... Office of the President  
Sc.B., Brown University, 1964; M.S., University of Rhode Island, 1966; Ph.D., Brown University, 1970. University Executive, Research and External Support.
- DUTT, SAMIR (2007) ..... Finance  
M.S., Indian Institute of Technology, New Delhi, 1979; Ph.D., State University of New York, Stony Brook, 1987; Ph.D., University of California, Berkeley, 2006. Associate Professor.
- DWYER, GARY COLBURN (1973) ..... Landscape Architecture  
B.F.A. and B.L.A., Syracuse University, 1967; B.S.L.A., New York State University, 1967; M.A., University of Denver, 1970. Professor Emeritus.
- ECHOLS, ERIN (2006) ..... Student Life and Leadership  
B.S., University of New Haven, 1998; M.F.A., North Carolina School of the Arts, 2001. Coordinator, Pride Alliance: LGBT Center.
- ECHOLS, ROBERT (2002) ..... Physics  
B.S., University of California, Davis, 1992; M.S., 1994; M.S., University of California, Santa Cruz, 1996; Ph.D., 1999. Associate Professor.
- EDWARDS, MARK S. (2007) ..... Animal Science  
B.A., Miami University, 1987; Ph.D., Michigan State University, 1995. Associate Professor.
- ELFRINK, T. LEIGH (1980) ..... Administration and Finance  
B.A., California Polytechnic State University, San Luis Obispo, 1978; M.A., 1998. Associate Director, Facilities Administration.
- ELLIOT, DENNIS K. (1985) ..... Administration and Finance  
B.S., California Polytechnic State University, San Luis Obispo, 1993. Registered Professional Engineer. Chief Engineer, Facility Services.
- ELLIS, REBECCA (1987) ..... Management  
B.A., University of Wisconsin, Madison, 1969; M.A., 1971; M.S., 1981; Ph.D. 1984. Professor.
- ELROD, SUSAN L. (1997) ..... College of Science and Mathematics, and  
Biological Sciences  
B.S., California State University, Chico, 1986; Ph.D., University of California, Davis, 1995. Professor.

- ENDRES, LELAND S. (1969).....Chemistry and Biochemistry  
B.A., Middlebury College, 1958; M.A., University of Oregon, 1963; Ph.D.,  
University of Arizona, 1966. Professor Emeritus.
- ENGLE, PATRICE L. (1980).....Psychology and Child Development  
B.A. Wellesley College, 1966; Ph.D., Stanford University, 1971. Professor.
- ERISEN, ELIF (2008).....Political Science  
B.A., Bogazici University, Istanbul, 1999; M.Sc., London School of Economics  
and Political Science, 2000; Ph.D., Stony Brook University, 2008. Assistant  
Professor.
- ESTES, ALLEN C. (2007).....Architectural Engineering  
B.S., United States Military Academy, 1978; M.S., Stanford University, 1987;  
M.B.A., Long Island University, 1989; Ph.D., University of Colorado, 1997.  
Professor and Department Head. Registered Civil Engineer, Virginia.
- FAGAN, KEVIN (2001).....Modern Languages and Literatures  
B.A., Gregorian University, Rome, 1972; M.A., 1977; M.A., Texas Tech  
University, 2000; Ph.D., 2003. Assistant Professor.
- FAHS, MICHAEL L. (1983).....Communication Studies  
A.B., California State University, Long Beach, 1972; M.A., University of  
Southern California, 1974; Ph.D., 1976. Professor.
- FANCHON, PHILLIP (1991).....Economics  
D.U.E.S., University of Paris, 1969; B.A., University of California, Santa Barbara,  
1972; M.A., 1975; M.A., 1978; Ph.D., 1982. Professor Emeritus.
- FARKYE, NANA Y. (1990).....Dairy Science  
B.Sc. (Hon), University of Ghana, 1980; M.S., Utah State University, 1985; Ph.D.,  
1986. Professor.
- FARUQUE, OMAR (1989).....Landscape Architecture  
B.S.L.A., Texas A & M University, 1971; M. Arch., 1972. Professor. Registered  
Architect, Texas, and Landscape Architect, Texas and Indiana.
- FERNFLORES, FRANCISCO (2000).....Philosophy  
B.Sc., University of Toronto, 1992; M.A., University of Western Ontario, 1993;  
Ph.D., 1998. Associate Professor.
- FERNFLORES, RACHEL (2006).....Philosophy, Women's and Gender Studies  
B.A., University of Regina, 1993; M.A., University of Saskatchewan, 1995; Ph.D.,  
Queens University, 2006. Assistant Professor.
- FERNANDO, RAYMOND (2002).....Chemistry and Biochemistry  
B.S., University of Sri Jayewardenepura, Sri Lanka; Ph.D., North Dakota State  
University, Fargo, 1986. Professor, The Arthur C. Edwards Endowed Chair in  
Coatings Technology and Ecology.
- FERNSLER, JONATHAN (2006).....Physics  
B.S., College of William and Mary, 1996; M.S., University of Colorado, Boulder,  
1999; Ph.D., 2004. Assistant Professor.
- FERREIRA, LESLIE S. (1978).....Dairy Science  
B.S., California State Polytechnic College, 1970; M.S., University of Illinois,  
1972; Ph.D., Utah State University, 1980. Professor Emeritus.
- FIDOPIASTIS, PANTELIS M. (2006).....Biological Sciences  
B.A., California State University, Fullerton, 1992; M.A., 1995; Ph.D., University  
of Hawaii, Manoa, 2001. Assistant Professor.
- FIEGEL, GREGG L. (1995).....Civil and Environmental Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1990; M.S.,  
University of California, Davis, 1992; Ph.D., 1995. Professor. Registered  
Professional Engineer and Geotechnical Engineer, California.
- FIORENZA, GIANCARLO (2008).....Art and Design  
B.A., University of California, Santa Cruz, 1991; M.A., Johns Hopkins University,  
1993; Ph.D., 2000. Assistant Professor.
- FIORITO, BASIL A. (1977).....Psychology and Child Development  
B.A., Marist College, 1968; M.S., New York University, 1970; M.A., 1975; Ph.D.,  
Syracuse University, 1977. Professor. Licensed Marriage, Family and Child  
Counselor, California.
- FIRPO, CHRISTINA E. (2006).....History  
B.A., The George Washington University, 2000; M.A., University of California,  
Los Angeles, 2002; Ph.D., 2007. Assistant Professor.
- FISHER, ERIC (2007).....Economics  
M.A., John Hopkins School of Advanced International Studies, 1979; Ph.D.,  
University of California, Berkeley, 1985. Professor.
- FISHER, GENE L. (1991).....Computer Science  
B.S., University of California, Irvine, 1973; Ph.D., 1985. Professor.
- FISHER, GWEN (2001).....Mathematics  
B.A., University of California, Santa Barbara, 1992; M.A., 1996; Ph.D.,  
University of Wisconsin, Madison, 2001. Associate Professor.
- FITZHENRY, WILLIAM (1997).....English  
B.A., State University of New York at Buffalo, 1984; M.A., University of  
Colorado, 1991; Ph.D., Duke University, 1997. Associate Professor.
- FLEISHON, NEIL L. (1985).....Physics  
S.B., Massachusetts Institute of Technology, 1973; M.A., University of California,  
Berkeley, 1975; Ph.D., 1979. Professor.
- FLORES, ERIC (2008).....Financial Aid  
B.S., California Polytechnic State University, San Luis Obispo, 2003. Financial  
Aid Counselor.
- FLORES, MARIA D. (2001).....Orfalea College of Business  
B.S., California State Polytechnic University, Pomona, 1985. Administrative  
Analyst.
- FLORES, ROBERT A. (1983).....Agricultural Education and Communication  
B.S., California Polytechnic State University, San Luis Obispo, 1977; M.S., 1978;  
Ph.D., Texas A & M University, 1989. Professor and Department Head.
- FLOYD, BARRY (1990).....Management  
B.S., Michigan State University, 1973; M.S., 1974; M.B.A., University of  
Michigan, 1983; Ph.D., 1985. Professor.
- FLOYD, KAREL J. (2005).....Orfalea College of Business  
B.A., Michigan State University, 1974. Administrative Analyst.
- FOGLE, EMILY (2007).....Chemistry and Biochemistry  
B.A., Sonoma State University, 2000; Ph.D., University of California, Davis,  
2005. Assistant Professor.
- FOLGER, ROBERT K. (2004).....Financial Aid  
B.A., University of Arizona, 1998. Financial Aid Counselor.
- FOROOHAR, MANZAR (1987).....History  
B.A., National University of Iran; M.A., California State University, Northridge,  
1973; C. Phil., University of California, Los Angeles, 1978; Ph.D., 1984.  
Professor.
- FORSTER, SOPHIA (2008).....English  
B.A., York University, 1998; M.A., University of Victoria, 2001; Ph.D., State  
University of New York at Buffalo, 2008. Assistant Professor.
- FOWLER, THOMAS, IV (1995).....Architecture  
B.Arch., New York Institute of Technology/Old Westbury, 1984; M.Arch.,  
Cornell University, 1994. Professor. Registered Architect, New York.
- FRAME, SAMUEL (2007).....Statistics  
B.S., California Polytechnic State University, San Luis Obispo, 2001; M.S.,  
University of California, Santa Barbara, 2004; Ph.D., 2007. Assistant Professor.
- FRANKEL, RICHARD B. (1988).....Physics  
B.S., University of Missouri, 1961; Ph.D., University of California, Berkeley,  
1965. Professor Emeritus.
- FRAYNE, COLETTE (1992).....Management  
B.S., University of Delaware, 1980; M.B.A., University of San Diego, 1981;  
Ph.D., University of Washington, 1986. Professor.
- FREBERG, LAURA A. (1987).....Psychology and Child Development  
B.A., University of California, Los Angeles, 1974; M.A., 1975; Ph.D., 1979.  
Professor.
- FREDEEN, TEANA A. (2008).....College of Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1991. Outreach  
Coordinator.
- FREED, TALI (2001).....Industrial and Manufacturing Engineering  
B.Sc., Technion-Israel Institute of Technology, Israel, 1983; M.Sc., 1988; Ph.D.,  
University of California, Berkeley, 1995. Associate Professor.
- FREEMAN, CAROL A. (1985).....Health and Counseling Services  
B.A., Aurora University, 1978; R.N., Ventura College, 1982; N.P., Family  
Practice, University of California, Davis, 1989. Nurse Practitioner.
- FREY, THOMAS G. (1970).....Chemistry and Biochemistry  
B.A., University of Oregon, 1965; Ph.D., University of Idaho, 1970. Professor  
Emeritus.
- FRISCH, SHERYL (1990).....Art and Design  
B.A., University of California, Riverside, 1983; M.A., 1988. Visual Resource  
Specialist.

- FRITZ, SUZANNE (1992).....University Housing  
B.S., University of California, Davis, 1985; M.Ed., University of Vermont, 1987.  
Education and Training Specialist.
- FRYER, STUART (2008).....Academic Records  
B.A., Norwich College, U.K., 1991; DIP.M., 1991. Articulation Officer.
- FUENTES, DANIEL (2008).....Student Academic Services  
B.A., California State University, Fresno, 2008. Educational Talent Search  
Outreach Counselor/Advisor.
- FUJITANI, SHARON H. (1977).....University Library  
B.A., University of California, Santa Barbara, 1963; M.L.S., University of Hawaii,  
1974; M.A., Pepperdine University, 1976. Senior Assistant Librarian.
- GALANTI, TERA (2008).....Art and Design  
B.F.A., California State University, Long Beach, 1986; M.F.A., 1995. Assistant  
Professor.
- GAMBLE, LYNNE E. (1976).....University Library  
B.A., University of Texas at Austin, 1968; M.L.S., 1969; M.A., California  
Polytechnic State University, San Luis Obispo, 1979. Associate Librarian  
Emeritus.
- GANNON, KIM RUTLEDGE (2002).....University Advancement  
B.A., Washburn University, 1988. Director, Alumni Relations.
- GARCIA, ANTONIO F. (2002).....Physics  
B.A., University of California, Los Angeles, 1988; B.S., San Jose State University,  
1994; M.S., The University of New Mexico, 1996; Ph.D., University of California,  
Santa Barbara, 2001. Associate Professor.
- GARCIA, JULIE A. (2007).....Psychology and Child Development  
B.A., California State University, San Bernardino, 1996; Ph.D., University of  
Michigan, Ann Arbor, 2005. Assistant Professor.
- GARCIA, STEVEN (1999).....Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 2006. Coordinator  
– Facilities Operations.
- GARNER, LAUREN C. (2005).....Horticulture and Crop Science  
B.S., The College of William and Mary, 1992; M.S., Cornell University, 1996;  
Ph.D., University of California, Riverside, 2004. Assistant Professor.
- GEARHART, RICHARD O. (2006).....Brock Center for Agricultural Communication  
B.S., California Polytechnic State University, San Luis Obispo, 1991. Director.
- GEE, VERA (1985).....Admissions, Recruitment and Financial Aid  
B.S., California Polytechnic State University, San Luis Obispo, 1982. Data  
Analyst.
- GELLING, JUNE A. (2004).....Health and Counseling Services  
B.S., University of California, Santa Barbara, 1980; Pharm.D., University of  
Southern California, 1986. Pharmacist-in-Charge.
- GENTILUCCI, JAMES L. (2003).....School of Education  
B.A., California State University, Northridge, 1980; M.A., California Polytechnic  
State University, San Luis Obispo, 1985; Ph.D., University of California, Santa  
Barbara, 2001. Assistant Professor.
- GERINGER, J. MICHAEL (1992).....Management  
B.S., Indiana University, 1980; M.B.A., University of Washington, 1983; Ph.D.,  
1986. Professor.
- GHARIBIAN, ARMEN (2008).....Associated Students, Incorporated  
B.A., California Polytechnic State University, San Luis Obispo, 2008. Assistant  
Coordinator – ITS User Support.
- GHARIBYAN, HASMIK (2000).....Computer Science  
M.S., Yerevan State University, Republic of Armenia, USSR, 1981; Ph.D., 1991.  
Professor.
- GIBERTI, BRUNO (1994).....Architecture  
B.S. Arch., California Polytechnic State University, San Luis Obispo, 1980;  
M.Arch., University of California, Berkeley, 1989; Ph.D., 1994. Professor.  
Registered Architect, California.
- GILBERT, BARBARA J. (2003).....Health and Counseling Services  
A.B., University of Missouri, 1982; M.A., Southern Illinois University, 1985;  
Ph.D., 1988. Psychologist.
- GILL, SAMANTHA J. (1997).....Natural Resources Management, BioResource  
and Agricultural Engineering  
B.S., Humboldt State University, 1991; M.S., 1993; Ph.D., University of  
California, Berkeley, 1997. Professor.
- GILLEN, GLEN D. (2006).....Physics  
B.S., Denison University, 1994; M.S., Miami University, 1996; M.A.T., 1997;  
M.S., The Ohio State University, 2001; Ph.D., 2002. Assistant Professor.
- GILLEN, KATHARINA (2006).....Physics  
Vordiplom, Rheinische Friedrich-Wilhelms Universität Bonn, 1998; M.S., The  
Ohio State University, 2000; Ph.D., 2005. Assistant Professor.
- GILLETTE, DAVID (2001).....English, Liberal Arts and Engineering Studies  
B.A., University of Iowa, 1985; M.A., University of New Mexico, 1992; Ph.D.,  
1995. Associate Professor and Co-Director, Liberal Arts and Engineering Studies.
- GOBLE, MARK (2008).....Health and Counseling Services  
B.S., Excelsior College, 2006. Information Technology Consultant.
- GOEL, RAKESH K. (1997).....Civil and Environmental Engineering  
B.Tech, Indian Institute of Technology, New Delhi, 1982; M.S., University of  
California, Berkeley, 1985; Ph.D., 1990. Professor and Department Chair.  
Registered Professional Engineer, California.
- GOERS, JOHN W. F. (1980).....Chemistry and Biochemistry  
B.S., University of Illinois, 1969; Ph.D., University of California, Los Angeles,  
1974. Professor.
- GOLD, ANNA (2008).....University Library  
B.A., University of California, Santa Cruz, 1976; M.L.S., Catholic University of  
America, 1982; M.S., Virginia Polytechnic and State University, 1999. Associate  
Dean.
- GOLDEN, BRUCE L. (2007).....Dairy Science  
B.S., Washington State University, Pullman, 1981; M.S., 1983; Ph.D., Colorado  
State University, 1991. Professor and Department Head.
- GOLDENBERG, MARNI (2003).....Recreation, Parks, and Tourism Administration  
B.S., California State University, Sacramento, 1995; M.S., Purdue University,  
1997; Ph.D., University of Minnesota, 2002. Associate Professor.
- GOMEZ, PETRA (2008).....Student Academic Services  
B.A., University of California, Santa Barbara, 2008. Educational Talent Search  
Outreach Counselor/Advisor.
- GONZALEZ, LUIS (2007).....Student Academic Services  
B.A., University of California, Santa Barbara, 2003; M.A., 2007. Upward Bound  
Director.
- GOODMAN, ANYA (2005).....Chemistry and Biochemistry  
B.S., Florida Atlanta University, 1996; Ph.D., Massachusetts Institute of  
Technology, 2003. Assistant Professor.
- GOODMAN, BRENT S. (2005).....Institutional Planning and Analysis  
B.A., University of Northern Colorado, 1989; M.S., 1997. Director, Institutional  
Planning and Analysis.
- GORMAN, LARRY R. (1997).....Finance  
B.S., Washington State University, 1985; M.B.A., Western Washington  
University, 1988; Ph.D., Northwestern University, 1998. Associate Professor.
- GRADY, DAVID V. (1971).....Biological Sciences  
A.B., University of California, Los Angeles, 1964; Ph.D., 1974. Professor Emeritus.
- GRAGSON, DEREK E. (1999).....Chemistry and Biochemistry  
B.S., California State University, Hayward, 1991; M.S., University of Oregon,  
1995; Ph.D., 1997. Associate Professor.
- GRANGER, BRIAN E. (2008).....Physics  
B.S., Westmont College, 1994; Ph.D., University of Colorado at Boulder, 2001.  
Assistant Professor.
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B.S., Massachusetts Institute of Technology, 1964; M.A., Washington University,  
1966; Ph.D., 1970. Professor Emeritus.
- GREENWOOD, JERUSHA B. (2006).....Recreation, Parks, and Tourism  
Administration  
B.S., University of Utah, 1998; M.S., 2002; Ph.D., North Carolina State  
University, 2006. Assistant Professor.
- GREENWOOD, P. BRIAN (2006).....Recreation, Parks, and Tourism Administration  
B.A., University of North Carolina at Chapel Hill, 1996. M.S., North Carolina  
State University, 2001; Ph.D., 2007. Assistant Professor.
- GREIG, PATRICIA (1983).....Associated Students, Incorporated  
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- GRIFFIN, LANNY (1997) ..... Biomedical and General Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1992; Ph.D.,  
University of California, Davis, 1996. Professor and Department Chair.
- GRIFFIN, PATRICK E. (1983) ..... Administration and Finance  
B.A., California Polytechnic State University, San Luis Obispo, 1982; M.A., 1989.  
Supervisor, Building Trades, Facility Services.
- GRIFFITH, A. ELIZABETH (2008) ..... Physics  
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- GRIGGS, KENNETH A. (1999) ..... Management  
B.A., University of Maryland, 1972; M.S., 1975; M.B.A., 1979; Ph.D., 1989.  
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B.S., California Polytechnic State University, San Luis Obispo, 2002; M.S.,  
University of La Verne, 2006. Financial Aid Counselor.
- GRIMES, JOSEPH E. (1973) ..... Academic Personnel  
B.A., St. Ambrose University, 1963; M.S., Illinois State University, 1968; Ph.D.,  
Iowa State University, 1973. Professor Emeritus of Computer Science, and  
Director of Faculty Professional Development.
- GRUNDMEIER, TODD A. (2004) ..... Mathematics  
B.S., University of New Hampshire, 1997; M.S., 2000; Ph.D., 2003. Assistant  
Professor.
- GU, CAIXING (1998) ..... Mathematics  
B.S., Zhejiang University, 1982; M.S., China Textile University, 1986; Ph.D.,  
Indiana University, 1994. Professor.
- GUISE, MEGAN (2009) ..... English  
B.S., Millersville University, 2002; M.Ed., 2004; Ph.D., University of Pittsburgh,  
2009. Assistant Professor.
- GUTHRIE, JAMES (2009) ..... Architectural Engineering  
B.A., University of California, Davis, 1972; M.S., University of California,  
Berkeley, 1973. Assistant Professor. Registered Structural Engineer and Civil  
Engineer, California.
- GUTIERREZ, THOMAS D. (2006) ..... Physics  
B.S., San José State University, 1991; M.S., 1994; Ph.D., University of California,  
Davis, 2000. Assistant Professor.
- HAAS, MAUREEN (2008) ..... Health and Counseling Services  
B.A., University of California, Berkeley, 1975; M.A., San Francisco State  
University, 1977; M.D., University of California, Irvine, 1985. Physician.
- HABIB, KENNETH (2006) ..... Music  
B.A., University of California, Los Angeles, 1983; M.A., University of California,  
Santa Barbara, 1995; Ph.D., 2005. Assistant Professor.
- HAGEN, CHARLES T. (1980) ..... Philosophy  
B.A., Harvard University, 1968; M.A., University of Michigan, 1977; Ph.D., 1981.  
Professor.
- HAGEN, JOHN (2001) ..... Chemistry and Biochemistry  
B.S., University of Nevada, Las Vegas, 1992; Ph.D., Stanford University, 1996.  
Associate Professor.
- HAGOBIAN, TODD A. (2009) ..... Kinesiology  
B.A., University of Southern California, 1991; M.A., San Francisco State  
University, 2002; Ph.D., University of Massachusetts at Amherst, 2007. Assistant  
Professor.
- HALEY, MARK (2007) ..... Health and Counseling Services  
B.S., California Polytechnic State University, San Luis Obispo, 1984; M.Phys.A.,  
Samuel Merritt College, 2003. Physician's Assistant.
- HALISKY, LINDA H. (1984) ..... College of Liberal Arts, English  
B.A., Whittier College, 1968; M.A., University of California, Riverside, 1978;  
Ph.D., 1984. Professor and Dean.
- HALL, GARRETT J. (2002) ..... Civil and Environmental Engineering  
B.S., Worcester Polytechnic Institute, 1992; M.S., University of Washington,  
1993; Ph.D., University of California, Berkeley, 2001. Associate Professor.
- HALL, KELLIE G. (1990) ..... Kinesiology  
B.S., Rocky Mountain College, 1977; M.S., Eastern Washington University, 1987;  
Ph.D., Louisiana State University, 1990. Professor.
- HALL, LAURA M. (2009) ..... Food Science and Nutrition  
B.S., California Polytechnic State University, San Luis Obispo, 2003; Ph.D.,  
University of California, Davis, 2008. Assistant Professor. Registered Dietitian.
- HALL, MICHAEL H. (1974) ..... Animal Science  
B.S., California Polytechnic State University, San Luis Obispo, 1973; M.S.,  
Kansas State University, 1975. Professor.
- HALLOCK, BRENT G. (1979) ..... Earth and Soil Sciences  
B.S., University of California, Davis, 1970; M.S., 1972; Ph.D., 1976. Professor.  
Certified Professional Soil Scientist; Certified Professional Soil Erosion and  
Sediment Control Specialist.
- HAMILTON, LYNN (1996) ..... Agribusiness  
B.S., Ohio State University, 1988; M.S., University of Minnesota, 1995; Ph.D.,  
1996. Professor.
- HAMILTON, STEPHEN (2004) ..... Economics  
B.A., University of California, Santa Barbara, 1991; M.S., University of  
California, Berkeley, 1994; Ph.D., 1996. Professor and Area Chair.
- HAMMOND, AMIE (2007) ..... Career Services  
B.A., Occidental College, 1995; M.A., New York University, 1998. Career  
Counselor.
- HAMPSEY, JOHN C. (1992) ..... English  
B.A., Holy Cross College, 1976; Ph.D., Boston College, 1982. Professor.
- HAMPSON, BRIAN C. (1991) ..... Food Science and Nutrition  
B.S., University of Illinois at Champaign-Urbana, 1981; M.S., 1983; Ph.D., 1988.  
Professor.
- HANNINGS, DAVID W. (1974) ..... Horticulture and Crop Science  
B.S., Auburn University, 1972; M.S., Cornell University, 1974. Professor.
- HANSON, JAMES L. (2005) ..... Civil and Environmental Engineering  
B.S., University of Wisconsin, Madison, 1990; M.S., University of Minnesota,  
Minneapolis, 1992; Ph.D., University of Wisconsin, Madison, 1996. Registered  
Professional Engineer, Wisconsin. Associate Professor.
- HANSON, MICHAEL T. (1978) ..... Biological Sciences  
B.S., Idaho State University, 1970; M.A., University of Missouri, 1973; Ph.D.,  
Texas A & M University, 1976. Professor Emeritus.
- HARATANI, JOYCE T. (1986) ..... Administration and Finance  
B.S., University of California, Los Angeles, 1974; B.S., California Polytechnic  
State University, San Luis Obispo, 1979. Manager, Human Resources.
- HARDING, TREVOR S. (2006) ..... Materials Engineering  
B.S., University of Michigan, 1995; M.S., 1997; Ph.D., 2000. Associate Professor  
and Department Chair.
- HARGRAVE, TERRY C. (1979) ..... Architecture  
B.Arch.Eng., Washington State University, 1965; M.Arch., Massachusetts  
Institute of Technology, 1978. Professor. Architect, California.
- HARKINS, JOY (2002) ..... Student Life and Leadership  
B.A., Claremont McKenna College, 2000; M.A., California Polytechnic State  
University, San Luis Obispo, 2004; Ph.D., University of California, Santa Barbara,  
2008. Coordinator, The Community CENTER.
- HARLAN, CRAIG (1986) ..... History  
B.A., University of California, Irvine, 1971; M.A., 1973; Ph.D., 1981. Professor.
- HARMS, MARTIN J. (1997) ..... Architecture  
B.Arch., University of Liverpool, 1962; M.S., 1985; Ph.D., University of  
Pennsylvania, 1991. Professor. Registered Architect, Pennsylvania. Member,  
American Institute of Architects (FAIA).
- HARRIS, ANNE M. (2006) ..... University Advancement  
B.A., California State University, Stanislaus, 1997; M.A., 2006. Director, Special  
Gifts.
- HARRIS, DAVID L. (2004) ..... Health and Counseling Services  
B.S., California State University, Long Beach, 1971; M.D., University of East  
Quezon City, 1976. Physician.
- HARRIS, JAMES G. (1982) ..... Electrical Engineering, Computer Engineering  
B.S., University of California, Berkeley, 1961; M.S., 1962; Ph.D., Syracuse  
University, 1968. Professor and Director, Computer Engineering.
- HARRIS, JOHN H. (1978) ..... Natural Resources Management  
B.S., Humboldt State College, 1968; M.S., 1970; Ph.D., Utah State University,  
1972. Professor.

- HARRIS, KATHLEEN C. (2003) ..... School of Education  
B.A., Douglass College, Rutgers University, 1971; M.Ed., Rutgers University,  
1972; Ph.D., Temple University, 1981. Associate Professor.
- HARRIS, TERRANCE L. (2004) ..... Admissions, Recruitment and Financial Aid  
B.S., California Polytechnic State University, San Luis Obispo, 2003; M.A., 2006.  
Admissions Officer.
- HARRIS, WALTER L. (1973) ..... Admissions, Recruitment and Financial Aid  
B.S., California Polytechnic State University, San Luis Obispo, 1973; M.A., 1975.  
Associate Director.
- HARTIG, DONALD G. (1979) ..... Mathematics  
B.S., Rensselaer Polytechnic Institute, 1964; M.S., University of Wisconsin,  
Milwaukee, 1966; Ph.D., University of California, Santa Barbara, 1970. Professor.
- HATTEN, GERRIE (2008) ..... Financial Aid  
B.A., University of California, San Diego, 1984; M.A., National University, 1988.  
Assistant Director of Financial Aid.
- HAUCK, ALLAN J. (2002) ..... Construction Management  
B.A., Kalamazoo College, 1973; M.Ed., Bowling Green State University, 1979;  
Ph.D., University of Maryland, 1990. Professor and Department Head. Certified  
Professional Constructor (CPC).
- HAUNGS, MICHAEL L. (2003) ..... Computer Science  
B.S., University of California, Berkeley, 1992; M.S., Clemson University, 1998;  
Ph.D., University of Davis, 2002. Assistant Professor.
- HAVANDJIAN, NISHAN (1980) ..... Journalism  
B.A., Haigazian University, Beirut, Lebanon, 1970; M.A., University of Georgia,  
1972; Ph.D., University of Texas at Austin, 1979. Professor.
- HAZELWOOD, SCOTT (2007) ..... Biomedical and General Engineering  
B.S., Harvey Mudd College, 1985; M.E., 1986; M.S., University of California,  
Davis, 1992; Ph.D., 1998. Assistant Professor.
- HEADRICK, DAVID H. (1998) ..... Horticulture and Crop Science  
B.S., California State Polytechnic University, Pomona, 1986; M.S., University of  
California, Riverside, 1988; Ph.D., 1992. Professor. Pest Control Advisor,  
California.
- HELMBRECHT, BRENDA (2004) ..... English  
B.A., Truman State University, 1997; M.A., Miami University, 1999; Ph.D., 2004.  
Assistant Professor, and Director of Writing.
- HENDERSON, STANLEY L. (1990) ..... Dairy Science  
B.S., Iowa State University, 1973; M.S., Southern Illinois University, 1976; Ph.D.,  
Utah State University, 1990. Professor.
- HENDRICKS, WILLIAM W. (1994) Recreation, Parks, and Tourism Administration  
B.A., California State University, Chico, 1980; M.B.P.A., John F. Kennedy  
University, 1984; Ph.D., University of Utah, 1993. Professor.
- HERNANDEZ, ANITA (1999) ..... School of Education  
B.A., California State University, Chico, 1978; M.A., California State University,  
Sacramento, 1990; Ph.D., Stanford University, 1999. Associate Professor.
- HERTER, ROBERTA J. (1998) ..... School of Education  
B.A., Michigan State University, 1969; M.A., 1979; Ph.D., University of  
Michigan, 1998. Professor.
- HESS, JEFFREY (2007) ..... Marketing  
B.A., Biola University, 1986; M.B.A., Pepperdine, 1988; Ph.D., University of  
Colorado-Boulder, 1998. Associate Professor.
- HEWES, AMY B. (1995) ..... College of Engineering  
B.A., Smith College, 1974; M.A., California Polytechnic State University, San  
Luis Obispo, 1997. Director, Publications and Communications.
- HEY, DAVID W. (2008) ..... Kinesiology  
B.S., University of Wisconsin, La Crosse, 1987; M.S., 1993; Ph.D., Southern  
Illinois University, 2004. Assistant Professor.
- HILL, JENNIFER L., CPT (2008) ..... Military Science  
B.S., University of Wisconsin - La Crosse, 2003.
- HILL, MARGARITA M. (2005) ..... Landscape Architecture  
B.S.L.A., University of California, Davis, 1986; M.S.C.D., 1989. Professor and  
Department Head.
- HILLERS, KENNETH J. (2004) ..... Biological Sciences  
B.S., Western Washington University, 1980; Ph.D., University of Oregon, 1998.  
Assistant Professor.
- HILTPOLD, PAUL (1989) ..... History  
B.A., University of Texas, 1974; M.A., 1976; Ph.D., 1981. Professor.
- HIMELBLAU, EDWARD T. (2005) ..... Biological Sciences  
B.S., University of California San Diego, 1992; Ph.D., University of Wisconsin,  
2000. Assistant Professor.
- HINDMARCH, LEANNE (2007) ..... University Library  
B.A., University of Toronto, 2003; M.L.S., 2005. Senior Assistant Librarian.
- HOELLWARTH, CHANCE (2002) ..... Physics  
B.S., California Polytechnic State University, San Luis Obispo, 1991; M.S.,  
University of California, Davis, 1994; Ph.D., 1997. Associate Professor.
- HOFFMAN, KENNETH A. (1974) ..... Physics  
B.A., University of California, Berkeley, 1966; M.A., 1969; Ph.D., 1973.  
Professor Emeritus.
- HOLLAND, V. L. (1972) ..... Biological Sciences  
B.A., Fresno State College, 1966; M.A., 1969; Ph.D., University of California,  
Berkeley, 1973. Professor Emeritus.
- HOLMAN, BRETT (2002) ..... Administration and Finance  
B.S., California Polytechnic State University, San Luis Obispo, 1988. Assistant  
Director for Accounts and Payment Management, Fiscal Services. Certified Public  
Accountant.
- HOLOCHER, PAUL (2006) ..... Intercollegiate Athletics  
B.A., Santa Clara University, 1990. Head Coach, Men's Soccer.
- HOLTZ, ANDREW J. (2008) ..... BioResource and Agricultural Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1999; D.E.,  
University of California, Davis, 2005. Assistant Professor. Registered Professional  
Engineer, California.
- HOLZAPPLE, ROBERT (2008) ..... Physics  
B.A., University of California, Berkeley, 1988; M.S., Stanford University, 1991;  
Ph.D., 1996. Associate Professor.
- HOPPER, MATTHEW S. (2006) ..... History  
B.A., Pepperdine University, 1996; M.A., Temple University, 1998; M.A.,  
University of California, Los Angeles, 2000; Ph.D., 2006. Assistant Professor.
- HOWARD, WAYNE H. (1999) ..... Agribusiness  
B.A., California State University, 1974; M.Sc., University of Florida, 1982; Ph.D.,  
Texas A&M University, 1987. Professor and Department Chair.
- HOWARD-GREENE, DANIEL (1994) ..... Office of the President  
B.A., University of California, Santa Cruz, 1975; M.S., University of Chicago,  
1978; Ph.D., 1983. Chief of Staff.
- HOWELL, ROBERT (1974) ..... Art and Design  
B.A., Brooks Institute, 1973; M.A., Pepperdine University, 1976. Professor.
- HUMPHREY, BROOKE D. (2007) ..... Animal Science  
B.S., California Polytechnic State University, San Luis Obispo, 1998; M.S.,  
University of California, Davis, 2000; Ph.D., 2004. Assistant Professor.
- HUNTER, MARK A. (2001) ..... Administration and Finance  
B.S., California Polytechnic State University, San Luis Obispo, 1987. Director,  
Facility Services.
- HURLEY, SEAN P. (2002) ..... Agribusiness  
B.A., University of San Francisco, 1994; Ph.D., Iowa State University, 2000.  
Associate Professor.
- HURT, SHELLEY L. (2008) ..... Political Science  
B.A., University of California, Berkeley, 1995; M.A., New School for Social  
Research, 2001; Ph.D., 2009. Assistant Professor.
- HWANG, JENNIE M. (2007) ..... Communication Studies  
B.A., National Central University (Taiwan), 1998; M.A., Michigan State  
University, 2001; Ph.D., University at Buffalo, 2007. Assistant Professor.
- IANNEO, BRITTANY L. (2008) ..... Disability Resource Center  
B.A., University of San Francisco, 2001; M.A., Chapman University, 2005;  
M.Ed.Psy., Azusa Pacific University, 2005. Credentialed Educational Psychologist  
Learning Disability Specialist.
- IDDINGS, GAYLE (1991) ..... Physics  
B.Sc., Imperial College, London, 1973; M.S., University of Colorado, 1977;  
Ph.D., 1982. Professor.
- IGNATOVA, ILIANA (2007) ..... Statistics  
B.M.S., Saint Kliment Ohridski University of Sofia, Bulgaria, 2001; M.S.,  
University of South Carolina, 2003; Ph.D., 2007. Assistant Professor.

- IKEDA, KIMI M. (1985-88, 1989).....Academic Affairs  
B.S., California Polytechnic State University, San Luis Obispo, 1988; M.A., 1996.  
Assistant Vice Provost for Systems and Resource Management.
- IMMOOS, CHAD E. (2004).....Chemistry and Biochemistry  
A.B., Occidental College, 1996; Ph.D., University of California, Irvine, 2002.  
Associate Professor.
- INCHAUSTI, ROBERT L. (1984).....English  
B.A., California State University, Sacramento, 1974; M.A., 1976; Ph.D.,  
University of Chicago, 1981. Professor.
- ISOM, DENISE A. (2008).....Ethnic Studies  
B.S., B.A., University of California, Davis, 1989; M.A., 1992; Ph.D., Loyola  
University, Chicago, 2003. Associate Professor.
- IVERSEN, TONYA (1990).....Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 1986; M.B.A.,  
1996. Director, Children's Programs.
- JACKSON, BARBARA J. (1998).....Construction Management  
B.S., Colorado State University, 1975; M.S., 1998; Ph.D., 2000. Professor. Class  
A General Contractor, Virginia. Designated Design-Build Professional (DBIA).
- JACKSON, DOUGLAS (2008).....Architecture  
B.Arch., Virginia Polytechnic Institute and State University, 1993; M.Arch.,  
Princeton University, 2000. Assistant Professor. Registered Architect, California.
- JACKSON, LORRAINE D. (1992).....Communication Studies  
B.A., University of Western Ontario, 1987; M.A., Pennsylvania State University,  
1989; Ph.D., 1992. Associate Professor.
- JACOBS, JEFFREY A. (2003).....Recreation, Parks and Tourism Management  
B.A., University of Michigan, 1991; M.S.W., 1994; Ph.D., 2004. Assistant  
Professor.
- JACOBSON, RALPH A. (1975).....Chemistry and Biochemistry  
B.A., Montclair State College, 1962; Ph.D., Cornell University, 1966. Professor  
Emeritus.
- JAGGIA, SANJIV (2007).....Economics, Finance  
B.A., Panjab University, India, 1981; Ph.D., Indiana University, Bloomington,  
1990. Associate Professor.
- JAMES, JENNIFER (2007).....Agribusiness  
B.S., University of California, Davis, 1994; M.S., 1996; Ph.D., 2000. Associate  
Professor.
- JAMESON, KRISTINA K. (2008).....Aerospace Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 2003; M.S., 2003;  
Ph.D., University of California, Los Angeles, 2008. Assistant Professor.
- JANKOVITZ, KRISTINE Z. (1996).....Kinesiology  
B.S., California Polytechnic State University, San Luis Obispo, 1984; M.S., 1989;  
Ph.D., University of Nebraska-Lincoln, 1995. Associate Professor and Graduate  
Coordinator.
- JANOWICZ, ROSEMARIE (1993).....Health and Counseling Services  
B.S., California Polytechnic State University, San Luis Obispo, 1978. Clinical  
Laboratory Scientist.
- JANSEN, DANIEL (2003).....Civil and Environmental Engineering  
B.S., University of California, San Diego, 1988; Ph.D., Northwestern University,  
1996. Associate Professor.
- JANZEN, DAVID S. (2006).....Computer Science  
B.A., Tabor College, 1990; M.S., University of Kansas, 1993; Ph.D., 2006.  
Assistant Professor.
- JAQUES, JODI D. (2001).....School of Education  
B.A., Saint Mary's College of California, 1986; M.Ed., Virginia Polytechnic  
Institute and State University, 1993; Ph.D., University of Virginia, 2000.  
Associate Professor.
- JASBINSEK, JOHN J. (2008).....Physics  
B.S., California State Polytechnic University, Pomona, 1992; M.A., University of  
California, Santa Barbara, 1994; Ph.D., University of Wyoming, 2008. Assistant  
Professor.
- JASTER, EDWIN H. (1992).....Dairy Science  
B.S., University of Wisconsin, 1970; M.S., University of Arizona, 1977; Ph.D.,  
1979. Professor.
- JAVADPOUR, ROYA (2003).....Industrial and Manufacturing Engineering  
B.S., Isfahan University of Technology, 1993; M.S., Louisiana State University,  
1996; M.S., 2000; Ph.D., 2001. Associate Professor.
- JEN, JOSEPH J. (1992-2001) (2006).....Office of the President  
B.S., National Taiwan University, 1960; M.S., Washington State University, 1964;  
M.B.A., Southern Illinois University, 1986; Ph.D., University of California,  
Berkeley, 1969. Senior Advisor to the President, Special Agricultural and Federal  
Initiatives.
- JENNINGS, BETTY S. (2001).....College of Liberal Arts  
B.A., California Polytechnic State University, San Luis Obispo, 1995; M.A., 2000.  
Academic Advisor.
- JERCICH, GEORGE D. (1985).....Art and Design  
B.A., San Jose State University, 1972; M.A., 1976; M.F.A., 1983. Professor  
Emeritus.
- JIMÉNEZ-FLORES, RAFAEL (1995).....Dairy Science  
B.S., U. La Salle, Mexico City, 1981; M.S., Cornell University, 1984; Ph.D.,  
University of California, Davis, 1989. Professor.
- JIN, XIAOMIN (2004).....Electrical Engineering  
B.S., Tsinghua University, Beijing, China, 1992; M.S., 1996; Ph.D., University of  
Illinois at Urbana-Champaign, 2001. Assistant Professor.
- JIPSON, JENNIFER (2005).....Psychology and Child Development  
B.A., Smith College, 1993; M.S., University of California, Santa Cruz, 1996;  
Ph.D., 2000. Assistant Professor.
- JOHNSON, ERIC B. (1980).....Art and Design  
B.A., University of Oregon, 1971; M.A., University of New Mexico, 1975;  
M.F.A., 1978. Professor.
- JOHNSON, JANE (1980).....Career Services  
B.S., California Polytechnic State University, San Luis Obispo, 1978; M.A., 1998.  
Career Counselor.
- JOHNSON, RICK (1987).....Associated Students, Incorporated  
B.A., University of the Pacific, 1978; M.A., 1982; D.P.A., University of La Verne,  
1999. Executive Director.
- JOHNSON, TRACEE (2008).....Student Academic Services  
B.A., California Polytechnic State University, San Luis Obispo, 2004; M.A., New  
York University, 2008. Student Support Services Program Coordinator/Academic  
Advisor.
- JOHNSON, WILLIAM V. (1966).....Music  
B.M.E., Indiana University, 1962; M.M., University of Michigan, 1966. Professor.
- JOHNSTON, HAL (1988).....Construction Management  
B.S., Washington State University, 1970; M.S., University of Florida, 1983.  
Professor. Certified Professional Estimator, Licensed General Contractor.
- JOHNSTON, SCOTT C. (2008).....Physics  
B.S., Stanford University, 1999; M.S., 2000; Ph.D., University of California, Santa  
Barbara, 2006. Assistant Professor.
- JOINES-NOVOTNY, LAURA E. (1989).....Architecture  
A.B. Vassar College, 1981; M.Arch., North Carolina State University, 1987.  
Professor. Registered Architect, California.
- JONES, BARRY K. (2001).....Construction Management  
M.Sc., University of Aston, U.K., 1980; Ph.D., University of Southampton, U.K.,  
1999. Professor. Chartered Builder (FCIOB); Fellow American Society of Civil  
Engineers.
- JONES, CINDY (1999).....Admissions, Recruitment and Financial Aid  
B.S., California Polytechnic State University, San Luis Obispo, 1979.  
Communications Analyst.
- JONES, DANE R. (1976).....Chemistry and Biochemistry  
B.A., University of Utah, 1969; Ph.D., Stanford University, 1974. Professor.
- JONES, R. THOMAS (2003).....College of Architecture and Environmental Design  
B.Arch., Cornell University, 1969. Dean. AIA, Registered Architect, California.
- JONES, TERRY L. (1998).....Social Sciences  
B.A., University of California, Santa Cruz, 1978; M.A., Sonoma State University,  
1982; M.A., University of California, Davis, 1989; Ph.D., 1995. Professor and  
Department Chair.
- JOSEPH, EILEEN E. (2006).....College of Liberal Arts  
B.A., Bucknell University, 1988; M.A., University of Virginia, Charlottesville,  
1992. Director of Advancement.
- JOSHI, HIMA (2006).....Chemistry and Biochemistry  
B.A., Northwestern University, 1994; Ph.D., University of San Diego, 2001.  
Assistant Professor.

- JOVANOVIĆ, JASNA (2005) ..... Psychology and Child Development  
B.S., University of Illinois, 1985; M.S., Pennsylvania State University, 1987;  
Ph.D. 1991. Associate Professor.
- JUNCO, MARIA L. (1989) ..... Theatre and Dance  
B.A., University of California, Los Angeles, 1985; M.A., 1988. Professor. C.M.A.  
– Certified Movement Analyst.
- KACHLAKEV, DAMIAN I. (2000) ..... Civil and Environmental Engineering  
B.S., University of Architecture, Civil Engineering and Geodesy, Sofia, Bulgaria,  
1986 and 1988; M.S., 1988; Ph.D., Oregon State University, Corvallis, 1997.  
Professor. Registered Professional Engineer, Bulgaria.
- KAIWI-LENTING, ANDRENE (1994) ..... Student Life and Leadership  
B.A., California Polytechnic State University, San Luis Obispo, 1991. Assistant  
Director/Coordinator, Orientation Programs.
- KAMINAKA, M. STEPHEN (1984) ..... BioResource and Agricultural Engineering  
B.S., University of California, Davis, 1968; M.S., University of Hawaii, 1973;  
Ph.D., Cornell University, 1977. Professor.
- KANE, STEVEN (1994) ..... School of Education  
B.A., California State Polytechnic University, Pomona, 1985; M.A., University of  
California, Los Angeles, 1989; Ph.D., 1993. Associate Professor. Licensed  
Psychologist, California.
- KANN, DAVID J. (1969) ..... English  
B.A., Brandeis University, 1964; M.A., New York University, 1966; Ph.D.,  
Occidental College, 1971. Postdoctoral study, State University of New York,  
Buffalo. Professor.
- KANTOROWSKI, ERIC J. (2004) ..... Chemistry and Biochemistry  
B.S., California State University, Fullerton, 1993; Ph.D., University of California,  
Davis, 1998. Associate Professor.
- KASPER, ERIC P. (1997) ..... Civil and Environmental Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1991; M.S.,  
University of California, Davis, 1992; Ph.D., University of California, Berkeley,  
1997. Professor. Registered Professional Engineer, California.
- KATO, GORO C. (1981) ..... Mathematics  
B.S., Shizuoka University, Japan, 1972; M.A., West Virginia University, 1974;  
Ph.D., University of Rochester, 1979. Professor.
- KAUL, ANTON (2003) ..... Mathematics  
B.S., University of California, Davis, 1994; M.S., Oregon State University, 1996;  
Ph.D., 2000. Assistant Professor.
- KEAN, ANDREW J. (2004) ..... Mechanical Engineering  
B.E., The Cooper Union, 1997; M.S., University of California, Berkeley, 1999;  
Ph.D., 2003. Assistant Professor.
- KEARNS, TIMOTHY J. (2000) Information Technology Services, Computer Science  
B.A., Boston College, 1969; M.S., University of Notre Dame, 1970; Ph.D., 1976.  
Associate Professor and Vice Provost/Chief Information Officer.
- KEELING, DAVID L. (1975) ..... Chemistry and Biochemistry  
B.S., Arizona State University, 1969; Ph.D., University of Hawaii, 1974. Professor  
Emeritus.
- KEELING, ELENA L. (1997) ..... Biological Sciences  
B.S., Yale University, 1989; Ph.D., University of California, San Francisco, 1996.  
Professor.
- KEEN, AARON W. (2002) ..... Computer Science  
B.S., University of California, Davis, 1997; M.S., 2000; Ph.D., 2002. Associate  
Professor.
- KEESE, JAMES R. (2003) ..... Social Sciences  
B.S., California Polytechnic State University, San Luis Obispo, 1987; M.A.,  
American Graduate School of International Management, 1989; Ph.D., University  
of Arizona, 1996. Associate Professor.
- KEESEY, DOUGLAS (1988) ..... English, Academic Programs  
B.A., University of California, Berkeley, 1982; M.A., 1984; Ph.D., Princeton  
University, 1988. Professor; Director, General Education Program.
- KEIF, MALCOLM G. (1989) ..... Graphic Communication  
B.S., California Polytechnic State University, San Luis Obispo, 1986; M.A.,  
California State University, Long Beach, 1989; Ph.D., University of Missouri,  
1995. Associate Professor.
- KEIL, DAVID J. (1976) ..... Biological Sciences  
B.S., Arizona State University, 1968; M.S., 1970; Ph.D., Ohio State University,  
1973. Professor.
- KELLER, EARL C. (1987) ..... Accounting  
B.B.A., University of Houston, 1963; M.B.A., University of Washington, 1970;  
Ph.D., University of Washington, 1973. Professor. Certified Public Accountant.
- KELLER, JOHN M. (2006) ..... Physics  
B.S., Stanford University, 1991; M.A., 1992; M.S., University of Colorado,  
Boulder, 1999; Ph.D., University of Arizona, 2006. Assistant Professor.
- KELLEY, LAWRENCE R. (2002) ..... Administration and Finance  
B.A., University of Akron, 1971; M.S., 1980. Vice President, Administration and  
Finance.
- KELLOGG, WILLIAM C. (1983) ..... Agricultural Education and Communication  
B.S., California Polytechnic State University, San Luis Obispo, 1976; M.S., 1983;  
Ph.D., Colorado State University, 1987. Professor.
- KELLY, LOIS M. (2005) ..... Financial Aid  
A.B., Westmont College, 1971; M.S., Southern Illinois University, Edwardsville,  
1986. Director of Financial Aid.
- KELLY, SHAUN F. (2002) ..... BioResource and Agricultural Engineering  
B.S., Michigan State University, 1985; M.S., 1990; Ph.D., Oregon State  
University, 1998. Associate Professor. Registered Professional Engineer, Oregon.
- KELTING, SCOTT D. (2007) ..... Construction Management  
B.S., California Polytechnic State University, San Luis Obispo, 2000; M.S., 2003.  
Assistant Professor. LEED Accredited.
- KENNELLY, BRIAN (2006) ..... Modern Languages and Literatures, Humanities  
B.A., University of California, Davis, 1986; M.A., University of Virginia, 1989;  
Ph.D., New York University, 1996. Professor, and Humanities Program Director.
- KERBO, HAROLD R. (1977) ..... Social Sciences  
B.A., University of Oklahoma, 1970; M.A., 1972; Ph.D., Virginia Polytechnic  
Institute and State University, 1975. Professor.
- KHALIL, HANY M. (1987) ..... Food Science and Nutrition  
B.S., University of Alexandria, Egypt, 1973; M.S. University of Illinois,  
Champaign-Urbana, 1983; Ph.D., 1987. Professor.
- KIANI, TANYA L. (2000) College of Agriculture, Food and Environmental Sciences  
B.A., California State University, Long Beach, 1984; M.B.A., California  
Polytechnic State University, San Luis Obispo, 1993. Assistant Dean,  
Advancement and External Relations.
- KING, LAURA M. (1989) ..... Psychology and Child Development  
B.A., University of Arkansas, 1977; M.S., Kansas State University, 1980; Ph.D.,  
1989. Associate Professor.
- KINGSBURY, KEVIN B. (1996) ..... Chemistry and Biochemistry  
B.S., College of William and Mary, 1986; Ph.D., Stanford University, 1993.  
Professor.
- KIRK, COLLEEN M. (2001) ..... Mathematics  
B.S., Stanford University, 1994; M.S., Southern Illinois University, Carbondale,  
1995; Ph.D., Northwestern University, 1999. Associate Professor.
- KITAMURA, ROBERT E. (1978) ..... Administration and Finance  
B.Arch., California Polytechnic State University, San Luis Obispo, 1975; M.S.,  
1993. Director, Facilities Planning and Capital Projects.
- KITTS, CHRISTOPHER L. (1995) ..... Biological Sciences  
B.Sc., University of Auckland, New Zealand, 1984; Ph.D., University of  
California, Santa Cruz, 1992. Professor and Department Chair.
- KLAY, JENNIFER L. (2006) ..... Physics  
B.S., University of California, Los Angeles, 1994; M.S., University of California,  
Davis, 1998; Ph.D., 2001. Assistant Professor.
- KLISCH, STEPHEN M. (2001) ..... Mechanical Engineering  
B.S., University of Virginia, 1991; M.S., 1994; Ph.D., University of California,  
Berkeley, 1999. Associate Professor.
- KNABLE, ANTHONY E. (1973) ..... Biological Sciences  
B.A., Blackburn College, 1965; M.A., Southern Illinois University, 1967; Ph.D.,  
1972. Professor Emeritus.
- KNIGHT, CHARLES A. (2003) ..... Biological Sciences  
B.S., Western Washington University, 1996; Ph.D., Stanford University, 2002.  
Assistant Professor.
- KNIGHT, RANDALL D. (1989) ..... Physics  
B.S., Washington University, 1972; Ph.D., University of California, Berkeley,  
1979. Professor.

- KOHLER, DALE (1999) ..... University Library  
B.S., California Polytechnic State University, San Luis Obispo, 1988. Director,  
Library Information Technology.
- KOLKAILAH, FAYSAL A. (1984) ..... Aerospace Engineering  
B.S., Cairo University, Egypt, 1969; M.S., University of Cincinnati, 1978; Ph.D.,  
Louisiana State University, 1982; additional graduate study, Cairo University.  
Professor. Registered Professional Engineer, Egypt.
- KOLLURU, GITA R. (2008) ..... Biological Sciences  
B.Sc., Queen's University, Kingston, Canada, 1991; M.A., University of  
California, Riverside, 1994; Ph.D., 1999. Assistant Professor.
- KOLT, LEAH (2003) ..... University Advancement  
B.A., University of Mississippi, 1971; M.M.A., University of South Carolina,  
1984. Director, Public Affairs.
- KONOPAK, BONNIE (2000) ..... School of Education  
B.A., University of California, Los Angeles, 1970; M.A., 1974; Ph.D., University  
of California, Santa Barbara, 1984.
- KOOB, ROBERT D. (1990-1995) (2008) ..... Academic Affairs  
B.A., University of Northern Iowa, 1962; Ph.D., University of Kansas, 1967.  
Provost and Vice President for Academic Affairs.
- KORMAN, THOMAS M. (2005) ..... Construction Management  
B.S., California Polytechnic State University, San Luis Obispo, 1995; M.S.,  
Stanford University, 1997; Ph.D., 2001. Assistant Professor. Registered  
Professional Engineer, Safety Assessment Evaluator, ACI Concrete Flatwork  
Technician.
- KRIEGER, DANIEL E. (1971) ..... History  
B.A., San Jose State College, 1965; Ph.D., University of California, Davis, 1973.  
Professor Emeritus.
- KUBINSKI, A. MARK (1975) ..... Biological Sciences  
B.S., Gonzaga University, 1968; M.S., Washington State University, 1971; Ph.D.,  
1974. Professor Emeritus.
- KUHN, DEVIN (2007) ..... Philosophy, Women's and Gender Studies  
B.A., Georgetown University, 2000; M.A., Claremont Graduate University, 2006;  
Ph.D., 2007. Assistant Professor.
- KURFESS, FRANZ J. (2000) ..... Computer Science  
M.S., Technical University of Munich, 1984; Ph.D., 1990. Professor.
- KYKER, BRADLEY W. (2003) ..... College of Agriculture, Food and  
Environmental Sciences  
B.S., California Polytechnic State University, San Luis Obispo, 1992; M.S.,  
California State University, Long Beach, 2003. Advising Resource Specialist;  
Director, MAP Student Center.
- LAIHO, LILY (2007) ..... Biomedical and General Engineering  
B.S., Stanford University, 1995; M.S., 1996; Ph.D., Massachusetts Institute of  
Technology, 2004. Assistant Professor.
- LAMB, STEPHAN R. (1979) ..... Student Life and Leadership  
B.A., Santa Clara University, 1973; M.A., University of the Americas, 1975;  
M.A., University of California, Santa Barbara, 1996. Associate Director.
- LAMPMAN, GREGORY B. (1995) ..... Administration and Finance  
Bachelor of Architecture, California Polytechnic State University, San Luis  
Obispo, 1975. Project Manager, Facility Services.
- LANCASTER, KATHRYN A. S. (1997) ..... Accounting  
B.A., Fort Lewis College, 1990; M.S., Colorado State University, 1991; Ph.D.,  
Texas A & M University, 1997. Associate Professor. Certified Public Accountant.
- LANGE, JOHN H. (1975) ..... Architecture  
B.S., University of Cincinnati, 1968; M.Arch., Stanford University, 1972; Ph.D.,  
University of Pennsylvania, 1975. Professor. Registered Architect, California.
- LANGE, KAREN F. (1989) ..... Architecture  
B.Arch., California Polytechnic State University, San Luis Obispo, 1980; M.Arch.,  
Columbia University, 1982. Professor. Registered Architect, California.
- LANGNER, CARRIE A. (2008) ..... Psychology and Child Development  
B.A., University of Michigan, 1997; Ph.D., University of California, Berkeley,  
2005. Assistant Professor.
- LAPORTE, MARY L. (1985) ..... Art and Design  
B.A., Washington State University, 1975; M.F.A., 1980. Professor.
- LASSANSKE, DANIEL E. (1975) ..... Horticulture and Crop Science  
B.S., California State Polytechnic College, 1970; M.S., 1971. Professor.
- LATHROP, AMANDA A. (2009) ..... Food Science and Nutrition  
B.S., California Polytechnic State University, San Luis Obispo, 1999; Ph.D.,  
Purdue University, 2002. Assistant Professor.
- LATNER, MICHAEL (2007) ..... Political Science  
B.A., California State University, Chico, 1995; M.A., University of California,  
Irvine, 2006; Ph.D., 2008. Assistant Professor.
- LAURSEN, PETER T. (2007) ..... Architectural Engineering  
M.S., University of California, San Diego; Ph.D., University of Auckland, New  
Zealand, 2003. Assistant Professor. Registered Civil Engineer, California.
- LAVER, GARY D. (1998) ..... Psychology and Child Development  
B.A., University of California, Santa Cruz, 1983; M.A., Claremont Graduate  
University, 1987; Ph.D., 1992. Professor and Department Chair.
- LAWLER, BRIAN P. (2007) ..... Graphic Communication  
B.S., California Polytechnic State University, San Luis Obispo, 1976; M.S., 2006.  
Assistant Professor.
- LEE, LARRY (2002) ..... Intercollegiate Athletics  
B.S., Pepperdine University, 1983; M.S., California Polytechnic State University,  
San Luis Obispo, 1985. Head Coach, Baseball.
- LEE, LINDSEY (2006) ..... Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 2005. Coordinator  
– Membership and Staff Services.
- LEE, STARR (2001) ..... Cal Poly Corporation  
B.A., Kansas State University, 1981; J.D., University of San Diego, 1990; M.B.A.,  
University of Texas, Austin, 1995. General Counsel.
- LEETHAM, LORLIE (1996) ..... Administration and Finance  
B.S., California Polytechnic State University, San Luis Obispo, 1991. Certified  
Public Accountant. Director, Fiscal Services.
- LEHR, CORINNE (2006) ..... Chemistry and Biochemistry  
B.S.C., University of Calgary, 2003; Ph.D., Montana State University, 2006.  
Assistant Professor.
- LEHR, JANE L. (2007) ..... Ethnic Studies, Women's and Gender Studies  
B.A., University of Rochester, 1997; M.S., Virginia Polytechnic Institute and State  
University, 2002; Ph.D., 2006. Assistant Professor.
- LEITHNER, ANIKA (2006) ..... Political Science  
Vordiplom, Friedrich-Alexander-Universität Erlangen-Nuremberg, Germany,  
1999; M.A., University of Colorado, 2002; Ph.D., 2006. Assistant Professor.
- LEMIEUX, PATRICK (2007) ..... Mechanical Engineering  
B.Sc.Eng., University of New Brunswick, Fredericton, Canada, 1991; M.Sc.,  
Cranfield Institute of Technology, Bedford, England, 1992; Ph.D., California  
Institute of Technology, 1999. Associate Professor.
- LEONG, KINGSTON L. (1970) ..... Biological Sciences  
B.S., University of Hawaii, 1963; M.S., 1966; Ph.D., Oregon State University,  
1970. Professor Emeritus.
- LEPORE, JASON (2007) ..... Economics  
B.A., University of California, Irvine, 2002; M.A., University of California, Davis,  
2003; Ph.D., 2007. Assistant Professor.
- LERIAN, STEVEN T. (2008) ..... College of Liberal Arts  
B.A., University of Southern California, 1972; M.F.A., Wayne State University,  
1975. Director, Cal Poly Arts.
- LEROY, RICHARD (2000) ..... International Education and Programs  
B.A., Louisiana State University, Baton Rouge, 1995. M.A., California Polytechnic  
State University, San Luis Obispo, 2002. Pacific Programs Director.
- LERTWACHARA, KEVIN (2004) ..... Management  
B.S., King Monkut's Institute of Technology, Thonburi, Bangkok, Thailand, 1994;  
M.B.A., Westminster College, 1996; Ph.D., University of Connecticut, 2004.  
Associate Professor.
- LEVENSON, HARVEY ROBERT (1983) ..... Graphic Communication  
B.S., Rochester Institute of Technology, 1967; M.S., South Dakota State  
University, 1968; Ph.D., University of Pittsburgh, 1980. Professor and Department  
Head.
- LEVI, DANIEL J. (1982) ..... Psychology and Child Development  
B.A., Lehigh University, 1973; M.S., University of Arizona, 1979; Ph.D., 1981.  
Professor.

- LIDDICOAT, ALBERT A. (2002) ..... Academic Personnel, Computer Engineering, Electrical Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1989; M.S., Stanford University, 1996; M.S., 1999; Ph.D., 2002. Assistant Vice President for Academic Personnel, and Professor.
- LIESE, JEFFREY E. (2008) ..... Mathematics  
B.S., California Polytechnic State University, San Luis Obispo, 2000; M.A., University of California, San Diego, 2004; Ph.D., 2008. Assistant Professor.
- LIGHTMAN, MARIANA (2008) ..... Student Life and Leadership  
B.S., California Polytechnic State University, San Luis Obispo, 2006. Coordinator, Women's Programs and Services/SAFER.
- LINDERT, LISA M. (2002) ..... Chemistry and Biochemistry  
B.S., University of Michigan, 1997; M.S., University of California, Santa Barbara, 2000; Ph.D., 2002. Associate Professor.
- LINDSEY-MULLIKEN, JOAN M. (2007) ..... Marketing  
B.S., University of Missouri, 1983; M.B.A., University of Arizona, 1996; Ph.D., 1999. Associate Professor.
- LIU, MEI-LING (1994) ..... Computer Science  
B.S., Iowa State University, 1972; M.S., 1974; M.S., California Polytechnic State University, San Luis Obispo, 1982; Ph.D., University of California, Santa Barbara, 1994. Professor Emeritus.
- LLOYD-MOFFETT, STEPHEN (2005) ..... Philosophy  
B.A., Claremont McKenna College, 1994; M.Th., St. Vladimir's Orthodox Seminary, 2004; M.A., University of California, Santa Barbara, 2001; Ph.D., 2005. Assistant Professor.
- LO, CHIEN-KUO (1983) ..... Civil and Environmental Engineering  
B.S., National Cheng Kung University, Taiwan, 1969; M.S., 1973; Ph.D., University of Iowa, 1981. Professor.
- LOBERG, MOLLY J. (2007) ..... History  
B.A., Pacific Lutheran University, 1998; M.A., Princeton University, 2002; Ph.D., 2006. Assistant Professor.
- LOCASCIO, JAMES GASPARE (1981) ..... Mechanical Engineering  
B.S., Newark College of Engineering, 1970; M.S., University of California, Santa Barbara, 1971; Ph.D., 1988. Associate Professor.
- LONDON, BLAIR (1993) ..... Materials Engineering  
B.S. Drexel University, 1981; M.S., Stanford University, 1983; Ph.D., 1986. Professor.
- LONG, DIANNE N. (1982) ..... Political Science  
B.S., State University of New York College at Buffalo, 1964; M.P.A., Michigan State University, 1977; Ph.D., 1982. Professor Emeritus.
- LONG, TODD (2004) ..... Philosophy  
B.A., University of Southern Mississippi, 1986; M.A., 1995; M.A., University of Wales, 2000; M.A., University of Rochester, 2002; Ph.D., 2003. Assistant Professor.
- LOOSLEY, SCOTT L. (2006) ..... Administration and Finance  
B.S., California Polytechnic State University, San Luis Obispo, 1980. Assistant Director, Facility Services Operations. Certified Arborist, International Society of Arboriculture; Licensed Pest Control Adviser and Qualified Applicator Certificate, California Department of Pesticide Regulation.
- LOPEZ, ROCIO (2008) ..... Student Academic Services  
B.A., University of California, Los Angeles, 2005. Upward Bound Program Coordinator/Academic Advisor.
- LOVAGLIO, ENRICA (2002) ..... Art and Design  
M.A., University of California, Santa Barbara, 2001; M.F.A. equivalent, University of Studies of Genova, Italy, 1996. Associate Professor.
- LOVING, BILL (2008) ..... Journalism  
B.A., University of Texas, El Paso, 1979; J.D., Southern Methodist University, 1991. Professor and Department Chair.
- LOWHAM, ELIZABETH A. (2007) ..... Political Science  
B.A., Carlton College, 2001; M.A., University of Colorado, 2003; Ph.D., 2007. Assistant Professor.
- LUCAS, MICHAEL A. (1998) ..... Architecture  
B.Arch., University of Cincinnati, 1979; M.Arch., Morgan State University, 1995. Professor. Registered Architect, Maryland.
- LUND, ULRIC J. (2001) ..... Statistics  
B.S., University of California, San Diego, 1990; M.S., University of California, Santa Barbara, 1993; Ph.D., 1998. Associate Professor.
- LUNDQUIST, TRYG J. (2006) ..... Civil and Environmental Engineering  
B.A., University of California, Berkeley, 1989; M.S., 1992; Ph.D., 2006. Assistant Professor. Registered Civil Engineer, California.
- LUPO, CHRISTOPHER (2008) ..... Computer Engineering, Computer Science  
B.S., California State University, Fresno, 1997; M.S., University of California, Davis, 2007; Ph.D., 2008. Assistant Professor.
- LUTRIN, CARL E. (1970) ..... Political Science  
B.A., Adelphi University, 1962; M.S., University of Wisconsin, 1965; Ph.D., University of Missouri, 1971; additional graduate work, Stanford University. Professor Emeritus.
- LYNCH, JOSEPH (2001) ..... Philosophy  
B.A., Virginia Commonwealth University, 1982; M.A., Claremont Graduate School, 1985; Ph.D., 1989. Associate Professor.
- LYNN, ABRAHAM C. (1996) ..... Architectural Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1986; M.S., University of California, Berkeley, 1991; Ph.D., 2001. Professor.
- LYONS, JOHN P. (2008) ..... Cal Poly Continuing Education  
B.A., University of California, Santa Barbara, 1997; M.A., 1999. Director, Business Services.
- MAAS, DONALD K. (1976) ..... School of Education  
B.A., University of California, Los Angeles, 1966; M.Ed., State University of New York at Buffalo, 1969; Ed.D., 1971. Professor.
- MacCARLEY, C. ARTHUR (1988) ..... Electrical Engineering, Computer Engineering  
B.S., University of California, Los Angeles, 1976; M.S., 1978; Ph.D., Purdue University, 1987. Professor and Department Chair, Electrical Engineering. Registered Professional Engineer, Colorado.
- MacCURDY, CAROL A. (1987) ..... English  
B.A., Southwestern at Memphis, 1972; M.A., University of South Carolina, 1975; Ph.D., 1980. Professor.
- MacDOUGALL, NEAL A. (1997) ..... Agribusiness  
B.A., Williams College, 1984; Ph.D., University of California, Berkeley, 1999. Associate Professor.
- MACEDO, JOSE (2002) ..... Industrial and Manufacturing Engineering  
B.S., Catholic University of Peru, Peru, 1982; M.S., University of California, Berkeley, 1984; Ph.D., Lehigh University, 1991. Associate Professor. Registered Professional Engineer, Texas.
- MACHAMER, JOSHUA T. (2003) ..... Theatre and Dance  
B.A., Whitier College, 1989; M.F.A., The Pennsylvania State University, 2000. Associate Professor and Associate Department Chair.
- MACKAY, ALISON (2007) ..... Management  
B.A., Brigham Young University, 1999; M.B.A., 2001; Ph.D., Ohio State University, 2006. Assistant Professor.
- MACKAY, TYSON (2007) ..... Management  
B.S., Brigham Young University, 2000; M.B.A., 2002; Ph.D., Ohio State University, 2006. Assistant Professor.
- MACKIN, THOMAS J. (2005) ..... Mechanical Engineering  
B.S., The Pennsylvania State University, 1980; M.S., 1987; Ph.D., 1991. Professor.
- MACRO, KENNETH L. (2000) ..... Graphic Communication  
B.A., Pennsylvania State University, University Park, 1993; M.A., The University of Akron, 2000. Assistant Professor.
- MADDREN, JESSE (1999) ..... Mechanical Engineering  
B.S.M.E., University of California, Santa Barbara, 1985; M.S.M.E., 1988; Ph.D., 1994. Associate Professor. Registered Professional Engineer, California.
- MADJEDI, JOHANNA J. (1992) ..... Information Technology Services  
B.S., California Polytechnic State University, San Luis Obispo, 1988. Director, Communications and Computing Services.
- MAGNUSSON, SHIRLEY J. (2004) ..... School of Education  
B.S., University of Missouri, Columbia, 1980; M.S., University of Iowa, 1986; Ph.D., University of Maryland, College Park, 1991. Professor.

- MAIN, KELLY D. (2007)..... City and Regional Planning  
B.A., University of California, Santa Barbara, 1972; M.A., Brown University,  
1983; Ph.D., University of California, Los Angeles, 2007. Assistant Professor.  
American Institute of Certified Planners.
- MALIK, ISMAIL (2003)..... University Housing  
B.S., University of California, San Diego, 1994; M.A., Seattle University, 1997.  
Learning Community Coordinator – First Year Connection.
- MALONEY, MARCY (1990)..... Associated Students, Incorporated  
B.A., California Polytechnic State University, San Luis Obispo, 1976; M.A., 1991.  
Director, ASI Programs.
- MANZANO, MARIA S. (2007)..... College of Engineering  
B.A., University of California, Santa Barbara, 2001. Retention Coordinator/  
Counselor.
- MARAVIGLIA, JAMES L. (1991)..... Admissions, Recruitment and Financial Aid  
B.S., Elmhurst College, 1976; M.S., Chicago State University, 1984. Assistant  
Vice President of Admissions, Recruitment and Financial Aid.
- MARCHBANKS, PAUL (2007)..... English  
B.S., Centre College of Kentucky, 1993; M.A., University of North Carolina at  
Chapel Hill, 2000; Ph.D., 2006. Assistant Professor.
- MARGARITO, CESAR (2003)..... Student Academic Services  
B.A., California Polytechnic State University, San Luis Obispo, 2002; M.A., 2006.  
Program Director, Student Support Services.
- MARK, WALTER R. (1972)..... Natural Resources Management  
B.S., Utah State University, 1968; M.S., Colorado State University, 1970; Ph.D.,  
1972. Professor. Registered Professional Forester, California.
- MARLIER, JOHN F. (1981)..... Chemistry and Biochemistry  
B.S., University of Wisconsin, Stevens Point, 1972; Ph.D., University of  
Wisconsin, Madison, 1978. Professor.
- MARLOW, MICHAEL L. (1988)..... Economics  
B.A., George Washington University, 1975; Ph.D., Virginia Polytechnic Institute,  
1978. Professor.
- MARSALEK, KIMBERLY C. (2006)..... College of Engineering  
B.A., California Polytechnic State University, San Luis Obispo, 2006. Lead  
Academic Advisor.
- MARSHALL, DAVID D. (2004)..... Aerospace Engineering  
B.S., Worcester Polytechnic Institute, 1994; M.S., Georgia Institute of  
Technology, 1995; Ph.D., 2003. Associate Professor.
- MARSHALL, KATHRYN G. (2007)..... Economics  
B.A., University of Texas, 1980; Ph.D., University of California, Berkeley, 1990.  
Assistant Professor.
- MARTIN, KATHLEEN J. (2002)..... Ethnic Studies  
B.A., California State University, Northridge, 1992; M.A., University of  
California, Santa Barbara, 1993, 1996; Ph.D., 1997. Assistant Professor.
- MARTIN, TAMMY S. (1998)..... Career Services  
B.A., Buena Vista College, 1987; M.A., California Polytechnic State University,  
San Luis Obispo, 2007. Career Counselor.
- MARTINEZ, CHARMAINE (2006)..... Art and Design  
B.F.A., University of Notre Dame, 1993; M.F.A., University of Wisconsin-  
Madison, 2003. Assistant Professor.
- MARTINEZ, WILLIAM, JR. (1993)..... Modern Languages and Literatures  
B.A., San Diego State University, 1986; M.A., 1988; Ph.D., University of  
California, Irvine, 1993. Professor and Department Chair.
- MARX, STEVEN R. (1988)..... English  
A.B., Columbia University, 1963; A.M., 1966; Ph.D., Stanford University, 1981.  
Professor Emeritus.
- MASE, G. THOMAS (2007)..... Mechanical Engineering  
B.S.M.E., Michigan State University, 1980; M.S.M.E., University of California,  
Berkeley, 1982; Ph.D., 1987. Associate Professor.
- MAY, THOMAS A. (1979)..... Administration and Finance  
B.S., California Polytechnic State University, San Luis Obispo, 1977. Licensed  
Building Contractor (B), Licensed Landscape Contractor (C27), Certified  
Asbestos Building Inspector, Certified Asbestos Contractor/Supervisor. Project  
Manager, Facility Services.
- McCALL, MICHAEL D. (1999)..... University Advancement  
B.A., Old Dominion University, 1982; J.D., Wake Forest University, 1986.  
Associate Vice President/Chief Development Officer.
- McCLURE, PAMELA H. (2005)..... Orfalea College of Business  
M.A., Columbia University, 1966. Director of Advancement.
- McCORMICK, KATHRYN E. (2003)..... Art and Design  
B.S., University of Cincinnati, 1996; M.S., 2001. Associate Professor.
- McCULLOUGH, MICHAEL (2008)..... Agribusiness  
B.S., Boise State University, 2003; M.S., Washington State University, 2007;  
Ph.D., 2008. Assistant Professor.
- McDANIEL, COLE C. (2005)..... Architectural Engineering  
B.S., University of California, San Diego, 1996; M.S., 1997; Ph.D., 2002.  
Assistant Professor. Registered Civil Engineer, California.
- McDERMOTT, ANN M. (2006)..... Kinesiology  
B.S., Boston University, 1977; M.S., Northeastern University, 1989; Ph.D., Tufts  
University, 2002. Associate Professor.
- McDERMOTT, STEVEN T. (1989)..... Communication Studies  
B.A., San Jose State University, 1973; M.A., 1976; Ph.D., Michigan State  
University, 1980. Professor.
- McDONALD, LUANN A. (1983)..... Financial Aid  
B.A., California Polytechnic State University, San Luis Obispo, 1978; M.A., 1981.  
Associate Director of Financial Aid.
- McDONALD, MARGOT K. (1992)..... Architecture  
B.A., B.S., University of California, Santa Barbara, 1980; M.Arch., University of  
Oregon, 1987. Professor. AIA, Registered Architect, Oregon. NCARB Certificate.
- McDONALD, ROB A. (2006)..... Aerospace Engineering  
B.S., University of Missouri-Rolla, 1999; M.S., Georgia Institute of Technology,  
2001; Ph.D., 2006. Assistant Professor.
- McGRATH, JUSTIN (2006)..... Intercollegiate Athletics  
B.S., University of Arkansas, Fayetteville, 2001. Head Coach, Men's Tennis.
- McKIM, BONNIE L. (2001)..... College of Liberal Arts  
B.S., California Polytechnic State University, San Luis Obispo, 1993; M.S., 2000;  
M.A., 2001. Academic Advisor, College of Liberal Arts.
- McKINLAY, KRISTINA I. (2002)..... Orfalea College of Business  
B.A., Westmont College, 1979; M.Div., San Francisco Theological Seminary,  
1985; M.B.A., California Polytechnic State University, San Luis Obispo, 2001.  
Director of Academic Advising.
- McKINSTRY, JOHN A. (1968)..... Social Sciences  
A.B., University of California, Los Angeles, 1961; A.M., University of Southern  
California, 1963; Ph.D., 1970. Professor Emeritus.
- McLAMORE, ALYSON (1991)..... Music  
B.A., University of California at Los Angeles, 1982; M.A., 1985; Ph.D., 1991.  
Professor.
- McQUAID, PATRICIA (1996)..... Management  
B.S., Case-Western Reserve University, 1978; M.B.A., Eastern Michigan  
University, 1982; M.S., Auburn University, 1988; Ph.D., Auburn University,  
1996. Professor.
- MEAGHER, JAMES M. (1988)..... Mechanical Engineering  
B.S., University of Akron, 1978; M.S., 1981; Ph.D., University of California,  
Berkeley, 1987. Professor.
- MEALY, BRYAN J. (2003)..... Electrical Engineering, Computer Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1990; M.S., 1993;  
M.S., University of California, Santa Cruz, 1999; Ph.D., 2002. Assistant Professor.
- MEDINA-MALONEY, DELFINA (2008)..... Financial Aid  
B.A., California Polytechnic State University, San Luis Obispo, 2004. Financial  
Aid Counselor.
- MEDINA, ELSA (2000)..... Mathematics  
B.S., California Polytechnic State University, San Luis Obispo, 1994; M.S., 1996;  
Ph.D., University of Northern Colorado, 2000. Associate Professor.
- MEDIZADE, MASON (1984)..... Mechanical Engineering  
B.S., Abadan Institute of Technology, 1978; M.S., University of Southern  
California, 1980; Ph.D., 1984. Professor.
- MEHIEL, ERIC A. (2004)..... Aerospace Engineering  
B.S., University of California, Santa Barbara, 1998; M.S., University of Colorado,  
2001; Ph.D., 2003. Assistant Professor.
- MEISENHEIMER, KRISTEN (2009)..... Chemistry and Biochemistry  
B.S., California Polytechnic State University, San Luis Obispo, 1992; Ph.D.,  
University of Colorado, Boulder, 1998. Assistant Professor.



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B.S., California Polytechnic State University, 1983; M.S., 1989; Ph.D., University of California, Davis, 1996. Professor.
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B.S., California Polytechnic State University, San Luis Obispo, 1973; M.P.A., University of San Francisco, 1981. Director, Human Resources.
- MENDES, ANTHONY A. (2004) ..... Mathematics  
B.S., University of California, Irvine, 2000; M.A., University of California, San Diego, 2001; Ph.D., 2004. Assistant Professor.
- MENON, UNNY (1978) ..... Industrial and Manufacturing Engineering  
A.P., Sheffield Polytechnic, England, 1969; M.Phil., 1972; Ph.D. University of Nottingham, 1985. Professor. Registered Professional Engineer, Great Britain.
- METCALF, LYNN E. (1986) ..... Marketing  
B.A., University of Oregon, 1978; M.I.M., American Graduate School of International Management, 1981; Ph.D., University of South Carolina, 1986. Professor and Area Chair.
- MIKLOWITZ, PAUL S. (1988).....Philosophy  
B.A., University of California, Santa Cruz, 1977; M.A., University of Chicago, 1979; M.Phil., Ph.D., Yale University, 1988. Professor.
- MILICH, TOM (2006) ..... Intercollegiate Athletics  
B.S., California State University, Long Beach, 1978. Head Coach, M/W Swimming and Diving.
- MILLÁN, JOSÉ A. (1998).....Student Academic Services  
B.S., California Polytechnic State University, San Luis Obispo, 1991; M.A., 2006. Academic Advisor/Coordinator, Supplemental Workshops in Math.
- MILLER, ADRIENNE (2006) ..... Office of Student Rights and Responsibilities  
B.A., University of California at Berkeley, 1974; M.A., 1977; J.D., Hastings School of Law, 1977. Coordinator, Office of Student Rights and Responsibilities.
- MILLER, CHARLES R. (Tad) (1987)..... Accounting  
B.A., College of Wooster, 1970; M.B.A., University of Arizona, 1980; Ph.D., 1987. Professor. Certified Public Accountant.
- MILLER, MICHAEL BARTON (1997).....Art and Design  
B.A., University of California, Irvine, 1986; M.F.A., University of Southern California, 1988. Professor.
- MILLER, MICHAEL D. (2006) ..... University Library  
B.A., Long Island University, 1971; M.S., 1972; M.P.S., New York University, 1993. Dean of Library Services.
- MILLER, SANDRA D. (1984) ..... Architecture  
B.A., Oberlin College, 1963; M.Arch., University of California, Berkeley, 1978. Professor. AIA, Registered Architect, California.
- MILOSEVIC, MARY (1980).....Career Services  
B.A., Sonoma State College, 1978; M.A., California Polytechnic State University, San Luis Obispo, 1988. Computing Consultant.
- MINNAUGH, FAITH (1996) ..... Intercollegiate Athletics  
B.A., Loyola University of Chicago, 1986; M.S., North Carolina State, 1994. Head Coach, Women's Basketball.
- MINTZ, STEVEN (2006)..... Accounting  
B.S., Long Island University, 1967; M.B.A., Syracuse University, 1969; D.B.A., George Washington University, 1978. Professor.
- MITCHELL, DAVID (2006) ..... Physics  
B.S., George Washington University, 1998; M.A., University of California, San Diego, 2001; Ph.D., 2004. Assistant Professor.
- MITRA, SUDESHNA (2006) ..... Civil and Environmental Engineering  
B.S., Bengal Engineering College, India, 1998; M.Eng., National University of Singapore, 2002; M.S., University of Arizona, 2005; Ph.D., Arizona State University, 2006. Assistant Professor.
- MOAZZAMI, SARA (1991)..... Civil and Environmental Engineering  
B.S., George Washington University, 1981; M.S., University of California, Berkeley, 1982; Ph.D., 1987. Professor.
- MOCK, RODNEY (2008) ..... Accounting  
J.D., University of Oregon School of Law, 2002; L.L.M., University of Washington School of Law, 2004. Assistant Professor.
- MOCKFORD, JASON (2008) ..... Student Life and Leadership  
B.S., California Polytechnic State University, San Luis Obispo, 2005; M.A., 2008. Assistant Coordinator, Orientation Programs.
- MOLINE, MARK A. (1998) ..... Biological Sciences  
B.A., St. Olaf College, 1987; Ph.D., University of California, Santa Barbara, 1996. Professor.
- MOELTER, MATTHEW J. (1998)..... Physics  
B.S., University of California, Irvine, 1981; Sc.M., Brown University, 1983; Ph.D., 1989. Professor and Department Chair.
- MONGE, VALERIE (2007)..... Health and Counseling Services  
B.A., California Polytechnic State University, San Luis Obispo, 19997; M.M.Sc., Emory University School of Medicine, 2001. Physician's Assistant.
- MONTECALVO, JOSEPH (1983) ..... Food Science and Nutrition  
B.S., University of Rhode Island, 1972; M.S., 1975; Ph.D., 1979. Professor.
- MONTELONGO, JOSÉ (2004) ..... University Library  
B.S., The University of Texas at El Paso, 1976; M.Ed., 1988; M.L.S., The University of Texas at Austin, 1995; Ph.D., New Mexico State University, 2002. Senior Assistant Librarian.
- MONTGOMERY, WAYNE R. (1982)..... University Library  
A.B., University of California, Berkeley, 1977; M.L.S., University of California, Los Angeles, 1981; M.A., California Polytechnic State University, San Luis Obispo, 1988. Senior Assistant Librarian.
- MONTOYA, MICHAEL A. (2004)..... Construction Management  
B.S., California Polytechnic State University, San Luis Obispo, 1997; M.S., Stanford University, 1998. Assistant Professor. Registered Professional Engineer, Licensed General Contractor, LEED Accredited.
- MOODY, LYNN E. (1999)..... Earth and Soil Sciences  
B.S., University of Cincinnati, 1974; M.S., California Polytechnic State University, San Luis Obispo, 1989; Ph.D., University of California, Riverside, 1993. Professor and Department Chair.
- MOORE, CAROLE M. (1980) ..... Career Services  
B.A., California Polytechnic State University, San Luis Obispo, 1976; M.A., 1978. Career Counselor.
- MOORE, MATTHEW J. (2006) ..... Political Science  
B.A., Eugene Lang College, 1997; Ph.D., Johns Hopkins University, 2004. Assistant Professor.
- MORENO, DEBBIE (2000)..... Admissions, Recruitment and Financial Aid  
B.A., California Polytechnic State University, San Luis Obispo, 1998; M.A., 2006. Process Analyst/Trainer.
- MORENO, J. KELLY (1991) ..... Psychology and Child Development  
B.S., University of California, Santa Barbara, 1980; M.S., University of Utah, 1985; Ph.D., 1988. Professor. Licensed Psychologist, California.
- MORI, BARBARA L. ROWLAND (1986)..... Social Sciences  
B.A., Hofstra University, 1967; M.A., University of Hawaii, 1983; Ph.D., 1987. Professor.
- MORRIS, ANDREW D. (1998)..... History  
B.S., Harvey Mudd College, 1991; M.A., 1996; Ph.D., University of California, San Diego, 1998. Professor and Department Chair.
- MORRISON, KENT E. (1979) ..... Mathematics  
B.A., University of California, Santa Cruz, 1971; Ph.D., 1977. Professor.
- MORTON, CORNEL N. (2002) ..... Student Affairs  
B.S., Tennessee State University, 1970; M.A., 1974; Ph.D., Kent State University, 1983. Vice President for Student Affairs.
- MOSS, ROBB E. S. (2006) ..... Civil and Environmental Engineering  
B.S., North Carolina State University, 1995; M.S., Utah State University, 1997; Ph.D., University of California, Berkeley, 2003. Assistant Professor. Registered Professional Engineer, California.
- MOTTMANN, JOHN (1974)..... Physics  
B.A., University of California, Los Angeles, 1966; M.A., 1967; Ph.D., 1972. Professor Emeritus.
- MUELLER, JAMES R. (1980) ..... Mathematics  
B.A., University of Wisconsin, 1975; Ph.D., California Institute of Technology, 1982. Professor.
- MULETA, MISGANA (2008) ..... Civil and Environmental Engineering  
B.S., Arbaminch University, 1996; M.S., National University of Ireland, Galway, 1999; Ph.D., Southern Illinois University, Carbondale, 2003. Assistant Professor. Registered Professional Engineer, California.

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B.S., California Polytechnic State University, San Luis Obispo, 1989; M.A., 2009.  
Associate Registrar.
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B.A., Pacific Lutheran University, 1998; M.A., University of Southern California,  
2004. Learning Community Coordinator.
- MULLIGAN, PATRICIA A. (1988).....School of Education  
B.A., Arizona State University, 1971; M.Ed., Kent State University, 1977; M.A.,  
Northern Arizona University, 1978; Ph.D., Arizona State University, 1987.  
Professor.
- MULLISEN, RONALD S. (1977).....Mechanical Engineering  
B.S., California State Polytechnic College, 1969; M.Eng., 1976; Ph.D., Colorado  
State University, 1983. Professor Emeritus. Registered Professional Engineer,  
California.
- MUÑOZ-CHRISTIAN, KAREN (2007).....Modern Languages and Literatures  
B.S., Iowa State University, 1981; M.A., Wichita State University 1985; Ph.D.,  
University of California, Irvine, 1994. Assistant Professor.
- MUNROE, PATRICK A. (1980).....Journalism  
A.O.C.A., Ontario College of Art, 1976; M.F.A., Virginia Commonwealth  
University, 1986. Professor Emeritus.
- MURPHY, BONNIE D. (2007).....Cal Poly Corporation  
B.A., Oglethorpe University, 1982; M.B.A., Mercer University, 1999. Executive  
Director.
- MURPHY, KATHLEEN S. (2007).....History  
B.A., University of Virginia, 2001; M.A., Johns Hopkins University, 2003; Ph.D.,  
2007. Assistant Professor.
- MURRAY, WILLIAM R. (1999).....Mechanical Engineering  
B.S., University of Texas, Austin, 1975; M.S., 1976; Ph.D., Massachusetts  
Institute of Technology, 1988. Professor.
- MWANGI, JAMES (2003).....Architectural Engineering  
B.Sc., University of Nairobi, Kenya, 1984; MSc., University of Lagos, Nigeria;  
Ph.D., University of California, Davis, 2001. Associate Professor. Registered  
Structural Engineer and Professional Engineer, California.
- NADEL, JEFF (1991).....College of Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1989; M.A., 1991;  
D.P.A., University of La Verne, 2004. Director, Information Technology.
- NAFISI, AHMAD (1983).....Electrical Engineering  
B.S., Arya Mehr University of Technology, Iran, 1975; M.S., University of  
Southern California, 1977; Ph.D., 1983. Professor.
- NAKAMURA, RAYMOND M. (1980).....Kinesiology  
B.S., Northern Illinois University, 1965; M.S. 1967; M.S., DePaul University,  
1980; Ph.D., University of Toledo, 1974. Professor Emeritus.
- NAKAMURA, ROYDEN (1978).....Biological Sciences  
B.A., University of Hawaii, 1961; M.S., 1965; Ph.D., University of British  
Columbia, 1970. Professor.
- NAZMI, AYDIN (2009).....Food Science and Nutrition  
B.S., University of California, Davis, 1998; M.S., 2004; Ph.D., Federal University  
of Pelotas, Brazil, 2007. Assistant Professor.
- NEEL, JOEL (2002).....Administration and Finance  
B.A., California State University, Hayward, 1989; MCRP, California Polytechnic  
State University, San Luis Obispo, 1993. Assistant Director, Capital and  
Environmental Planning, Facilities Planning and Capital Projects.
- NEFF, GRACE ANN (1995).....Chemistry and Biochemistry  
B.S., New Mexico State University, 1989; Ph.D., University of Oregon, 1998.  
Assistant Professor.
- NEILL, DAWN (2008).....Social Sciences  
B.A., Louisiana State University, 1996; M.A., 1999; M.A., University of  
Washington, 2004; Ph.D., 2007. Assistant Professor.
- NEILL, STERN (2008).....Marketing  
B.A., Louisiana State University, 1992; M.B.A., Southeastern Louisiana  
University, 1994; Ph.D., Louisiana State University, 2000. Associate Professor.
- NELSON, CRAIG J. (1994).....University Advancement  
B.S., California Polytechnic State University, San Luis Obispo, 2000. Director,  
Cal Poly Fund and Advancement Services.
- NELSON, JILL (2008).....Architectural Engineering  
B.S., University of Nevada, Reno, 1978; M.S., University of Washington, 1982.  
Assistant Professor. Registered Structural and Civil Engineer, California and  
Washington; LEED AP.
- NELSON, YARROW M. (1999).....Civil and Environmental Engineering  
B.S., University of California, Berkeley, 1979; M.S., Cornell University, 1992;  
Ph.D., 1997. Professor.
- NEUENHOFER, ANSGAR (2001).....Architectural Engineering  
B.S., Technical University at Aachen, Germany, 1988; M.S., University of  
California, Berkeley, 1991; Ph.D., Technical University at Aachen, Germany,  
1994. Associate Professor. Registered Civil Engineer, California.
- NEUHAUS, TOM (1998).....Food Science and Nutrition  
B.S., Oberlin College, 1975; M.S., University of Maryland, 1982; Ph.D., Cornell  
University, 2000. Associate Professor.
- NEVEU, MARC J. (2007).....Architecture  
B.Arch., Wentworth Institute of Technology, 1995; M.Arch., McGill University,  
Montreal, 2000; Ph.D., 2006. Assistant Professor.
- NEY, CHERYL L. (2006).....Academic Programs  
B.S., Arizona State University, 1977; M.S., Baylor University, 1980; Ph.D.,  
University of Chicago, 1986. Associate Vice Provost for Academic Programs.
- NICHOLSON, LISA M. (2001).....Food Science and Nutrition  
B.S., California State University, Northridge, 1985; M.S., 1987; Ph.D., University  
of Southern California, 1999. Associate Professor. Registered Dietitian.
- NICKELSEN, NONA (NICKY) (2000).....Parent Program  
B.S., California Polytechnic State University, San Luis Obispo, 1995. Parent  
Program Coordinator.
- NICO, PHILLIP L. (2000).....Computer Science, Computer Engineering  
B.A., University of California, Berkeley, 1991; M.S., University of California,  
Davis, 1994; Ph.D., 2000. Associate Professor.
- NIKU, SAEED B. (1983).....Mechanical Engineering  
B.S., Tehran Polytechnic University, 1975; M.S., Stanford University, 1976;  
Ph.D., University of California, Davis, 1982. Professor. Registered Professional  
Engineer, California.
- NOEL, JAY E. (1990).....Agribusiness  
B.S., University of California, Davis, 1973; M.S., 1974; Ph.D., 1979. Professor.
- NOLAND, JAYMIE J. (1999).....Animal Science  
B.S., Colorado State University, 1981; D.V.M., Colorado State University, 1987.  
Professor.
- NOORI, MOHAMMAD (2005).....College of Engineering  
B.S., University of Illinois at Urbana-Champaign, 1977; M.S., Oklahoma State  
University, 1980; Ph.D., University of Virginia, 1984. Dean.
- NOTERMANN, ELLEN M. (1979).....College of Architecture and  
Environmental Design  
B.S., California Polytechnic State University, San Luis Obispo, 1990; M.A., 1999.  
Director of Advising Center.
- NUÑEZ, ALBERT A., JR., (1995).....Admissions, Recruitment and Financial Aid  
B.A., California Polytechnic State University, San Luis Obispo, 1996. Associate  
Director of Communications.
- NUTTALL, BRENT (2003).....Architectural Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1986; M.S.,  
University of California, Berkeley, 1987. Associate Professor. Registered  
Structural and Civil Engineer, California.
- NUWORSOO, CORNELIUS K. (2005).....City and Regional Planning  
B.S., University of Science and Technology, Ghana, 1981; M.S., Morgan State  
University, 1986; MCP, University of California, Berkeley, 2002; Ph.D., 2004.  
Assistant Professor. American Institute of Certified Planners. Institute of  
Transportation Engineers.
- O'BRIEN, JENNIFER (2008).....International Education and Programs  
B.S., California Polytechnic State University, San Luis Obispo, 1984; M.A.,  
University of Arizona, 1992. Supervisor, Pacific Programs.
- O'BRYANT, CAMILLE P. (1999).....Kinesiology  
B.A., Smith College, 1983; M.S., 1986; Ph.D., Ohio State University, 1996.  
Associate Professor and Department Chair.
- OGREN, SANDRA G. (2004).....University Advancement  
B.A., Luther College, 1969; J.D., University of Minnesota, 1973. Vice President  
for University Advancement.

- O'HARA, CHRISTINE E. (2008).....Landscape Architecture  
B.A., Stanford University, 1987; M.L.A. University of Washington, 2002.  
Assistant Professor. Certificate in Preservation Planning.
- OKADA, DARYL (2006) .....Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 1997. IT  
Programmer.
- OKUMA, TARYN L. (2008) .....English  
B.A., Scripps College, 2000; M.A., University of Wisconsin-Madison, 2001;  
Ph.D., 2008. Assistant Professor.
- OLIVER, JOHN Y. (2007).....Computer Engineering, Electrical Engineering  
B.S., Boston University, 1998; M.S., University of California, Davis, 2006; Ph.D.,  
2007. Assistant Professor.
- OLSEN, ERIC (2004).....Industrial Technology  
B.S., University of Maine at Orono, 1979; M.B.A., Virginia Polytechnic Institute  
and State University, 1987; Ph.D., The Ohio State University, 2004. Assistant  
Professor.
- OLVERA, NELDA (1993).....Student Academic Services  
B.A., California Polytechnic State University, San Luis Obispo, 1993; M.A., 1994.  
Academic Advisor/Instructor; Director, Educational Talent Search.
- OPAVA-STITZER, SUSAN (1993) .....Research and Graduate Programs  
B.S., College of Mt. St. Vincent, New York, 1968; Ph.D., University of Michigan,  
1972. Dean.
- ORIJ, JOHN (1987).....History  
B.A., University of Nigeria, 1967; M.A., Rutgers University, 1975; Ph.D., Rutgers  
University, 1977. Associate Professor.
- ORTH, JOEL J. (2003).....History  
B.A., California Polytechnic State University, San Luis Obispo, 1996; M.A., Iowa  
State University, 1998; Ph.D., 2004. Assistant Professor.
- OVERMAN, DOUG (1976).....Administration and Finance  
B.S. California Polytechnic State University, San Luis Obispo, 1976. Assistant  
Director, Facility Services.
- OWEN, FRANKLIN C. (1998).....Mechanical Engineering  
BSME, Mississippi State University, 1978; MSME, Oregon State University,  
1983; Ph.D., University of Texas, 1998. Associate Professor. Registered  
Professional Engineer, Maine.
- PAL, NIRUPAM (1995).....Civil and Environmental Engineering  
B.S., Calcutta University, India, 1984; M.S., 1986; Ph.D., New Jersey Institute of  
Technology, 1993. Professor.
- PALANDOKEN, HASAN (2009) .....Chemistry and Biochemistry  
B.S., California State University, Chico, 1993; M.S., University of California,  
Davis, 1997; Ph.D., 2006. Assistant Professor.
- PAN, JIANBIAO (2003) .....Industrial and Manufacturing Engineering  
B.E., Xidian University, Xian, China, 1990; M.S., Tsinghua University, Beijing,  
China, 1996; Ph.D., Lehigh University, 2000. Associate Professor.
- PANDE, ANURAG (2008) .....Civil and Environmental Engineering  
B.Tech., Indian Institute of Technology, Bombay, 2002; M.S., University of  
Central Florida, 2003; Ph.D., 2005. Assistant Professor.
- PANETTA, DANIEL L. (1986) .....Architecture  
B.S., California Polytechnic State University, San Luis Obispo, 1976; M. Arch.,  
University of California, Berkeley, 1986. Professor. Registered Landscape  
Architect, California. Registered Architect, California.
- PAPATHAKIS, PEGGY (2006) .....Food Science and Nutrition  
B.S., California Polytechnic State University, San Luis Obispo, 1977; M.S.,  
University of California, Davis, 2000; Ph.D., 2005. Assistant Professor. Registered  
Dietitian.
- PAQUIN, DANA (2008).....Mathematics  
B.S., Davidson College, 2002; Ph.D., Stanford University, 2007. Assistant  
Professor.
- PARKER-KENNEDY, CHRIS (1989) .....Disability Resource Center  
B.A., University of Kansas, Lawrence, 1975; M.Ed., California Polytechnic State  
University, San Luis Obispo, 1999. Access Specialist (Deaf/Hard of Hearing;  
Health and Mobility Impairments) .
- PARKS, DENNIS R. (2000) .....Cal Poly Continuing Education  
B.A., Baldwin-Wallace College, 1975; M.A., Kent State University, 1977; Ed.D.,  
University of Virginia, 1982. Dean.
- PARKS, ROSEANN N. (2001) .....University Library  
B.M.E., Baldwin-Wallace College, 1977; M.Ed., University of Virginia, 1981;  
Ed.S., 1982. Director of Library Advancement.
- PASCUAL, CHRISTOPHER C. (2000) .....Mechanical Engineering  
B.S., Cornell University, 1985; M.S., Georgia Institute of Technology, 1996;  
Ph.D., 1999. Professor. Registered Professional Engineer, California.
- PATTERSON, W. KEITH (1998).....Horticulture and Crop Science  
B.S., B.A., University of Arkansas, 1969; M.S., 1978; Ph.D., University of  
Missouri, 1985. Associate Professor.
- PATTON, LINDA J. (1991).....Mathematics  
B.A., University of California, San Diego, 1985; M.A., 1987; Ph.D., 1991.  
Professor.
- PECK, ROXY L. (1979).....College of Science and Mathematics, Statistics  
B.A., University of California, Riverside, 1972; Ph.D., 1979. Associate Dean and  
Professor.
- PEDERSEN, MARY E. (1981).....College of Agriculture, Food and  
Environmental Sciences  
B.A., University of California, Santa Barbara, 1973; M.S., University of  
California, Los Angeles, 1976; Ph.D., 1980. Associate Dean.
- PEDROTTI, JENNIFER TERAMOTO (2003) ...Psychology and Child Development  
B.A., University of California, Davis, 1996; M.S., University of Kansas, 2000;  
Ph.D., 2003. Associate Professor.
- PENDERGAST, CAROL (2001) .....University Advancement  
B.A., Dickinson College, 1966; MPhil, Yale University, 1968; Ph.D., 1974.  
Director, University Partnerships.
- PENDERGAST, WILLIAM R. (2000) .....Management  
B.A., University of Notre Dame, 1966; M.A., Columbia University, 1968; Ph.D.,  
1971. Professor.
- PERACCA, MARY L. (2001).....Health and Counseling Services  
M.A., Antioch University, 1991; MFT, 1997. Counselor/Drug and Alcohol  
Specialist.
- PERRINE, JOHN D. (2008).....Biological Sciences  
B.S., Vanderbilt University, 1991; M.S., Miami University, Ohio, 1995; Ph.D.,  
University of California, Berkeley, 2005. Assistant Professor.
- PESACRETA, SANDRA J. (2001).....Health and Counseling Services  
B.S., California State University, Dominguez Hills, 1993; Masters in Nursing and  
Family Nurse Practitioner, University of California, Los Angeles, 1995. Nurse  
Practitioner. ANCC Board Certified, 1996.
- PETERS, TROY (2007) .....Architecture  
B.A., University of Illinois, 1989; M.Arch., University of Oregon, 2003. Assistant  
Professor. AIA, Registered Architect, Illinois and Wisconsin.
- PETERSEN, GEORGE J. (2004) .....School of Education  
B.A., Pontificia Studiorum Universitas A.S. Thoma AQ. In Urbe, Rome, Italy,  
1981; B.A., University of California, Santa Barbara, 1986; M.A., 1991; Ph.D.,  
1993. Professor.
- PETERSON, DANIEL G. (2003) .....Animal Science  
B.S., University of California, Davis, 1999; Ph.D., Cornell University, 2003.  
Associate Professor.
- PETERSON, JOHN C. (2007) .....Horticulture and Crop Science  
B.S., University of Rhode Island, 1974; Ph.D., Rutgers University, 1978. Professor  
and Department Head.
- PETRAY, MARNIE JO (2006).....English  
B.A., Arkansas Tech University, 1988; M.A., Purdue University, 1991; Ph.D.,  
2004. Assistant Professor.
- PETTEY, L. ALLEN (2004) .....Animal Science  
B.S., California Polytechnic State University, San Luis Obispo, 1998; M.S.,  
Oklahoma State University, 2000; Ph.D., University of Kentucky, 2004. Assistant  
Professor.
- PHELAN, SUZANNE (2008) .....Kinesiology  
B.A./B.S., University of Colorado at Boulder, 1989; M.A., MCP Hahnemann  
University, 1999; Ph.D., 2001. Assistant Professor.
- PHILLIPS, JOHN C. (1974) .....Horticulture and Crop Science  
B.S., Washington State University, 1967; M.S., Colorado State University, 1969;  
Ph.D., Oregon State University, 1974. Professor and Interim Department Head.  
Pest Control Advisor, California.

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B.A.Arch., Yale, 1991; M.Arch., University of Pennsylvania Graduate School of Architecture, 1994; M.A., Princeton, 2003; Ph.D., 2008. Assistant Professor. Registered Architect., California.
- PIERCE, MELISSA (2001) ..... Admissions, Recruitment and Financial Aid  
B.S., California Polytechnic State University, San Luis Obispo, 1998; M.A., 2000. Admissions Officer.
- PIERCE, TODD J. (2005) ..... English  
B.A., Southern California College, 1988; M.A., Oregon State University, 1992; M.F.A., University of California, Irvine, 1995; Ph.D., Florida State University, 2003. Associate Professor.
- PIIRTO, DOUGLAS D. (1985) ..... Natural Resources Management  
B.S., University of Nevada, Reno, 1970; M.S., Colorado State University, 1971; Ph.D., University of California, Berkeley, 1977. Professor and Department Head. Registered Professional Forester, California.
- PILKINGTON, WAYNE (2005) ..... Electrical Engineering  
B.S., Lafayette College, 1981; M.S., Rochester Institute of Technology, 1989; M.S., University of Rochester, 1999; Ph.D., 2005. Assistant Professor.
- PILLSBURY, NORMAN H. (1974) ..... Natural Resources Management  
B.S., Humboldt State College, 1968; M.S., Humboldt State University, 1972; Ph.D., Colorado State University, 1976. Professor. Registered Professional Forester, California.
- PINARD, LEO W., II (1970) ..... Social Sciences  
B.A., University of Santa Clara, 1962; M.A., University of Notre Dame, 1963; Ph.D., 1971. Professor.
- PLUMMER, WILLIAM E. (1979) ..... Animal Science  
B.S., North Carolina State University, 1970; M.S., 1976; Ph.D., Utah State University, 1979. Professor.
- POHL, JENS G. (1973) ..... Architecture  
B.Arch., University of Melbourne, Australia, 1964; M.Bldg.Sci., University of Sydney, 1967; Ph.D., 1970. Professor, Graduate Coordinator. Registered Architect, Australia.
- POKORNY, CORNEL K. E. (1983) ..... Computer Science  
M.S., Technical University Vienna, Austria, 1973; Ph.D., 1977. Professor.
- POLING, JOHN E. (1976) ..... Physics  
B.A., University of Chicago, 1965; M.S., University of Iowa, 1969; Ph.D., 1975. Professor.
- PONCE, PATRICIA (1988-1993) (1998) ..... Academic Programs  
B.A., San Diego State University, 1985; M.S., University of Rhode Island, 1987; M.A., University of California, Los Angeles, 1995; Ph.D., 2002. Special Assistant to the Vice Provost, Academic Programs and Undergraduate Education.
- PORUMAMILA, HEMANTH (2008) ..... Mechanical Engineering  
B.E., BMS College of Engineering, Bangalore, India, 2000; M.S., Iowa State University, 2003; Ph.D., 2007. Assistant Professor.
- POURAGHABAGHER, A. REZA (1979) ..... Industrial and Manufacturing Engineering  
B.S., University of Colorado, 1972; M.S., University of California, 1973; Ph.D. University of Iowa, 1977. Professor. Certified in Production and Inventory Management (CPIM).
- PRANATA, HERLINA (2008) ..... Health and Counseling Services  
B.S., University of Utah, 1997; Ph.D., 2002. Counselor.
- PRESTON, WILLIAM L. (1980) ..... Social Sciences  
B.A., Fresno State College, 1971; M.A., California State University, Fresno, 1973; Ph.D., University of Oregon, 1979. Professor.
- PROCTOR, ANDREW J. (1973) ..... Kinesiology  
B.S., California State Polytechnic College, 1970; M.S., 1971; Ph.D., University of Utah, 1978. Professor Emeritus.
- PRODANOV, VLADIMIR (2009) ..... Electrical Engineering  
M.S., State University of New York, Stony Brook, 1995; Ph.D., 1997. Assistant Professor.
- PUIG-SUARI, JORDI (1998) ..... Aerospace Engineering  
B.S., Purdue University, 1988; M.S., 1990; Ph.D., 1993. Professor and Department Chair.
- PULITANO, ELVIRA (2006) ..... Ethnic Studies  
Laurea (B.A.), Università di Messina, Italy, 1993; University of New Mexico, 1997; Ph.D., 2002. Assistant Professor.
- QENANI-PETRELA, EIVIS (2002) ..... Agribusiness  
B.S., University of Tirana, Albania, 1987; M.A., Washington State University, 1998; Ph.D., 2002. Associate Professor.
- QU, BING (2008) ..... Civil and Environmental Engineering  
B.S., Tongji University (China), 2001; M.S., 2004; Ph.D., State University of New York at Buffalo, 2008. Assistant Professor.
- QUARLES, MARKEL (1999) ..... Career Services  
B.S., California Polytechnic State University, San Luis Obispo, 1998; M.S., 2003. Career Counselor.
- QUIJANO, EDDY (2004) ..... Orfalea College of Business  
B.A., University of New Orleans, 1970; J.D., Loyola University School of Law, 1971. Director, Graduate Programs in Accounting.
- RAGSDALE, DAVID O. (1991) ..... Administration and Finance  
B.S., California Polytechnic State University, San Luis Obispo, 1984. Registered Environmental Health Specialist. Environmental Health and Safety Manager, Risk Management.
- RAGSDALE, JOSEPH J. (2002) ..... Landscape Architecture  
B.A., University of California, Berkeley, 1991; M.L.A., University of Virginia, 2000. Assistant Professor.
- RAHIM, ASHRAF (2003) ..... Civil and Environmental Engineering  
B.S., University of Mansoura, Egypt, 1986; M.S., 1991; Ph.D., University of Mississippi, Oxford, 2001. Associate Professor.
- RAINEY, PAUL E. (1987) ..... Industrial and Manufacturing Engineering,  
Materials Engineering  
B.S.M.E., B.S.Met.E., Purdue University, 1967; M.S., Massachusetts Institute of Technology, 1968; Ph.D., Texas A & M University, 1981. Professor, and Department Chair, Industrial and Manufacturing Engineering. Registered Professional Engineer, Texas.
- RAMEZANI, CYRUS A. (1999) ..... Finance  
B.A., University of California, Santa Cruz, 1984; M.S., 1988; M.S., University of California, Berkeley, 1991; Ph.D., 1992. Professor and Area Chair.
- RAMIREZ, MARISA (2007) ..... University Library  
B.S., The University of Texas at Austin, 1999; M.L.S., The University of North Carolina-Chapel Hill, 2005. Senior Assistant Librarian.
- RAMIREZ, RICHARD M. (1975) ..... Administration and Finance  
B.B.A., New Mexico State University, 1971; M.B.A., California Polytechnic State University, San Luis Obispo, 1998. Associate Vice President for Finance.
- RAMOS, GEORGE (2003) ..... Journalism  
B.S., California Polytechnic State University, San Luis Obispo, 1969. Professor.
- RAMOS DOYLE, ELAINE M. (1972, 1976) ..... Research and Graduate Programs  
B.S., California Polytechnic State University, San Luis Obispo, 1981; M.S., 1994. Senior Grants Analyst.
- RAWLINGS, DON P. (1979) ..... Mathematics  
B.S., Arizona State University, 1974; M.A., University of California, San Diego, 1976; Ph.D., 1978. Professor and Department Chair.
- REAVES, SCOTT (2003) ..... Food Science and Nutrition  
B.S., California Polytechnic State University, San Luis Obispo, 1991; Ph.D., University of Arizona, 1995. Associate Professor.
- REGIER, RONALD (1987) ..... College of Liberal Arts  
B.A., University of Puget Sound, 1973; M.F.A., Michigan State University, 1977; M.A., University of Wisconsin, 1987. Managing Director, Performing Arts Center.
- REICH, JONATHAN (2001) ..... Architecture  
B.A., University of Washington, Seattle, 1979; B.A.E.D., 1979; M.Arch., University of California, Berkeley, 1983. Professor. AIA, Registered Architect, California and Washington.
- REIN, STEVEN (1998) ..... Statistics  
B.A., University of California, Los Angeles, 1987; M.A., University of California, Berkeley, 1989; Ph.D., 1993. Associate Professor.
- REINHART, JAMES (2002) ..... Cal Poly Corporation  
B.S.B.A., Bryant College, 1978; M.B.A., National University, 1982. Associate Executive Director. Certified Public Accountant, California.
- RETSEK, DYLAN Q. (2003) ..... Mathematics  
B.S., California Polytechnic State University, San Luis Obispo, 1996; M.A., Washington University, 1997; Ph.D., 2001. Assistant Professor.

- REYNOLDS, NANCY J. (1986) ..... Administration and Finance  
B.S., California Polytechnic State University, San Luis Obispo, 1977. Assistant Director, Fiscal Services.
- RICE, MARGARET (PEGGY) S. (1996).....Chemistry and Biochemistry  
B.S., University of California, Los Angeles, 1979; Ph.D., University of Oregon, 1990. Professor.
- RICE, ROBERT P., JR. (1995) ..... Horticulture and Crop Science  
B.S., University of Georgia, 1973; M.S., Michigan State University, 1974; Ph.D., 1977. Professor.
- RICE, THOMAS J., JR. (1981).....Earth and Soil Sciences  
B.S., University of Wisconsin, Madison, 1974; M.S., Montana State University, 1976; Ph.D., North Carolina State University, 1981. Professor. Certified Professional Soil Scientist.
- RICHERT, BENJAMIN P. (2003) ..... Mathematics  
B.S., Wheaton College, 1995; Ph.D., University of Illinois, Urbana-Champaign, 2000. Associate Professor.
- RICKARD, BRADLEY J. (2003) ..... Agribusiness  
B.C., University of Guelph, 1996; M.S., 1998; Ph.D., University of California, Davis, 2002. Assistant Professor.
- RICHISON, JEANNINE (2000) ..... English, School of Education  
B.A., Point Loma College, 1974; M.A., California State University, San Bernardino, 1979; Ph.D., New York University, 1995. Associate Professor.
- RIDGELY, JOHN R. (2001) .....Mechanical Engineering  
B.S., University of California, Berkeley, 1986; M.S., 1988; Ph.D., 2001. Associate Professor.
- RIENER, KENNETH (1983) .....Finance  
B.S., University of Idaho, 1968; M.S., Purdue University, 1969; Ph.D., 1976. Professor Emeritus.
- RIHAL, SATWANT S. (1969)..... Architectural Engineering  
B.S., University of Delhi, India, 1961; M.S., University of Minnesota, 1964; Ph.D., University of New Mexico, 1969. Professor Emeritus. Registered Civil Engineer, California.
- RILEY, KATE J. (2003)..... Mathematics  
B.S., South Dakota State University, 1980; M.S., Montana State University, 1992; Ph.D., 2003. Assistant Professor.
- RINALDA, CHARLOTTE (1999).....Career Services  
B.A., Southern Connecticut State University, New Haven, 1990; M.A., California Polytechnic State University, San Luis Obispo, 1994. Career Counselor.
- RINZLER, PAUL (1997) ..... Music  
B.A., University of California at Santa Barbara, 1977; M.A., 1980; D.A., University of Northern Colorado, 1988. Professor.
- RITCHIE, GERRY (2008).....Food Science and Nutrition  
B.S., University of Reading, UK, 1974; Ph.D., University of Western Australia, 1981; B.S., University of Adelaide, Australia, 1995. Professor.
- RITTER, MATTHEW K. (2003) ..... Biological Sciences  
B.S., University of California, Santa Barbara, 1996; Ph.D., University of California, San Diego, 2002. Associate Professor.
- ROBBINS, MARIAN E. (2004) ..... Mathematics  
B.A., Agnes Scott College, 1986; M.S., University of Virginia, 1989; Ph.D., 1992. Associate Professor.
- ROBERTS, MATTHEW J.(1997) ..... Administration and Finance  
B.S., California Polytechnic State University, San Luis Obispo, 1981; M.B.A., Golden Gate University, 1986. Director, Contracts, Procurement and Risk Management Services.
- ROBILLARD, JUSTIN (2008) ..... Testing Services  
B.A., University of California, Los Angeles, 2001. Testing Coordinator. Certified Test Center Administrator.
- ROBINS, LORI (2008).....Chemistry and Biochemistry  
B.S., Brandeis University, 2002; Ph.D., University of California, Davis, 2007. Assistant Professor.
- ROBINSON, PATRICIA (2008)..... Health and Counseling Services  
B.S., California State University, Los Angeles, 1993; M.D., University of California, Davis, 1999. Physician.
- ROCHE, HERVÉ (2007).....Finance  
B.S., University Pierre and Marie Curie, France, 1989; M.S., Ecole Nationale des Ponts et Chaussées, France, 1990; M.A., Institute d'Etudes Politiques de Paris, France, 1991; M.A., University of Paris Dauphine, France, 1994; Ph.D., University of Pennsylvania, 2000. Associate Professor.
- ROLDAN, GREG M. (2006) .....College of Engineering  
B.A., California Polytechnic State University, San Luis Obispo, 2001. Academic Advisor.
- ROLLINS, BARBARA A. (2004) ..... Financial Aid  
B.A., California State University, San Marcos, 1993; M.A., California Polytechnic State University, San Luis Obispo, 1996. Financial Aid Counselor.
- RONG, XIAOYING (2005) ..... Graphic Communication  
B.E., Beijing Institute of Printing, 1992; MBA, Beijing Institute of Technology, 1999; M.S., Western Michigan University, 2003; Ph.D., Western Michigan University, 2007. Assistant Professor.
- ROSENBERG, LOUIS B. (2005) .....Mechanical Engineering, School of Education  
B.S., Stanford University, 1991; M.S., 1993; Ph.D., 1994. Associate Professor.
- ROSS, DAVID D. (1999).....Information Technology Services  
B.S., Pepperdine University, 1990; M.S., California State University, Sacramento, 1998. Manager, Service Desk.
- ROSS, GREGORY B. (2004) ..... Health and Counseling Services  
B.S., California State University, Long Beach, 1978. Laboratory Scientist.
- ROSSMAN, ALLAN J. (2001) .....Statistics  
B.A., Geneva College, 1984; M.S., Carnegie Mellon University, 1986; Ph.D., 1989. Professor.
- ROY, SOMA (2008).....Statistics  
B.Sc., Delhi University, 2000; M.Sc., 2002; M.S., The Ohio State University, 2005; Ph.D., 2008. Assistant Professor.
- RUBBA, JOHANNA E. (1995) .....English  
B.A., Rutgers University, 1975; M.A., Southern Illinois University, 1986; Ph.D., University of California, San Diego, 1993. Associate Professor.
- RUCAS, STACEY L. (2005) .....Social Sciences  
B.A., University of Texas, Arlington, 1998; M.A., 2000; Ph.D., University of New Mexico, 2004. Assistant Professor.
- RUEF, MICHAEL (1999) ..... School of Education  
B.A., University of San Francisco, 1966; M.A., San Diego State University, 1992; Ph.D., University of Kansas, 1997. Associate Professor.
- RUMMELL, KATHRYN (1997).....English  
B.A., Centre College, 1990; M.A., University of North Carolina at Chapel Hill, 1992; Ph.D., 1997. Professor and Department Chair.
- RUSSELL, CRAIG H. (1982)..... Music  
B.M., University of New Mexico, 1973; M.M., 1976; Ph.D., University of North Carolina, 1981. Professor.
- RUTHERFORD, ROBERT T. (1974).....Animal Science  
B.S., University of California, Davis, 1970; M.S., California Polytechnic State University, San Luis Obispo, 1976. Professor.
- RYAN, KATHLEEN A. (1981).....Psychology and Child Development  
B.A., San Diego State University, 1975; M.A., Bowling Green State University, 1978; Ph.D., 1980. Professor.
- RYUJIN, DONALD H. (1989) .. Ethnic Studies, Psychology and Child Development  
B.A., Stanford University, 1968; M.A., University of Michigan, 1972; Ph.D., 1983. Professor.
- SAENZ, RICHARD A. (1980).....Physics  
A.B., University of California, Berkeley, 1972; M.S., Cornell University, 1975; Ph.D., 1977. Professor.
- SAGHRI, JOHN A. (2000) .....Electrical Engineering, Computer Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1973; M.S., Oregon State University, 1975; Ph.D., Rensselaer Polytechnic Institute, 1979. Associate Professor.
- SALAS, NATALIE K. (2006)..... Financial Aid  
B.A., Fresno Pacific University, 2003. Financial Aid Counselor.
- SALIKLIS EDMOND P. (2005) ..... Architectural Engineering  
B.S., University of Illinois, Chicago, 1984; M.S., Syracuse University, 1988; Ph.D., University of Wisconsin, Madison, 1992. Assistant Professor. Registered Civil Engineer, California.
- SANDIGE, RICHARD S. (1998).....Electrical Engineering, Computer Engineering  
B.S., West Virginia University, 1963; M.S., 1969; Ph.D., Texas A & M University, 1978. Professor. Registered Professional Engineer, West Virginia.

- SANDOVAL, EMILY (2008) ..... University Housing  
B.A., University of California, Riverside, 2002; M.Ed., University of Southern California, 2004. Learning Community Coordinator.
- SARGENT, GARY F., LTC (2006) ..... Military Science  
B.A., University of Massachusetts, Amherst, 1988; M.A., Boston University, 1999.
- SAUNDERS, KARL F. (2006) ..... Physics  
B.S., Dublin City University, 1996; Ph.D., University of Oregon, 2001. Assistant Professor.
- SAVAGE, ARLINE (2004) ..... Accounting  
B.Com., University of Port Elizabeth, South Africa, 1977; B.Com. Honours, 1986; M.Com., 1993; D.Commerce, 1999. Professor.
- SAVAGE, RICHARD (2002) ..... Materials Engineering  
B.S., Juniata College, 1975; Ph.D., Indiana University, 1979. Associate Professor.
- SCARAMOZZINO, JEANINE (2008) ..... University Library  
B.A., University of California, Santa Cruz, 1995; M.A., 2000; M.L.I.S., San Jose State University, 2005. Senior Assistant Librarian.
- SCHAFER, CAROLE L. (1987) ..... University Housing  
B.A., Alfred University, 1985; M.S., 1987. Associate Director of Housing/Director of Residential Life and Education.
- SCHAFFNER, ANDREW (1997) ..... Statistics  
B.S., California Polytechnic State University, San Luis Obispo, 1992; M.S., University of Washington, 1994; Ph.D., 1997. Professor.
- SCHECHTER, MONICA (2000) ..... International Education and Programs  
B.A., University of Minnesota, 1984; M.P.A., University of Colorado, Denver, 1993. Associate Director, Study Abroad and CSU International Programs.
- SCHLEMER, LIZABETH T. (1993) ..... Industrial and Manufacturing Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1981; M.S., University of Southern California, 1986; M.B.A., 1986; Ph.D., University of California, Santa Barbara, 2007. Associate Professor.
- SCHNUPP, ALVIN J. (1988) ..... Theatre and Dance  
B.S., Millersville State College, 1974; M.A., Bowling Green State University, 1979; Ph.D. University of California, Los Angeles, 1985. Professor.
- SCHOONOVER, ROD W. (1994) ..... Chemistry and Biochemistry  
B.S., University of Kansas, Lawrence, 1986; M.S., University of Michigan, Ann Arbor, 1989; Ph.D., 1993. Professor.
- SCHROETER, CHRISTIANE (2007) ..... Agribusiness  
B.S., Justus-Liebig University, 1997; M.S., 2001; M.S., Kansas State University, 2000; Ph.D., Purdue University, 2005. Assistant Professor.
- SCHULTZ, CRAIG J. (1989) ..... Information Technology Services  
B.S., California Polytechnic State University, Pomona, 1982; B.S., San Jose State University, 1989; M.B.A., California Polytechnic State University, San Luis Obispo, 1992. Director, User Support Services.
- SCHULTZ, NED W. (1976) ..... Psychology and Child Development  
B.S., Pennsylvania State University, 1973; M.A., 1975; Ph.D., Ohio State University, 1976. Professor.
- SCHUSTER, PETER J. (2003) ..... Mechanical Engineering  
B.A., Cornell University, 1991; M.S., Stanford University, 1992; Ph.D., Michigan Technology University, 2000. Associate Professor.
- SCHWARTZ, DEBORA (1996) ..... English  
A.B., Bryn Mawr College, 1982; M.A., Princeton University, 1986; Ph.D., 1994. Associate Professor.
- SCHWARTZ, PETER V. (2005) ..... Physics  
B.S., Massachusetts Institute of Technology, 1986; M.S., Princeton University, 1993; Ph.D., 1998. Associate Professor.
- SCOTT, KENNETH C. (1975) ..... Agribusiness  
B.S., Brigham Young University, 1970; Ph.D., Washington State University, 1975. Professor.
- SCRIVEN, TAL (1980) ..... Philosophy  
B.A., University of South Florida, 1976; M.A., 1977; Ph.D., University of Southern California, 1980. Professor and Department Chair.
- SEIFODDINI, AHMAD K. (1984) ..... Industrial and Manufacturing Engineering  
B.S., Abadan Institute of Technology, 1965; M.S., Oklahoma State University, 1973; Ph.D., 1976. Professor Emeritus.
- SELBY, MICHAEL J. (1991) ..... Psychology and Child Development  
B.S., University of California, Santa Barbara, 1971; M.S., California Polytechnic State University, San Luis Obispo, 1981; Ph.D., Memphis State University, 1988. Professor. Licensed Psychologist, California.
- SELF, BRIAN (2006) ..... Mechanical Engineering  
B.S., Virginia Polytechnic Institute and State University, 1988; M.S., 1991; Ph.D., University of Utah, 1996. Associate Professor.
- SENA, JAMES (1987) ..... Management  
B.S., Xavier University of Ohio, 1961; M.B.A., 1964; M.S., University of Dayton, 1968; D.B.A., University of Kentucky, 1972. Professor.
- SENG, JOHN S. (2003) ..... Computer Science, Computer Engineering  
B.S., Northwestern University, 1997; M.S., University of California, San Diego, 1999; Ph.D., 2003. Assistant Professor.
- SETTLE, ALLEN K. (1970) ..... Political Science  
B.A., University of California, Santa Barbara, 1966; M.A., 1967; Ph.D., 1970. Professor.
- SHABAN, ALI O. (1984) ..... Electrical Engineering  
B.S., University of Tripoli, 1974; M.S., University of Southern California, 1978; Ph.D., Oregon State University, 1985. Professor.
- SHAFFER, MARY K. (1980) ..... Information Technology Services  
B.A., Sonoma State University, 1974. Policy and Program Assurance Specialist, E&IT Campus Compliance Officer, Office of the CIO.
- SHAFRAN, ARIC (2007) ..... Economics  
B.S., Cornell University, 1999; M.A., University of Colorado, 2003; Ph.D., 2007. Assistant Professor.
- SHANI, ABRAHAM B. (Rami) (1983) ..... Management  
B.A., University of Tel Aviv, 1972; M.A., 1978; Ph.D., Case Western Reserve University, 1981. Professor.
- SHAPIRO, JONATHAN (1998) ..... Mathematics  
B.A., University of California, Berkeley, 1988; Ph.D., 1995. Professor.
- SHARPE, JOHN P. (1995) ..... Physics  
B.Sc., Edinburgh University, 1985; Ph.D., 1989. Professor.
- SHEIKH, ZAHED (2006) ..... College of Engineering  
B.S., AryaMeh University of Technology, Iran, 1978; M.S., University of Iowa, 1981; Ph.D., 1985. Director, Project Based Learning Institute.
- SHELTON, MARK D. (1982) ..... College of Agriculture, Food and Environmental Sciences  
B.S., University of Idaho, 1977; M.S., Purdue University, 1980; Ph.D., Utah State University, 1989. Associate Dean. Registered Professional Entomologist.
- SHEPHERD, LINDA (2002) ..... Political Science  
B.A., University of California, Los Angeles; M.S., California State University, Sacramento, 1990; M.A., University of California, Davis, 1994; Ph.D., 1998. Associate Professor and Department Chair.
- SHERMAN, MORGAN P. (2008) ..... Mathematics  
B.S., Knox College, 1999; M.A., Columbia University, 2000; M.Phil., 2004; Ph.D., 2005. Assistant Professor.
- SHIBATA, MARTIN (1990) ..... Career Services  
B.A., University of California, Los Angeles, 1975; M.P.A., California State University, Los Angeles, 1983; additional graduate work, University of Southern California, 1985. Director.
- SHOLLENBERGER, KIM A. (2002) ..... Mechanical Engineering  
B.S., Cornell University, 1989; M.S., University of California, Berkeley, 1991; Ph.D., 1994. Professor.
- SIEMBIEDA, WILLIAM J. (1997) ..... City and Regional Planning  
B.A., University of California, Berkeley, 1965; MCRP, University of California, Berkeley, 1967; MPA, California State University, San Diego, 1970; Ph.D., University of California, Los Angeles, 1990. Professor and Department Head. American Institute of Certified Planners.
- SILVESTRI, MICHAEL G. (1978) ..... Chemistry and Biochemistry  
B.S., University of California, Santa Barbara, 1973; Ph.D., University of California, Santa Cruz, 1977. Professor.
- SIMEK, JAN W. (1977) ..... Chemistry and Biochemistry  
B.A., Kalamazoo College, 1970; M.S., Stanford University, 1971; Ph.D., 1975. Professor.

- SIMON, ANDREAS (2008)..... Accounting  
M.A., University of Applied Sciences, Germany, 2003; Ph.D., University of Queensland, Australia, 2008. Assistant Professor.
- SIMONIAN, LONNY G. (2003)..... Construction Management  
B.S., California Polytechnic State University, San Luis Obispo, 1978; M.S., University of California, Berkeley, 1992. Assistant Professor. Registered Professional Engineer, Certified Project Management Professional.
- SINGH, JAGJIT (Jay) (2003)..... Industrial Technology  
B.S., Poona University, Pune, India, 1992; M.S., Michigan State University, 1998; Ph.D., 2002. Associate Professor.
- SIROIS, DAWN M. (1995)..... College of Engineering  
B.A., University of Rhode Island, 1995. Lead Academic Advisor.
- SKAMFER, RON (2003)..... Associated Students, Incorporated  
B.S., California Polytechnic State University, San Luis Obispo, 1997; M.S., San Jose State University, 2001. Associate Director.
- SKLAR, JEFF C. (2005)..... Statistics  
B.A.S., University of California, Davis, 1995; M.A., University of California, Santa Barbara, 1998; Ph.D., 2003. Assistant Professor.
- SKLAR, MARIA D. (2006)..... College of Engineering  
B.A., University of California, Los Angeles, 2005. Academic Advisor.
- SLEM, CHARLES M. (1975)..... Psychology and Child Development  
B.A., University of California, Los Angeles, 1968; M.A., 1972; Ph.D., Wayne State University, 1975. Professor Emeritus.
- SLIVOVSKY, LYNNE A. (2003)..... Electrical Engineering, Computer Engineering  
B.S., Purdue University, 1992; M.S., 1993; Ph.D., 2001. Associate Professor.
- SMIDT, ROBERT K. (1978)..... Statistics  
B.S., Manhattan College, 1971; M.S., Rutgers University, 1973; Ph.D., University of Wyoming, 1976. Professor and Department Chair.
- SMILKSTEIN, TINA (2009)..... Computer Engineering, Electrical Engineering  
B.S., Nanzan University, 1989; M.S., University of California, Berkeley, 2003; Ph.D., 2007. Assistant Professor.
- SMITH, DALE A. (1973)..... Animal Science  
B.S., University of California, Davis, 1971; D.V.M., 1973. Professor.
- SMITH, ERLING (2008)..... Academic Programs, Institutional Planning and Analysis  
B.S., University of Leeds, 1969; Ph.D., University of Durham, 1975. Vice Provost for Programs and Planning.
- SMITH, HUGH M. (2000)..... Computer Science, Computer Engineering  
B.S., Xavier University, 1985; M.S., Michigan State University, 1994; Ph.D., 1999. Associate Professor.
- SMITH, KENT D. (1981)..... Statistics  
B.A., University of Utah, 1967; M.S., Air Force Institute of Technology, 1969; M.S., University of California, Riverside, 1979; Ph.D., 1981. Professor.
- SMITH, TERRY L. (1980)..... Earth and Soil Sciences  
B.S., University of Nebraska, Lincoln, 1972; M.S., 1975; Ph.D., Iowa State University, 1980. Professor.
- SOARES, JOHN (2003)..... Journalism  
B.A., Providence College, 1982; J.D., Syracuse University College of Law, 1997; M.A., Emerson College, 1998. Professor.
- SPARLING SUSAN (1978)..... Student Academic Services  
B.S., University of Texas, 1970; M.A., California Polytechnic State University, San Luis Obispo, 1978. Academic Advisor/Instructor. Director.
- SPILLER, ROBERT (1989)..... Animal Science  
B.S., California State Polytechnic College, 1969; M.S., 1971; Ph.D., Oregon State University, 1974. Professor.
- SPILLER, WILLIAM T. (1991)..... Music  
B.M., University of Washington, 1981; M.M., Indiana University, 1983; D.M.A., University of Southern California, 1991. Professor and Department Chair.
- SPRADLIN, WENDY (1978)..... College of Liberal Arts  
B.A., California Polytechnic State University, San Luis Obispo, 1978; M.A., 1984. Coordinator, Advising Center.
- SPRAGUE, EUMI (1991)..... Cal Poly Corporation  
B.S., California Polytechnic State University, San Luis Obispo, 1991. IT Manager.
- STALEY, CLINTON A. (1988)..... Computer Science  
B.A., Principia College, 1980; M.S., University of California, Santa Barbara, 1982; Ph.D., 1987. Professor.
- STANKUS, MARK (1998)..... Mathematics  
B.S., Rensselaer Polytechnic Institute, 1987; Ph.D., University of California, San Diego, 1993. Associate Professor.
- STANLEY, L. JUNE (2002)..... Health and Counseling Services  
B.S., Ohio State University, Columbus, 1975; M.S. and Family Nurse Practitioner Certification, California State University, Fresno, 1993. Nurse Practitioner. ANCC Board Certified, 1998.
- STANNARD, SANDRA (2001)..... Architecture  
B.A., University of California, Berkeley, 1987; M.Arch., University of Washington, 1992. Associate Professor. AIA, Registered Architect, California and Idaho.
- STANTON, DIANA L. (2000)..... Theatre and Dance  
B.A., University of California, Irvine, 1994; M.F.A., University of Colorado, Boulder, 1997. Assistant Professor.
- STEBBINS, MICHAEL W. (1982)..... Management  
B.S., University of California, Berkeley, 1967; M.B.A., 1968; Ph.D., 1973. Professor Emeritus.
- STEERS, DENNIS (2003)..... College of Engineering  
B.A., California Polytechnic State University, San Luis Obispo, 1981. Communications Specialist.
- STEGNER, PAUL DUSTIN (2007)..... English  
B.A., University of San Francisco, 2000; M.A., The Pennsylvania State University, 2002; Ph.D., 2007. Assistant Professor.
- STEINMAUS, SCOTT J. (1998)..... Biological Sciences  
B.S., University of California, Davis, 1984; Ph.D., 1996. Professor. Pest Control Advisor, California.
- STETS, ROBERT D. (2006)..... University Advancement  
B.A., Muhlenberg College, 1975; J.D., Duke University Law School, 1978; M.B.A., St. Josephs University, 2005. Associate Vice President for University Advancement, Operations and Finance.
- STEVENSON, JON (2005)..... Intercollegiate Athletics  
B.A., University of California, Santa Barbara, 1980. Head Coach, Volleyball.
- STEWART, PATRICIA A. (1971)..... Student Academic Services  
B.S., California State Polytechnic College, 1970; M.A., California Polytechnic State University, San Luis Obispo, 1972. Academic Advisor/Instructor; Coordinator, Academic Skills Center.
- STEWART, SUSAN (1983)..... Student Academic Services  
B.A., California Polytechnic State University, San Luis Obispo, 1983. Information Technology Consultant.
- STONE, MICHAEL A., MAJ (2008)..... Military Science  
B.S., United States Military Academy, 1999.
- STONEMAN, PATRICIA-ANN (1990)..... Cal Poly Continuing Education  
B.A., California State University at Northridge, 1974; M.A., 1978. Director, Academic Programs.
- STOWE, KEITH S. (1971)..... Physics  
B.S., Illinois Institute of Technology, 1965; M.S., University of California, San Diego, 1967; Ph.D., 1971. Professor Emeritus.
- STRAND, CHRISTY (2007)..... Biological Sciences  
B.A., Concordia University 1992; Ph.D., Arizona State University, 2007. Assistant Professor.
- STUBLER, CRAIG P. (1997)..... Earth and Soil Sciences  
B.S., California Polytechnic State University, San Luis Obispo, 1996. Technician.
- STYLES, STUART W. (1984)..... BioResource and Agricultural Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1984; M.B.A., 1988; D.Eng., University of California, Davis, 2001. Associate Professor. Registered Civil Engineer, California.
- SUESS, MICHAEL H. (1975)..... Academic Personnel  
B.S., California Polytechnic State College, San Luis Obispo, 1970; M.S., 1971; additional graduate study: Brigham Young University; D.P.A., University of La Verne, 1997. Associate Vice President for Academic Personnel.
- SUN, CHENG (1989)..... Electrical Engineering  
B.S., National Taiwan University, Taiwan, 1958; M.S., Cornell University, 1962; Ph.D., 1965. Professor.



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B.S., University of Nevada, Las Vegas, 1996; M.S.E., 2006. University Registrar.
- SUNGAR, NILGUN (1989).....Physics  
B.S., Middle East Technical University, Turkey, 1979; Ph.D., University of Missouri, 1985. Professor.
- SUTLIFF, MICHAEL A. (1997).....Kinesiology  
B.A., Biola University, 1986; M.S., National University, 1990; Dr. of Arts, Middle Tennessee State University, 1992. Associate Professor.
- SWANSON, DOUGLAS (2006).....Journalism  
B.A., Eastern New Mexico University, 1984; M.A., 1991; Ed.D., Oklahoma State University, 1999. Associate Professor.
- SWARTZ, TERESA A. (1991).....Marketing  
B.S., Clarion University of Pennsylvania, 1974; M.B.A., 1977; Ph.D., Ohio State University, 1981. Professor.
- SWEARINGEN, DON E. (1974).....Architecture  
B.Arch., Oklahoma State University, 1968; M.Arch., University of Illinois, 1972. Professor Emeritus. Registered Architect, Arizona.
- SWEATT, LISA I. (2000).....Psychology and Child Development  
B.S., University of California, Irvine, 1989; M.A., Ohio State University, 1992; Ph.D., Loyola University Chicago, 1999. Assistant Professor. Licensed Psychologist, California.
- SYDNOR, WILLIAM E. (1981).....Student Academic Services  
B.A., Whittier College, 1971; M.A., University of California, Riverside, 1974; M.A., California Polytechnic State University, San Luis Obispo, 1986. Coordinator, Study Sessions; Study Skills Advisor/Instructor, Academic Skills Center.
- SZE, LAWRENCE (1998).....Mathematics  
B.S., Louisiana State University, Baton Rouge, 1986; M.A., University of California, Los Angeles, 1989; Ph.D., Penn State University, 1998. Associate Professor.
- SZLAVIK, ROBERT (2006).....Biomedical and General Engineering  
B.Eng., McMaster University, 1991; M.Eng., 1994; Ph.D., 1999. Assistant Professor.
- TANDON, SHYAMA (1983).....Electrical Engineering  
B.S., Banaras University, India, 1965; M.S., University of Iowa, 1971; Ph.D., Texas A & M, 1976. Professor Emeritus.
- TAUFIK (1999).....Electrical Engineering  
B.S., Northern Arizona University, 1993; M.S. University of Illinois at Chicago, 1995; Dr.Eng., Cleveland State University, 1999. Associate Professor.
- TAYLOR, EMILY N. (2005).....Biological Sciences  
B.A., University of California, Berkeley, 1998; Ph.D., Arizona State University, 2005. Assistant Professor.
- TAYLOR, J. KEVIN (1999).....Kinesiology  
B.A., Newcastle and Sunderland Polytechnic, Newcastle, England, 1986; M.S., Central Washington University, 1990; Ph.D., University of South Carolina, 1994. Associate Professor.
- TERRY, RAYMOND D. (1974).....Mathematics  
B.S., State University of New York, 1966; M.S., Michigan State University, 1968; Ph.D., 1972. Professor Emeritus.
- TEUFEL, BRADY (2006).....Journalism  
B.A., University of California, Santa Cruz, 1997; M.A., University of Missouri, 2003. Assistant Professor.
- TEXTER, DALE (1991).....Cal Poly Corporation  
B.S., California State University, Northridge, 1976. Chief Financial Officer.
- THATCHER, TRACY (2005).....Civil and Environmental Engineering  
B.S., University of California, Davis, 1984; M.S., University of California, Berkeley, 1991; Ph.D., 1996. Assistant Professor. Registered Professional Engineer, California.
- THOMAS, GREGORY (2008).....Health and Counseling Services  
B.A., Hampshire College, 1976; M.P.H., University of California, Berkeley, 1980; M.D., University of California, San Francisco, 1980. Physician.
- THOMPSON, JOHN JAY (1998).....Modern Languages and Literatures  
B.A., University of California, Santa Barbara, 1986; M.A., Yale University, 1987; M.Phil., 1989; Ph.D., 1993. Professor.
- THOMPSON, RICHARD P. (1990).....Natural Resources Management  
B.S., Oklahoma State University, 1974; M.S., 1978; Ph.D., Texas A&M University, 1990. Professor. Registered Professional Forester, California and Oklahoma.
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BSE, University of Central Florida, 1988; MSME, 1991; Ph.D., University of Florida, 1997. Professor.
- THULIN, ANDREW J. (1998).....Animal Science  
B.S., California Polytechnic State University, San Luis Obispo, 1977; M.S., Kansas State University, Manhattan, 1979; Ph.D., 1985. Professor and Department Head.
- TIETJE, BRIAN C. (1999).....Orfalea College of Business, Marketing  
B.S.B.A., Bowling Green State University, 1988; M.B.A., University of Hawaii, 1994; Ph.D., University of Washington, 1999. Associate Dean and Professor.
- TILLEY, MARCIA L. (2006).....Agribusiness  
B.S., Iowa State University, 1970; M.A., University of Florida, 1976; J.D., 1979. Professor.
- TIMMS, BENJAMIN F. (2007).....Social Sciences  
B.A., University of New Mexico, 1997; M.A., Indiana University, 1999; Ph.D., 2007. Assistant Professor.
- TODOROV, TODOR D. (2003).....Mathematics  
B.S., University of Sofia, 1975; Ph.D., University of Sofia and Bulgarian Academy of Sciences, 1982. Assistant Professor.
- TOKER, UMUT (2005).....City and Regional Planning  
B.Arch., Middle East Technical University, Ankara, 1996; M.C.P., 1999; Ph.D., North Carolina State University, 2003. Assistant Professor.
- TOMANEK, LARS (2005).....Biological Sciences  
B.S., University of Konstanz, Germany, 1995; M.S., 1995; Ph.D., Oregon State University, 1999. Assistant Professor.
- TOMILSON, DOROTHY (1983).....Testing Services  
B.A., University of the State of New York Regents College, 1991. Test Program Coordinator. Certified Test Center Administrator.
- TONG, PHILLIP S. (1988).....Dairy Science  
B.S., University of California, Davis, 1977; M.S., Cornell University, 1982; Ph.D., 1986. Professor and Director of the Dairy Products Technology Center.
- TORNATZKY, LOU (2006).....Industrial Technology  
B.A., Ohio State University, 1964; Ph.D., Stanford University, 1969. Professor and Area Chair.
- TORRES, EVELYN M. (1989).....English  
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- TRICE, TOM R. (2002).....History  
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- TROXEL, PATRICIA (1990).....English  
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- TSO, JIN (1988).....Aerospace Engineering  
B.S., National Taiwan University, 1971; M.S., 1973; Ph.D., Johns Hopkins University, 1983. Professor.
- TURNER, CLARK S. (1999).....Computer Science  
B.S., Kings College, 1979; M.A., Pennsylvania State University, 1981; J.D., University of Maine, 1986; Ph.D., University of California, Irvine, 1999. Professor.
- UYTTEWAAL, JOHAN M. (2000).....Administration and Finance  
B.S., Lycée Louis Le Grand, Paris-France, 1977; M.S.C.E., School of Public Works, Paris-France, 1980; M.S.C.E., University of California, Berkeley, 1982; M.B.A., University of California, Los Angeles, 1989. Assistant Director, Building Design and Construction, Facilities Planning and Capital Projects. Registered Professional Engineer, California.
- UYTTEWAAL, KIMBERLY C. (1998).....Office of the President  
B.A., University of California, Berkeley, 1983; M.A., New York University, 1988. Executive Assistant.
- VAHEY, TERRY (1984).....Administration and Finance  
B.A., University of San Francisco, 1995. Director of Information Technology Services.

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B.S., University of Patras, Greece, 1982; M.S., Western Michigan University,  
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- VALENCIA-LAVER, DEBRA L. (1991) .... College of Liberal Arts, Psychology and  
Child Development  
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- VALLE, VICTOR (1992).....Ethnic Studies  
B.A., California State University, Long Beach, 1974; M.A., 1978; M.S.J.,  
Northwestern University, 1981. Professor and Department Chair.
- VANASUPA, LINDA S. (1991).....Materials Engineering  
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- VAN DRAANEN, NANINE A. (1996).....Chemistry and Biochemistry  
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- VASSEY, TERRY L. (2006).....Horticulture and Crop Science  
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- VAVRA, RANDY (2003).....Student Academic Services  
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Engineers.
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B.S., Michigan State University, 1965; M.S., University of Idaho, 1968; Ph.D.,  
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University of California, Berkeley, 1993. Associate Professor.
- VILLEGAS, DANIEL J. (1987).....Economics  
B.S., University of Southern California, Los Angeles, 1972; A.M., Stanford  
University, 1975; Ph.D., 1979. Associate Professor.
- VISCI, JOSEPH “CHIP” M. (2009).....University Advancement  
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- VIX, MARLIN DALE (1977).....Agribusiness  
B.S., San Jose State College, 1968; M.S., California Polytechnic State University,  
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- VORST, KEITH L. (2005).....Industrial Technology  
B.S., Purdue University, 1977; M.S., Michigan State University, 2002; Ph.D.,  
2005. Assistant Professor.
- VREDEVOE, LARISA K. (1999).....Biological Sciences  
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- VUOTTO, FRANK (2002).....University Library  
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- WACK, PAUL (1997).....City and Regional Planning  
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Northridge, 1974; MPA, University of Southern California, 1976. Professor.  
American Institute of Certified Planners.
- WAITINAS, CATHERINE (2006).....English  
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B.S., California State University, Fresno, 1982; N.P., 1986. Nurse Practitioner.
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B.S., University of Illinois at Urbana-Champaign, 1989; M.S., 1991; Ph.D., 1996.  
Associate Professor. Registered Professional Engineer, California.
- WALKER, JOHN L. (2001).....Statistics  
B.S., University of Chicago, 1988; M.S., Cornell University, 1993; Ph.D., 1995.  
Associate Professor.
- WALKER, KENDRICK W. (1973).....Philosophy  
B.A., University of Southern California, 1965; M.A., 1969; Ph.D., 1974.  
Professor.
- WALL, LEONARD W. (1969).....Physics  
B.S., Louisiana Tech University, 1963; Ph.D., Iowa State University, 1969.  
Professor Emeritus.
- WALLS, VICTORIA (2000).....Orfalea College of Business  
B.S., California Polytechnic State University, San Luis Obispo, 2000; M.B.A.,  
2004. Assistant Director of Graduate Programs.
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Engineering, and Materials Engineering  
B.S., Rensselaer Polytechnic Institute, 1973; M.S., 1976; Ph.D., 1985. Professor  
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- WALSH, TIM (2009).....Intercollegiate Athletics  
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- WALTER, VIRGINIA R. (1974).....Horticulture and Crop Science  
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- WARNER, WENDY J. (2006).....Agricultural Education and Communication  
B.S., The Ohio State University, 1998; Ph.D., University of Florida, 2006.  
Assistant Professor.
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B.S., California Polytechnic State University, San Luis Obispo, 2001. Assistant to  
the Director/Registrar.
- WATABE-BELZEL, MADOKA (1993).....Food Science and Nutrition  
B.S., Illinois State University, 1982; M.S., 1983; Ed.D., Pepperdine University,  
1991. Professor. Registered Dietitian.
- WATTON, WILLIAM E. (2002).....Administration and Finance  
B.A., University of Redlands, 1980. University Police Chief and Director,  
University Police.
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B.A., Louisiana State University, 1969; A.D., Northwestern State University,  
1977; M.B.A., University of Dallas, 1981; Ph.D., The University of Texas, Dallas,  
1985. Associate Professor.
- WEBB, KAREN (1995).....Administration and Finance  
B.A., University of California, Los Angeles, 1978. Assistant Vice President,  
Administration and Finance.
- WEBER, PAUL A. (1999).....Construction Management  
B.S., California Polytechnic State University, San Luis Obispo, 1981; B.Arch.,  
1983; M.B.A., 1992; Ph.D., Colorado State University, 2000. Associate Professor.  
Registered Architect, California. Licensed Building Contractor (B), California.
- WEDDIGE, KRISTI S. (2004).....College of Science and Mathematics  
B.S., University of Tennessee, Knoxville, 1994; M.A., California Polytechnic  
State University, San Luis Obispo, 2004. Director of Advising Center and  
Academic Advisor.
- WEHNER, DAVID J. (1994).....College of Agriculture, Food and  
Environmental Sciences  
B.S., University of Notre Dame, 1972; M.S., Pennsylvania State University, 1975;  
Ph.D., 1979. Dean.
- WEISENTHAL, HOWARD (1984).....Architecture  
B. Arch., University of Florida, 1972; M. Arch., 1974. Professor. Registered  
Architect, Florida.
- WENDT, DEAN E. (2002).....Biological Sciences  
B.S., California Polytechnic State University, San Luis Obispo, 1993; A.M., 1995;  
Ph.D., Harvard University, 1999. Associate Professor.
- WESTPHAL, RUSSELL (2008).....Mechanical Engineering  
B.S., Washington State University, 1978; M.S., Stanford University, 1979; Ph.D.,  
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- WETZEL, S. JEAN (1996).....Art and Design  
B.A., Rockford College, 1982; M.A., University of Kansas, 1985; M.Phil., 1986;  
Ph.D., 1991. Associate Professor.
- WHITE, DONALD E. (1987) .....Industrial and Manufacturing Engineering  
B.S., University of California, Berkeley, 1965; M.S., Stevens Institute of  
Technology, 1967; Ph.D., Case Western Reserve University, 1971; M.B.A.,  
Pepperdine University, 1980. Professor.
- WHITE, MATTHEW E. (2001) ..... Mathematics  
B.S., Cornell University, 1990; M.S., California Polytechnic State University, San  
Luis Obispo, 1994; Ph.D., University of California, Santa Barbara, 2000.  
Associate Professor.
- WHITEFORD, MARY A. (1982) .....Academic Programs  
B.S., New York University, 1978. Academic Programs Analyst.
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BSME, Michigan Technological University, 1987; MSME, Stanford University,  
1988; Ph.D., Stanford University, 1995. Associate Professor.
- WILD, ROSEMARY (1999) ..... Management  
B.A., University of Arizona, 1980; M.A., 1981; M.S., 1985; Ph.D., 1989.  
Professor and Area Chair.
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B.A., University of California, Riverside, 1989; Ph.D., University of California,  
Santa Cruz, 2001. Assistant Professor.
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B.A., Pomona College, 1988; M.A., The Johns Hopkins University, 1996; Ph.D.,  
1998. Associate Professor.
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Human Resources.
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- WINEBRENNER, TERRENCE C. (1983) ..... Communication Studies  
B.S., Southwest Missouri State University, 1971; M.A., 1972; Ph.D., Ohio State  
University, 1985. Professor and Department Chair.
- WINSTEAD, CANDACE R. (2005) ..... Biological Sciences  
B.A., Augustana College, 1991; Ph.D., Loyola University, 1999. Assistant  
Professor.
- WOLF, MARIANNE MCGARRY (1994) ..... Agribusiness  
B.A., The Johns Hopkins University, 1976; M.S., 1977; Ph.D., 1979. Professor.
- WONG, JEFFREY C. (2002) .....Horticulture and Crop Science  
B.S., Saint Mary's College of California, 1994; M.S., University of Illinois at  
Champaign, 1999; Ph.D., 2002. Associate Professor. The J. G. Boswell Foundation  
of Pasadena Endowed Chair.
- WONG, KINSLEY (1989) .....University Housing  
B.S., California Polytechnic State University, San Luis Obispo, 1990. Assistant  
Director for Housing Information Systems.
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B.S., Oklahoma State University, 1985; M.M.F.T., Abilene Christian University,  
1991. Community Standards and Programming Coordinator.
- WOOD, ZOË J. (2003) .....Computer Science  
B.A., University of California, Santa Cruz, 1992; B.S., 1997; M.S., California  
Institute of Technology, 2000; Ph.D., 2003. Assistant Professor.
- WU, XI (2005) .....Mechanical Engineering  
M.S., Chong Qing University, 1991; Dr. Eng., Cleveland State University, 2005.  
Assistant Professor.
- YANG, TAO H. (1987) .....Industrial and Manufacturing Engineering  
B.S., Tunghai University, Taiwan, 1978; M.S., San Jose State University, 1982;  
Ph.D., Arizona State University, 1987. Associate Professor.
- YEH, GRACE I. (2007) ..... Ethnic Studies  
B.A., Duke University, 1995; M.A., Georgetown University, 2000; M.A.,  
University of California, Los Angeles, 2003; Ph.D., 2007. Assistant Professor.
- YELLAND, GEORGE L. (1988) ..... Information Technology Services  
B.A., University of California, San Diego, 1972. Director, Technology  
Architecture and Special Projects.
- YEUNG, PO SAI MARIE (2006) ..... Biological Sciences  
B.Sc., The Chinese University of Hong Kong, 1995; M.S., California Polytechnic  
State University, San Luis Obispo, 2001; Ph.D., Cornell University, 2004.  
Assistant Professor.
- YILDIZ, ILHAMI (2007) .....BioResource and Agricultural Engineering  
B.S., University of Ankara, 1983; M.S., 1985; M.S., The Ohio State University,  
1987; M.S.M.E., 1993; Ph.D., 1993. Associate Professor.
- YIP, CHRISTOPHER L. (1988) ..... Architecture  
B.A., University of California, Berkeley, 1971; M. Arch., 1977; Ph.D., 1985.  
Professor.
- YONG, YUEN-CJEN (1978) .....Mechanical Engineering  
B.E., University of Malaya, 1969; M.E., University of California, Davis, 1977;  
Ph.D., 1984. Professor. Registered Professional Engineer, Great Britain and  
Malaysia.
- YORK, JONATHAN (2008) ..... Industrial Technology  
B.A., Yale University, 1973; M.A., Michigan State University, 1976; Ph.D., 1979.  
Associate Professor.
- YOSHIMURA, MICHAEL A. (1975) ..... Biological Sciences  
B.A., Stanford University, 1970; M.S., University of Hawaii, 1972; Ph.D.,  
University of Arizona, 1975. Professor.
- YU, XIAO-HUA (HELEN) (2000) ..... Electrical Engineering  
B.S., TianJin University, People's Republic of China, 1988; M.S., Temple  
University, 1992; Ph.D., University of California, Irvine, 1998. Associate  
Professor.
- ZACHMEYER, DRU (2008) ..... Administration and Finance  
B.A., California Polytechnic State University, San Luis Obispo, 1999; J.D.,  
University of California, Los Angeles, 2003. Member, California Bar Association.  
Licensed California Real Estate Broker. Contracts Manager, Contracts,  
Procurement and Risk Management Services.
- ZAMBRANO, EDUARDO (2007) ..... Economics  
B.A., Universidad Católica Andrés Bello, Venezuela, 1993; M.A., Cornell  
University, 1998; Ph.D., Cornell University, 1999. Associate Professor.
- ZAMMIT, RONALD E. (1986) ..... Physics  
B.S., Louisiana State University, 1969; M.S., Purdue University, 1971; Ph.D.,  
1975. Professor.
- ZHANG, XIAOZHENG (JANE) (2003) ..... Electrical Engineering  
Diplom, University of Erlangen-Nuremberg, Germany, 1997; Ph.D., Georgia  
Institute of Technology, 2002. Assistant Professor.
- ZEUSCHNER, RAYMOND F. (1980) ..... Communication Studies  
A.B., University of California, Berkeley, 1966; M.A., San Francisco State College,  
1968; Ph.D., University of California, Los Angeles, 1973. Professor Emeritus.
- ZOHNS, MARK A. (1986) .....BioResource and Agricultural Engineering  
B.S., California Polytechnic State University, San Luis Obispo, 1981; M.S.,  
University of California, Davis, 1983; D.Eng., 1986. Professor. Registered  
Mechanical Engineer, California.
- ZULFACAR, MALIHA (2002) ..... Social Sciences  
B.A., Western College, 1971; M.A., University of Cincinnati, 1973; M.S., 1973;  
Ph.D., Paderborn University, Germany, 1997. Associate Professor.
- ZWEIFEL, K. RICHARD (1972) ..... College of Architecture and  
Environmental Design  
B.S.L.A., University of Wisconsin, 1970; M.S.L.A., 1975. Professor and Associate  
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# Appendix

## HIGHER EDUCATION ACT (HEA)

Under the Higher Education Act of 1965 (HEA) and its many amendments, Cal Poly is required to make certain disclosures and institutional information "readily available" to prospective and enrolled students, employees, the general public and the department of education on an annual basis (20 U.S.C. Section 1092(a)). For additional information, please contact the Dean of Students Office at (805) 756-0327.

## Privacy Rights of Students in Education Records

[www.ess.calpoly.edu/\\_records/stu\\_info/ferpa\\_use.htm](http://www.ess.calpoly.edu/_records/stu_info/ferpa_use.htm)

The federal Family Educational Rights and Privacy Act (FERPA) of 1974 (20 U.S.C. 1232g) and regulations adopted thereunder (34 C.F.R. 99) set out requirements designed to protect students' privacy in their records maintained by the campus. The statute and regulations govern access to student records maintained by the campus and the release of such records. The law provides that the campus must give students access to most records directly related to the student, and must also provide opportunity for a hearing to challenge the records on the grounds that they are inaccurate, misleading or otherwise inappropriate. The right to a hearing under this law does not include any right to challenge the appropriateness of a grade determined by the instructor. The law generally requires the institution to receive a student's written consent before releasing personally identifiable data about the student. The institution has adopted a set of policies and procedures governing implementation of the statute and the regulations. Copies of these policies and procedures may be obtained at the Office of Academic Records or the Educational Equity Services Office. Among the types of information included in the campus statement of policies and procedures are:

- 1) the types of student records maintained and the information they contain;
- 2) the official responsible for maintaining each type of record;
- 3) the location of access lists indicating persons requesting or receiving information from the record;
- 4) policies for reviewing and expunging records;
- 5) student access rights to their records;
- 6) the procedures for challenging the content of student records;
- 7) the cost to be charged for reproducing copies of records; and
- 8) the right of the student to file a complaint with the Department of Education. The Department of Education has established an office and review board to investigate complaints and adjudicate violations. The designated office is: Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW, Washington, D.C. 20202-5920.

The campus is authorized under the Act to release "directory information" concerning students. "Directory information" may include the student's name, address, telephone listing, electronic mail address, photograph, date and place of birth, major field of study, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, grade level, enrollment status, degrees, honors, and awards received, and the most recent previous educational agency or institution attended by the student. The above-designated information is subject to release by the campus at any time unless the campus has received prior written objection from the student specifying what information the student requests not be released. Written objections should be sent to the University Registrar.

The campus is authorized to provide access to student records to campus officials and employees who have legitimate educational interests in such access. These persons have responsibilities in the campus' academic, administrative or service functions and have reason for accessing student records associated with their campus or other related academic responsibilities. Student records may also be disclosed to other persons or organizations under certain conditions

(e.g., as part of accreditation or program evaluation; in response to a court order or subpoena; in connection with financial aid; or to other institutions to which the student is transferring).

## Completion/Graduation Rates

[www.ipa.calpoly.edu/federal/fed.html](http://www.ipa.calpoly.edu/federal/fed.html)

In 2006, the graduation rate for Cal Poly freshmen who entered the University in the Fall of 2000 was 67.7%. For more detailed information, please contact Institutional Planning and Analysis at 805 756-2461.

## Equity in Athletics Disclosure Act (EADA)

[www.calpoly.edu/~inststdy/federal/fed.html](http://www.calpoly.edu/~inststdy/federal/fed.html)

The Equity in Athletics Disclosure Act requires co-educational institutions of postsecondary education that participate in a Title IV, federal student financial assistance program, and have an intercollegiate athletic program, to prepare an annual report to the Department of Education on athletic participation, staffing, and revenues and expenses, by men's and women's teams.

In compliance with this requirement, information contained in the current report for Cal Poly San Luis Obispo is available on the US Department of Education's web site at <http://ope.ed.gov/athletics/Search.asp>. Alternatively, a link is also available to this and other publications through Cal Poly's Institutional Planning & Analysis web site (see link at top of this section). A paper copy of the report is available upon request.

## Campus Security Report (Clery Act)

[www.Police.calpoly.edu](http://www.Police.calpoly.edu)

Crime statistics for Cal Poly are provided for all prospective and current students, faculty and staff on the website, along with critical updates and prevention advisories. These statistics are reported monthly to the Federal and State Departments of Justice as well as annually to the Office of the Chancellor of the CSU. Crime statistics are published to inform the campus community and to meet mandated reporting requirements. A printed copy of the Campus Security Report is available by request at the University Police Department.

## Institutional and Financial Assistance Information

**Student Financial Assistance.** Director, Financial Aid, Admin. 212, 756-2927:

1. A description of the federal, state, institutional, local, and private student financial assistance programs available to students who enroll at Cal Poly;
2. For each aid program, a description of procedures and forms by which students apply for assistance, student eligibility requirements, criteria for selecting recipients from the group of eligible applicants, and criteria for determining the amount of a student's award;
3. A description of the rights and responsibilities of students receiving financial assistance, including federal Title IV student assistance programs, and criteria for continued student eligibility under each program;
4. The satisfactory academic progress standards that students must maintain for the purpose of receiving financial assistance and criteria by which a student who has failed to maintain satisfactory progress may reestablish eligibility for financial assistance;
5. The method by which financial assistance disbursements will be made to students and the frequency of those disbursements;
6. The terms of any loan received as part of the student's financial aid package, a sample loan repayment schedule, and the necessity for repaying loans;
7. The general conditions and terms applicable to any employment provided as part of the student's financial aid package;
8. The responsibility of Cal Poly for providing and collecting exit counseling information for all student borrowers under the federal student loan programs; and
9. The terms and conditions for deferral of loan payments for qualifying service under the Peace Corps Act, the Domestic Volunteer Service Act of 1973, or comparable volunteer community service.



**Return of Federal Title IV student assistance funds.** Director, Financial Aid, Admin. 212, 756-2927.

**Cost of Attending Cal Poly.** Director, Financial Aid, Admin. 212, 756-2927: fees and tuition (where applicable); the estimated costs of books and supplies; estimates of typical student room, board, and transportation costs; and, if requested, additional costs for specific programs.

**Refund Policies.** Registrar, Admin. 222, 756-2531: return of unearned tuition and fees or other refundable portions of institutional charges.

**Facilities and Services available to Students with Disabilities.** Director, Disability Resource Center, Student Services Bldg. (124), 756-1395.

**Reporting Criminal Actions or Other Emergencies.** University Police, Building 74, 756-2281.

**Prevention of Drug and Alcohol Abuse and Rehabilitation Programs.** Office of the Vice President for Student Affairs, Admin. 209, 756-1521.

**Grievance Procedures for Students.** The Dean of Students Office, Bldg 124, Rm 125, 756-03271.

**Teacher Certification Examinations, pass rates, teacher preparation programs.** School of Education, Bldg 2, Rm 120, 756-2126.

## CAMPUS SMOKING POLICY

Please view the revised smoking policy for the Cal Poly campus implemented January 1, 2004 at <http://policy.calpoly.edu/cap/100/cap190.htm>

## CAREER PLACEMENT

The Career Services office (805-756-2501) may furnish, upon request, information about the employment of students who graduate from programs or courses of study preparing students for a particular field. This information includes data concerning the average starting salary and the percentage of previously enrolled students who obtained employment. The information may include data collected from either graduates of the campus or graduates of all campuses in the California State University system.

## MILITARY SELECTIVE SERVICE ACT

The federal Military Selective Service Act (the "Act") requires most males residing in the United States to present themselves for registration with the Selective Service System within thirty days of their eighteenth birthday. Most males between the ages of 18 and 25 must be registered. Males born after December 31, 1959 may be required to submit a statement of compliance with the Act and regulations in order to receive any grant, loan, or work assistance under specified provisions of existing federal law. In California, students subject to the Act who fail to register are also ineligible to receive any need-based student grants funded by the state or a public postsecondary institution. Selective Service registration forms are available at any U.S. Post Office, and many high schools have a staff member or teacher appointed as a Selective Service Registrar. Applicants for financial aid can also request that information provided on the Free Application for Federal Student Aid (FAFSA) be used to register them with the Selective Service. Information on the Selective Service System is available and the registration process may be initiated online at <http://www.sss.gov>.

## DETERMINATION OF RESIDENCE FOR NONRESIDENT TUITION PURPOSES

University requirements for establishing residency are independent from those of other types of residency, such as for tax purposes, or other state or institutional residency. **These regulations were promulgated not to determine whether a student is a resident or nonresident of California, but rather to determine whether a student should pay University fees on an in-state or out-of-state basis.** A resident for tuition purposes is someone who meets the requirements set forth in the Uniform Student Residence Requirements. These laws governing residence for tuition purposes at the California State University are California Education

Code sections 68000-68090, 68120-68134, and 89705-89707.5, and California Code of Regulations, Title 5, **Subchapter 5, Article 4**, sections 41900-41916. This material can be viewed on the Internet by accessing the California State University's website at [www.calstate.edu/GC/resources.shtml](http://www.calstate.edu/GC/resources.shtml). (Updated 12/07/09)

Each campus's Admissions Office is responsible for determining the residence status of all new and returning students based on the Application for Admission, Residency Questionnaire, Reclassification Request Form, and, as necessary, other evidence furnished by the student. A student who fails to submit adequate information to establish eligibility for resident classification will be classified as a nonresident.

Generally, establishing California residence for tuition purposes requires a combination of physical presence and intent to remain indefinitely. An adult who, at least one full year prior to the residence determination date for the term in which enrollment is contemplated, can demonstrate physical presence in the state combined with evidence of intent to remain in California indefinitely, may establish California residence for tuition purposes. A minor normally derives residence from the parent(s) they reside with or most recently reside with.

Evidence demonstrating intent may vary from case to case but will include, and is not limited to, the absence of residential ties to any other state, California voter registration and voting in California elections, maintaining California registration and driver's license, maintaining active California bank accounts, filing California income tax returns and listing a California address on federal tax returns, owning residential property or occupying or renting an apartment where permanent belongings are kept, maintaining active memberships in California professional or social organizations, and maintaining a permanent military address and home of record in California.

Nonresident students seeking reclassification are required to complete a supplemental questionnaire that includes questions concerning their financial dependence on parents **or others who do not meet** University requirements for classification as residents for tuition purposes.

**Financial independence is required**, along with physical presence and intent, **to be eligible for reclassification.** (Updated 12/07/09)

Non-citizens establish residence in the same manner as citizens, unless precluded by the Immigration and Nationality Act from establishing domicile in the United States.

Exceptions to the general residence requirements are contained in California Education Code sections 68070-68084 and California Code of Regulations, Title 5, Subchapter 5, Article 4, sections 41906-41906.5, and include, but are not limited to, members of the military and their dependents, certain credentialed employees of school districts and most students who have attended high school in California and graduated or attained the equivalent. Whether an exception applies to a particular student cannot be determined before the submission of an application for admission and, as necessary, additional supporting documentation. Because neither campus nor Chancellor's Office staff may give advice on the application of these laws, applicants are strongly urged to review the material for themselves and consult with a legal advisor.

## Residence determination dates

Fall .....	September 20	Spring.....	April 1
Winter .....	January 5	Summer.....	July 1

Students classified as non-residents may appeal a final campus decision within 120 days of notification by the campus. A campus residence classification appeal must be in writing and submitted to:

The California State University, Office of General Counsel,  
401 Golden Shore, 4<sup>th</sup> Floor, Long Beach, CA 90802-4210

The Office of General Counsel can either decide the appeal or send the matter back to the campus for further review.

Students incorrectly classified as residents or incorrectly granted an exception from nonresident tuition are subject to reclassification as nonresidents and payment of nonresident tuition in arrears. If incorrect classification results from false or concealed facts, the student is also subject to discipline pursuant to Section 41301 of Title 5 of the California Code of Regulations.

Resident students who become nonresidents or who no longer meet the criteria for an exception must immediately notify the Admissions Office.

Changes may have been made in the rate of nonresident tuition and in the statutes and regulations governing residence for tuition purposes in California between the time this information is published and the relevant residence determination date. Students are urged to review the statutes and regulations stated above.

### USE OF SOCIAL SECURITY NUMBER

Applicants are required to include their correct social security numbers in designated places on applications for admission pursuant to the authority contained in Section 41201, Title 5, *California Code of Regulations*, and Section 6109 of the Internal Revenue Code (26 U.S.C. 6109). The University uses the social security number to identify students and their records including identification for purposes of financial aid eligibility and disbursement and the repayment of financial aid and other debts payable to the institution. Also, the Internal Revenue Service requires the University to file information returns that include the student's social security number and other information such as the amount paid for qualified tuition, related expenses, and interest on educational loans. This information is used by the IRS to help determine whether a student, or a person claiming a student as a dependent, may take a credit or deduction to reduce federal income taxes.

### STUDENT CONDUCT

Inappropriate conduct by students or by applicants for admission is subject to discipline as provided in Sections 41301 through 41304 of Title 5, *California Code of Regulations*. These sections are:

#### 41301. Standards for Student Conduct.

##### (a) Campus Community Values

The University is committed to maintaining a safe and healthy living and learning environment for students, faculty, and staff. Each member of the campus community should choose behaviors that contribute toward this end. Students are expected to be good citizens and to engage in responsible behaviors that reflect well upon their university, to be civil to one another and to others in the campus community, and contribute positively to student and university life.

##### (b) Grounds for Student Discipline

Student behavior that is not consistent with the Student Conduct Code is addressed through an educational process that is designed to promote safety and good citizenship and, when necessary, impose appropriate consequences. The following are the grounds upon which student discipline can be based:

- (1) Dishonesty, including:
  - (A) Cheating, plagiarism, or other forms of academic dishonesty that are intended to gain unfair academic advantage.
  - (B) Furnishing false information to a University official, faculty member, or campus office.
  - (C) Forgery, alteration, or misuse of a University document, key, or identification instrument.
  - (D) Misrepresenting one's self to be an authorized agent of the University or one of its auxiliaries.
- (2) Unauthorized entry into, presence in, use of, or misuse of University property.
- (3) Willful, material and substantial disruption or obstruction of a University-related activity, or any on-campus activity.

(4) Participating in an activity that substantially and materially disrupts the normal operations of the University, or infringes on the rights of members of the University community.

(5) Willful, material and substantial obstruction of the free flow of pedestrian or other traffic, on or leading to campus property or an off-campus University related activity.

(6) Disorderly, lewd, indecent, or obscene behavior at a University related activity, or directed toward a member of the University community.

(7) Conduct that threatens or endangers the health or safety of any person within or related to the University community, including physical abuse, threats, intimidation, harassment, or sexual misconduct.

(8) Hazing, or conspiracy to haze. Hazing is defined as any method of initiation or pre-initiation into a student organization or student body, whether or not the organization or body is officially recognized by an educational institution, which is likely to cause serious bodily injury to any former, current, or prospective student of any school, community college, college, university or other educational institution in this state (Penal Code 245.6), and in addition, any act likely to cause physical harm, personal degradation or disgrace resulting in physical or mental harm, to any former, current, or prospective student of any school, community college, university, or other educational institution. The term "hazing" does not include customary athletic events or school sanction events.

Neither the express or implied consent of a victim of hazing, nor the lack of active participation in a particular hazing incident is a defense. Apathy or acquiescence in the presence of hazing is not a neutral act, and is also a violation of this section.

(9) Use, possession, manufacture, or distribution of illegal drugs or drug-related paraphernalia, (except as expressly permitted by law and University regulations) or the misuse of legal pharmaceutical drugs.

(10) Use, possession, manufacture, or distribution of alcoholic beverages (except as expressly permitted by law and University regulations), or public intoxication while on campus or at a University related activity.

(11) Theft of property or services from the University community, or misappropriation of University resources.

(12) Unauthorized destruction, or damage to University property or other property in the University community.

(13) Possession or misuse of firearms or guns, replicas, ammunition, explosives, fireworks, knives, other weapons, or dangerous chemicals (without the prior authorization of the campus president) on campus or at a University related activity.

(14) Unauthorized recording, dissemination, or publication of academic presentations (including handwritten notes) for a commercial purpose.

(15) Misuse of computer facilities or resources, including:

- (A) Unauthorized entry into a file, for any purpose.
- (B) Unauthorized transfer of a file.
- (C) Use of another's identification or password.
- (D) Use of computing facilities, campus network, or other resources to interfere with the work of another member of the University community.
- (E) Use of computing facilities and resources to send obscene or intimidating and abusive messages.
- (F) Use of computing facilities and resources to interfere with normal University operations.
- (G) Use of computing facilities and resources in violation of copyright laws.
- (H) Violation of a campus computer use policy.

(16) Violation of any published University policy, rule, regulation or presidential order.

(17) Failure to comply with directions of, or interference with, any University official or any public safety officer while acting in the performance of his/her duties.

(18) Any act chargeable as a violation of a federal, state, or local law that poses a substantial threat to the safety or well-being of members of the University community, to property within the University community or poses a significant threat of disruption or interference with University operations.

(19) Violation of the Student Conduct Procedures, including:

- (A) Falsification, distortion, or misrepresentation of information related to a student discipline matter.
- (B) Disruption or interference with the orderly progress of a student discipline proceeding.
- (C) Initiation of a student discipline proceeding in bad faith.
- (D) Attempting to discourage another from participating in the student discipline matter.
- (E) Attempting to influence the impartiality of any participant in a student discipline matter.
- (F) Verbal or physical harassment or intimidation of any participant in a student discipline matter.
- (G) Failure to comply with the sanction(s) imposed under a student discipline proceeding.

(20) Encouraging, permitting, or assisting another to do any act that could subject him or her to discipline.

#### (c) Procedures for Enforcing this Code

The Chancellor shall adopt procedures to ensure students are afforded appropriate notice and an opportunity to be heard before the University imposes any sanction for a violation of the Student Conduct Code.

#### (d) Application of this Code

Sanctions for the conduct listed above can be imposed on applicants, enrolled students, students between academic terms, graduates awaiting degrees, and students who withdraw from school while a disciplinary matter is pending. Conduct that threatens the safety or security of the campus community, or substantially disrupts the functions or operation of the University is within the jurisdiction of this Article regardless of whether it occurs on or off campus. Nothing in this Code may conflict with Education Code section 66301 that prohibits disciplinary action against students based on behavior protected by the First Amendment.

#### 41302. Disposition of Fees: Campus Emergency; Interim Suspension.

The President of the campus may place on probation, suspend, or expel a student for one or more of the causes enumerated in Section 41301. No fees or tuition paid by or for such student for the semester, quarter, or summer session in which he or she is suspended or expelled shall be refunded. If the student is readmitted before the close of the semester, quarter, or summer session in which he or she is suspended, no additional tuition or fees shall be required of the student on account of the suspension.

During periods of campus emergency, as determined by the President of the individual campus, the President may, after consultation with the Chancellor, place into immediate effect any emergency regulations, procedures, and other measures deemed necessary or appropriate to meet the emergency, safe-guard persons and property, and maintain educational activities.

The President may immediately impose an interim suspension in all cases in which there is reasonable cause to believe that such an immediate suspension is required in order to protect lives or property and to insure the maintenance of order. A student so placed on interim suspension shall be given prompt notice of charges and the opportunity for a hearing within 10 days of the imposition of interim suspension. During the period of interim suspension, the student shall not, without prior written permission of the President or designated representative, enter any campus of the California State University other than to attend

the hearing. Violation of any condition of interim suspension shall be grounds for expulsion.

#### IMMIGRATION REQUIREMENTS FOR LICENSURE

The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (P.L. 104-193), also known as the Welfare Reform Act, includes provisions to eliminate eligibility for federal and state public benefits for certain categories of lawful immigrants as well as benefits for all illegal immigrants. Students who will require a professional or commercial license provided by a local, state, or federal government agency in order to engage in an occupation for which the CSU may be training them must meet the immigration requirements of the Personal Responsibility and Work Opportunity Reconciliation Act to achieve licensure. Information concerning these requirements is available from the Academic Programs Office, Admin. 315, 756-2246.

#### AVERAGE SUPPORT COST PER FULL-TIME EQUIVALENT STUDENT AND SOURCES OF FUNDS

The total support cost per full-time equivalent student (FTES) includes the expenditures for current operations, including payments made to students in the form of financial aid, and all fully reimbursed programs contained in state appropriations. The average support cost is determined by dividing the total cost by the number of full-time equivalent students (FTES). The total CSU 2009/10 final budget amounts were \$2,337,952,000 from state General Fund appropriations (not including capital outlay funding), \$1,593,422,000 from State University Fee (SUF) revenue, \$300,342,000 from other fee revenues and reimbursements for a total of \$4,231,716,000. The number of projected 2009/10 full-time equivalent students (FTES) is 357,403. The number of full-time equivalent students is determined by dividing the total academic student load by 15 units per term (the figure used here to define a full-time student's academic load).

The 2009/10 average support cost per full-time equivalent student based on General Fund appropriation and State University Fee revenue only is \$11,000 and when including all sources as indicated below is \$11,840. Of this amount, the average student fee support per FTE is \$5,298, which includes all fee revenue in the CSU Operating Fund (e.g., State University Fee, nonresident tuition, application fees, and other miscellaneous fees).

2009/2010	Amount	Average Cost Per FTES	%
Total Support Cost.....	\$4,231,716,000	\$11,840	100
-State Appropriation.....	2,337,952,000	6,542	55
-Student Fee Support <sup>1</sup> .....	1,593,422,000	4,458	38
-Other Income and Reimbursements <sup>2</sup> .....	300,342,000	840	7

<sup>1</sup> Student fee support represents campus 2009/10 final budget submitted State University Fee revenue deposited in the State Treasury/state higher education fund.

<sup>2</sup> The other income and reimbursements represent campus other fee 2009/10 final budget revenues submitted, as well as reimbursements in the CSU Operating Fund.

The average CSU 2009/10 academic year, resident, undergraduate student fees required to apply to, enroll in, or attend the university is \$4,893. However, the costs paid by individual students will vary depending on campus, program, and whether a student is part-time, full-time, resident, or nonresident.

(Updated 12/07/09)

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## Academic Standards

### Academic Obligations

All students are expected to be diligent in the pursuit of their courses of study in order that both they and the State receive maximum benefit from the educational opportunities provided. Each student is responsible for his or her enrollments and timely adds, drops and withdrawals following campus policy.

Students are expected to satisfy the academic demands required by their instructors in such ways as they may set forth, in order to satisfy the instructor that they are performing their assignments in a proper manner.

Instructors are expected to give first priority to meeting their scheduled classes and other assigned responsibilities, including keeping regular office hours for student conferences.

In classroom settings, instructors have the authority and responsibility to establish rules, maintain order, and to dismiss students from a class session for violation of the rules or misconduct. Violations or misconduct warranting more than a single dismissal from a class session should be referred by the instructor to the Office of Student Rights and Responsibilities (756-2794) for disciplinary action.

### Expected Academic Progress (EAP) Policy

Expected Academic Progress is defined as making appropriate degree progress each academic year by earning a certain percentage of degree applicable units that meet major, support, general education, concentration, and free elective (if applicable) requirements that are directly associated with the student's declared major.

Expected Academic Progress (EAP) is monitored for all students every spring quarter. Students who fall behind in their EAP will be designated as having an **EAP deficiency** and may be required to meet with their academic advisor. Although this designation will not be noted on their transcript, students will be expected to make up this deficiency.

Those students who are required to meet with their advisor are expected to review and discuss their academic progress, and to create a reasonable academic plan to help get the student back on track. Attending summer session, either at Cal Poly, a community college, or another regionally accredited institution may be suggested. Should the student decide to attend another institution, he or she must confirm that the courses they decide to take at that institution will apply to their Cal Poly degree requirements upon transfer.

If the student continues to have an EAP deficiency, their department or college **may have a hold placed on their registration for the next term or place them on Administrative Academic Probation (see the section on Administrative Academic Probation).**

Those students who have a demonstrated need to attend Cal Poly on a part-time basis for at least three consecutive quarters may be considered exempt from the EAP policy. These students will be required to submit an EAP Exemption Request through their advisors in order to be evaluated for exemption.

In addition to the university's EAP policy, the College of Engineering has additional requirements. Please see the College of Engineering Advising Center for details.

### I. Native EAP Policy

*(Effective for all students entering as first-time freshmen Fall 2010 and thereafter)*

Every full-time undergraduate student is required to make reasonable academic progress toward completion of the bachelor's degree. EAP is monitored for all Cal Poly students in order to help them graduate in a timely manner.

Students entering Cal Poly as first-time freshmen and who are enrolled in four-year degree programs (e.g., BA, BS, BFA) are expected to graduate in twelve quarters. Normally, this will not include summer terms, as summer is considered an opportunity to make up for any lack of progress in prior quarters or to bank progress for future quarters.

To maintain Expected Academic Progress, the following standards should be met by the end of each respective year:

**First year:** Completion of at least **20%** of the total number of units required for the degree.

**Second year:** Completion of at least **45%** of the total number of units required for the degree.

**Third year:** Completion of at least **75%** of the total number of units required for the degree.

**Fourth year:** Completion of at least **100%** of the total number units required for the degree.

Example: A student enrolled in a four-year degree program requiring 180 total units would need to complete no fewer than 36 units by the end of the first year, no fewer than 81 units by the end of the second year, no fewer than 135 by the end of the third year, and no fewer than 180 by the end of the fourth year.

To determine the standards for programs requiring more than 180 total units, multiply the total units required by .20, .45, .75, or 1.0 for each respective year. Students enrolled in a five-year degree (e.g., BArch, BLA) or blended programs must also demonstrate Expected Academic Progress and should consult with their major department for specific requirements.

**Benchmark Courses:** In addition to monitoring the number of required units completed, some departments may identify specific benchmark courses that should be completed by the end of each respective year. Students should check with their advisor for such requirements.

**Degree Applicable Units:** Departments rely on data derived from each student's Degree Progress Report (DPR) to verify that the expected number of units completed constitute degree-applicable units (units that advance the student toward degree completion). In tallying these units for the purpose of monitoring EAP, degree-applicable credits earned from Advanced Placement (AP), International Baccalaureate (IB), and accredited baccalaureate-level transfer work will be included.

**Concentrations:** If the student's major requires a concentration, units taken for the concentration are included in assessing the EAP. The concentration should be declared no later than reaching 90 units (junior standing).

**Minors:** Minors are optional at Cal Poly and are not a part of a student's EAP. Depending on the student's major, courses taken for the minor may or may not represent degree-applicable units (see "Maximum Units" below). Students who decide to pursue a minor should declare their minor no later than the end of their junior year. Minors must be completed within the EAP requirements identified (i.e., maximum number of units and quarters allowed for the degree). No minor will be awarded after the baccalaureate degree requirements have been met.

**Maximum Units:** Students graduating on time (this would be 12 quarters, excluding summers, for students enrolled in four-year degree programs) have no cap on the number of units they may complete at Cal Poly. **Students who do not graduate on time may complete no more than 24 Cal Poly units above the number required for the degree.** Exceeding the allowable 24 units may result in a hold being placed on the student's registration or the student being placed on administrative academic probation. The student will be required to submit a **Degree Completion Plan** to the major department before he or she is allowed to continue their education at Cal Poly. The Degree Completion Plan may only include degree applicable units as the student will not be allowed to take non-degree applicable classes during this period. In tallying the Maximum Units, *only Cal Poly units* will be included. Credit earned from AP, IB, and transfer work will not be used in the Maximum Units calculation.

**Failure to make reasonable academic progress** as prescribed by this policy may result in a hold being placed on the student's registration or the student being placed on administrative-academic probation. Notification that a hold has been placed or being placed on administrative-academic probation will be sent to the student's Cal Poly email address. Continued failure to meet EAP standards may result in disqualification from the University.

**Exemptions:** Students who have to comply with an externally imposed set of degree progress standards (e.g., athletes following NCAA regulations) may continue to follow those guidelines. Other students for whom the Expected Academic Progress policy represents undue

hardship may appeal for exemption through their advisors. Such appeals should be supported with documentation as appropriate (e.g. a physician's note).

## II. Transfer EAP Policy

*(Effective for all junior transfers entering Fall 2010 and thereafter)*

Every full-time undergraduate student is required to make reasonable academic progress toward completion of their bachelor's degree. EAP is monitored for all Cal Poly students in order to help them graduate in a timely manner.

Ideally, those who enter Cal Poly as upper division transfer students and who are enrolled in four-year degree programs (BA, BS, BFA) are expected to graduate in two years (six quarters). However, EAP policy does allow students three years (nine quarters, *excluding summer quarters*) to complete their degree requirements at Cal Poly, should they still have remaining lower division requirements after they are admitted as junior transfers.

To maintain Expected Academic Progress, the following standards should be met by the end of the specified year of study at Cal Poly (note that these standards are based on the assumption that all upper division transfer students enter with at least 90 degree-applicable units and are General Education (GE) certified for lower division GE not specified by the major):

**First year:** Completion of at least **55%** of the total number of units required for the degree.

**Second year:** Completion of at least **80%** of the total number units required for the degree.

**Third year:** Completion of **100%** of the total number of units required for the degree.

Example: A transfer student enrolled in a four-year degree program requiring 180 total units would need to have completed no fewer than 99 degree-applicable units by the end of the first year, no fewer than 144 degree-applicable units by the end of the second year, and no fewer than 180 degree-applicable units by the end of the third year of study.

To determine the standards for programs requiring more than 180 total units, multiply the total units required by .55 or .80 or 1.0 for each respective year. Students enrolled in five-year degrees (e.g., BArch, BLA) or blended programs must also demonstrate Expected Academic Progress and should consult with their major department for specific requirements.

**Benchmark Courses:** In addition to monitoring the number of degree-applicable units completed, some departments may identify specific benchmark courses that should be completed by the end of each respective year. Students should check with their advisor for such requirements.

**Degree Applicable Units:** Departments rely on data derived from each student's Degree Progress Report (DPR) to verify that the minimum number of units completed

constitute degree-applicable units (units that advance the student toward degree completion). In tallying these units for the purpose of monitoring satisfactory progress, degree-applicable credit earned from Advanced Placement (AP), International Baccalaureate (IB), and accredited baccalaureate level transfer work will be included.

**Concentrations:** If the student's major requires a concentration, units taken for the concentration are included in assessing the EAP. The concentration should be declared as soon as possible and no later than the end of the second quarter of study at Cal Poly.

**Minors:** Minors are optional at Cal Poly and are not a part of a student's Expected Academic Progress. Depending on the student's major, courses taken for the minor may or may not represent degree-applicable units (See "Maximum Units" below). Students electing a minor should declare the minor as soon as possible and no later than the end of the first year of study at Cal Poly. Minors must be completed within the EAP requirements identified (e.g., maximum number of units and quarters allowed for the major). No minor will be awarded after the baccalaureate degree requirements have been met.

**Maximum Units:** Transfer students graduating on time (in 9 quarters, excluding summers, for transfer students enrolled in four-year degree programs) have no cap on the number of units they may complete at Cal Poly. **Transfer students who are NOT on track to graduate on time may complete no more than 24 Cal Poly units above the number required for the degree.** Exceeding the allowable 24 units may result in a hold placed on the student's registration or the student being placed on administrative-academic probation. A **Degree Completion Plan** must be submitted to the major department before they will be allowed to continue their education at Cal Poly; such transfer students may enroll *only* in degree-applicable units. In tallying the Maximum Units, *only Cal Poly units* will be included. Credit earned from AP, IB, and transfer work will not be used in the Maximum Units calculation.

**Failure to make reasonable academic progress** as prescribed by this policy may result in a hold being placed on the student's registration or the student being placed on administrative-academic probation. Notification that a hold has been placed or being placed on administrative-academic probation will be sent to the student's Cal Poly email address. Continued failure to meet EAP standards may result in disqualification from the University.

**Exemptions:** Students complying with an externally imposed set of degree progress standards (e.g., athletes following NCAA regulations) may continue to follow those guidelines. Other students for whom the Expected Academic Progress policy represents undue hardship may appeal for exemption through their advisors. Such appeals should be supported with documentation as appropriate (e.g., a physician's note).

## Academic Probation and Disqualification

*Effective Fall 2010 (Updated 8/30/10)*

The quality of academic performance is considered in the determination of a student's eligibility to remain enrolled.

Uniform standards for academic probation or disqualification, and for administrative-academic probation or disqualification, are in effect at all campuses of the California State University. Undergraduate students may be placed on academic probation and later be disqualified, or be placed on administrative-academic probation and later be disqualified, when they do not meet these standards.

Students who have been placed on academic probation, administrative-academic probation, or who have been notified of their disqualification may request review of such action by the dean of the college taking the action. Students who have been disqualified for inadequate progress or performance are not readmitted until presentation of satisfactory evidence that they have improved their chances of academic success. The request for readmission is referred to the dean of the college in which the student wishes to enroll.

Students on academic probation may not participate on intercollegiate teams nor may they hold positions of leadership in student organizations or student government groups. These include, but are not limited to, such groups as: athletic teams, debate teams, drama casts, judging teams, ASI councils, boards and committees. Such students may not hold an office in a student organization, nor may they be editors, managers, or hold similar positions on student publications. However, students on academic probation may participate in such activities as club membership, intramurals, and music that do not include travel and the official representation of the University.

Certain groups may have set higher standards than the minimum for specific positions or areas of responsibility that require considerable commitments of time and energy.

An undergraduate student becomes subject to academic probation or disqualification under the conditions shown below. For minimum scholarship standards applicable to graduate and post-baccalaureate students see the Graduate Programs section.

### I. Academic Probation

An undergraduate student is automatically placed on academic probation when the grade point average drops below 2.0 (C). The grade point average applies to the current term (unadjusted for any subsequent grade forgiveness), the Cal Poly cumulative, or the higher education cumulative. The student is advised promptly, by email or other means, of being placed on probation. It is the student's responsibility to check his/her campus email account regularly.

**Note:** For first-time freshmen with Cal Poly coursework only, academic probation in their first quarter of attendance will also equate to subject to disqualification (see below).



## II. Academic Disqualification

- A. An undergraduate student is subject to disqualification when any of the following is true:
- (1) The student's Cal Poly cumulative, or higher education cumulative grade point average is below 2.0.
  - (2) The student is on academic probation for two consecutive quarters.
  - (3) The student has been on academic probation for four non-consecutive quarters.
- An undergraduate student who is subject to disqualification may be disqualified at the discretion of his/her college.
- B. An undergraduate student will be disqualified when either of the following is true:
- (1) The student has been on academic probation three consecutive quarters.
  - (2) The student has been on academic probation three or more non-consecutive quarters and has a current Cal Poly cumulative or higher education cumulative grade point average that is below 2.0.

## III. Notice of Disqualification

Students who are disqualified at the end of a quarter are notified before the beginning of the next consecutive regular quarter. Students disqualified at the beginning of a summer enrollment break are notified at least one month before the start of the fall quarter.

The Office of the Registrar will notify the student by email. It is the student's responsibility to check his/her campus email account regularly.

## IV. Administrative-Academic Probation

An undergraduate or graduate student may be placed on administrative-academic probation by action of the dean of the college in which the student is enrolled for any of the following reasons:

- A. Withdrawal from all or a substantial portion of a program of studies in two successive terms or in any three terms. (Note: a student whose withdrawal is directly associated with a chronic or recurring medical condition or its treatment is not subject to administrative-academic probation for such withdrawal.)
- B. Repeated failure to make Expected Academic Progress (see the section on Expected Academic Progress) toward the stated degree or program objective, including that resulting from assignment of 15 units of NC, when such failure appears to be due to circumstances within the control of the student.
- C. Failure to comply, after due notice, with an academic requirement or regulation which is routine for all students or a defined group of students.

When such action is taken, the student is notified in writing and is provided with the conditions for removal from

probation and the circumstances which would lead to disqualification, should probation not be removed.

## Academic Probation and Disqualification

*Policy updated 8/30/10; see above*

The quality of academic performance is considered in the determination of a student's eligibility to remain enrolled. An undergraduate student becomes subject to academic probation or disqualification under the conditions shown below. For minimum scholarship standards applicable to graduate and post-baccalaureate students see the Graduate Programs section.

### I. Academic Probation

An undergraduate student is automatically placed on academic probation when the grade point average drops below 2.0 (C). The grade point average applies to the current term (unadjusted for any subsequent grade forgiveness), the Cal Poly cumulative, or the higher education cumulative. The student is advised promptly, by email or other means, of being placed on probation. It is the student's responsibility to notify the Office of Academic Records of address changes.

An undergraduate student is removed from academic probation when the current term, Cal Poly cumulative, and higher education cumulative grade point averages are *all* 2.0 or higher.

### II. Academic Disqualification

- A. An undergraduate student on academic probation for two consecutive terms is subject to academic disqualification.
- B. An undergraduate student on academic probation is also subject to academic disqualification when:
  - (1) As a freshman (fewer than 45 quarter units of college credit completed) the student falls below a grade point average of 1.50 in all units attempted (higher education GPA) or in all units attempted at Cal Poly (Cal Poly cumulative GPA).
  - (2) As a sophomore (45 through 89 quarter units of college credit completed) the student falls below a grade point average of 1.70 in all units attempted (higher education GPA) or in all units attempted at Cal Poly (Cal Poly cumulative GPA).
  - (3) As a junior (90 to 134 quarter units of college credit completed) the student falls below a grade point average of 1.85 in all units attempted (higher education GPA) or in all units attempted at Cal Poly (Cal Poly cumulative GPA).
  - (4) As a senior (135 or more quarter units of college credit completed) the student falls below a grade point average of 1.95 in all units attempted (higher education GPA) or in all units attempted at Cal Poly (Cal Poly cumulative GPA).
- C. In addition to the above disqualification standards applicable to students on probation, the President may designate a campus official to act to disqualify an



individual not on probation when the following circumstances exist:

- (1) At the end of any term, the student has a cumulative grade point average (higher education or Cal Poly) below 1.0; and
- (2) The cumulative grade point average is so low that in view of the student's overall educational record, it seems unlikely that the deficiency will be removed within a reasonable period.

### III. Notice of Disqualification

Students who are disqualified at the end of a quarter are notified before the beginning of the next consecutive regular quarter. Students disqualified at the beginning of a summer enrollment break are notified at least one month before the start of the fall quarter.

Notification may occur by email or other means. A student is considered notified if he/she has previously received a written academic contract and has failed to meet its terms, making the student subject to disqualification. It is the student's responsibility to notify the Office of Academic Records of address changes.

In cases where a student ordinarily would be disqualified at the end of a term save for the impossibility of making timely notification, the student may be advised by the student's school dean that the disqualification is to be effective at the end of the next term. Such notification includes any condition which, if met, would result in permission to continue in enrollment. Failure to notify a student does not create the right of that student to continue enrollment.

### IV. Administrative-Academic Probation

An undergraduate or graduate student may be placed on administrative academic probation by action of the dean of the college in which the student is enrolled for any of the following reasons:

- A. Withdrawal from all or a substantial portion of a program of studies in two successive terms or in any three terms. (Note: a student whose withdrawal is directly associated with a chronic or recurring medical condition or its treatment is not subject to administrative academic probation for such withdrawal.)
- B. Repeated failure to progress toward the stated degree or program objective, including that resulting from assignment of 15 units of NC, when such failure appears to be due to circumstances within the control of the student.
- C. Failure to comply, after due notice, with an academic requirement or regulation which is routine for all students or a defined group of students.

When such action is taken, the student is notified in writing and is provided with the conditions for removal from probation and the circumstances which would lead to disqualification, should probation not be removed.

## Academic Petitions

Academic petitions are handled through the academic affairs division of the University. The process of review may include the academic department, academic advising offices, administrative offices, and/or college dean's office. Typical academic petitions include, but are not limited to, transferring from one program to another, academic requirement or policy deviation requests, and admission/re-admission issues. Contact the appropriate office for specific academic petition procedures.

### Academic Petition Appeals

Following a petition decision, and under limited circumstances, students may appeal to the Vice Provost for **Programs and Planning Academic Programs and Undergraduate Education** or his/her designee. The right to an appeal is not guaranteed and an appeal is only granted if the student can show that one or more of the following exist:

1. A requirement or policy was incorrectly applied to the petition.
2. A requirement or policy is unclear or ambiguous.
3. There is new information that should be considered in the evaluation of the petition.
4. There are special circumstances warranting the granting of the appeal.

The granting of an academic petition appeal gives students the opportunity to present the merits of their petition to the Vice Provost. The Vice Provost's decisions regarding appeals represent the University's final decision on academic petitions. Contact the Office of Academic Programs at 756-2246 for more information on the procedures for filing an academic petition appeal.

## Student Grievances

The University provides students with a variety of mechanisms to address student grievances or concerns. In all such matters, the University encourages students to attempt to resolve their grievance or concern at the source of the issue (i.e., with the professor, department chair or administrator, or college associate dean). The Dean of Students' Office (756-0327) is available to any campus community member to assist with identifying and clarifying appropriate campus policies and procedures for addressing student grievances or concerns.

For general questions about grievances, contact the Dean of Students' Office, 756-0327. The following list contains the offices or programs designated to address the more common student grievances at the University:

**Grade Grievances** – The Fairness Board: Contact the Academic Senate Office, 756-1258 (See page 16 for more detail on the functions of this Board)

**Student or Student Club Misconduct** –Office of Student Rights and Responsibilities, 756-2794 (See page 29 for more detail on the functions of this Office)

### **Eligibility for Intercollegiate Athletics**

Eligibility for competition in intercollegiate athletics is regulated in general by the rules of the National Collegiate Athletic Association (NCAA), and specifically by current Conference and university regulations. The Director of Athletics is responsible for maintaining up-to-date intercollegiate athletics eligibility rules applicable to the University. The Faculty Athletic Representative has the responsibility for the interpretation of the NCAA, Conference, and university rules for determining student eligibility to represent the University in intercollegiate athletic events.

### **Eligibility for Student Activities**

Students on either academic or disciplinary probation may not participate on intercollegiate teams nor may they hold positions of leadership in chartered student organizations or coded student government groups. Students on probation may participate in such student organizations and groups as members but they may not hold an office or represent the University or the Associated Students, Incorporated, in any official capacity.

### **Student Conduct and Discipline**

It is expected that all Cal Poly students are enrolled for serious educational pursuits and that they conduct themselves so as to preserve an appropriate atmosphere of learning. It is also expected that all students who enroll at Cal Poly are willing to assume the responsibilities of citizenship in the campus community. Association in such a community is voluntary, and students may withdraw from it at any time that they consider the obligations of membership disproportionate to the benefits. While enrolled, students are subject to campus authority that includes the prerogative of dismissing those whose conduct is inimical to the aims of an institution of higher education.

While enrolled, students are subject to the regulations governing discipline stated in *Education Code* Section 66017 and in Title 5 of the *California Code of Regulations*, Sections 41301–41302, and to such rules and regulations as have been approved and promulgated by authority of the President. Copies of Title 5 *California Code of Regulations* 41301 and 41302, which deal specifically with student disciplinary regulations, are available to all students in the "Appendix" of this catalog. Other applicable regulations are contained in this Catalog, in the *Campus Administrative Policies*, the Standards for Student Conduct, Rights and Responsibilities, and in other official university publications, including the Cal Poly web site.

## 2009-11 Cal Poly Catalog

### Aerospace Engineering Department

## AERO–AEROSPACE ENGINEERING

### AERO 102 General Aviation (4)

Fundamentals of flight aerodynamics and principles. Introduction to power systems, instrumentation, flight planning, modern air navigation, weather data interpretation, flight computer uses, meteorology. Hands-on cockpit/taxi familiarization. Private pilot's examination preparation. Not a technical elective for engineering students. Field trip may be required. 4 lectures.

### AERO 103 Instrument Aviation (4)

Introduction to advanced aircraft instrumentation, flight planning, interpretation of weather data, and meteorology. Instrument navigation, uses of flight computer, subjects covered in instrument pilot's examination. Not acceptable as technical elective to engineering students. 4 lectures. Prerequisite: Private pilot certification.

### AERO 121 Aerospace Fundamentals (2)

Introduction to the engineering profession including the aeronautical and aerospace fields. Engineering approach to problem-solving and analysis of data obtained from experiments. Basic nomenclature and design criteria used in the aerospace industry. Applications to basic problems in the field. 1 lecture, 1 laboratory.

### AERO 200 Special Problems for Undergraduates (1–4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Consent of department head.

### AERO 215 Introduction to Aerospace Design (2)

Introduction to problem solving techniques and team-centered design projects in aerospace engineering. Primary emphasis on the solution of design problems in aerospace engineering using computers. 2 laboratories. Prerequisite: AERO 121, MATH 143. Recommended: CSC 111, IME 144.

### AERO 240 Additional Engineering Laboratory (1–4) (CR/NC)

Total credit limited to four units. Credit/No Credit grading. 1-4 laboratories.

### AERO 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### AERO 300 Aerospace Engineering Analysis (5)

Analytical methods for aerospace engineering problems. Topics include vector calculus, linear algebra, differential equations, Laplace transforms and Fourier series. Computer tools and numerical methods as applied to problems in aerodynamics, structures, stability and control and astronautics. 4 lectures, 1 laboratory. Prerequisite: PHYS 133, ME 211. Corequisite: MATH 244.

### AERO 301, 302, 303 Aerothermodynamics I, II, III (4) (4) (4)

Properties and characteristics of fluids, fluid statics and dynamics, the thermodynamic relations, laminar and turbulent flows, subsonic and supersonic flows as applied to flight vehicles. Introduction to heat transfer. 4 lectures, fall, winter and spring. **AERO 301** prerequisite: ME 211 and AERO 300. **AERO 302** prerequisite: AERO 301. **AERO 303** prerequisite: AERO 302. *Revised for clarification, effective Spring 2010.*

### AERO 304 Experimental Aerothermodynamics (2)

Laboratory experiments verify the momentum and energy equations. Fan performance, boundary layer measurements, diffuser performance, and induction pump performance experiments are evaluated. 1 lecture, 1 laboratory. Prerequisite: ENGL 149. Concurrent: AERO 302.

### AERO 306 Aerodynamics and Flight Performance (4)

Introduction to theoretical aerodynamics. Primary emphasis in the subsonic region, including compressibility effects. Basic aerodynamic theory: Airfoil theory, wing theory, lift and drag. Team-centered aerodynamic design. Flight performance. 4 lectures. Prerequisite: AERO 215, AERO 301. Concurrent: AERO 302.

### AERO 307 Experimental Aerodynamics (2)

Wind tunnel testing of basic aerodynamic properties of airfoils, finite wings, aircraft or spacecraft models, and vehicle flight performance. Emphasis on both static and dynamic responses of aircraft. Various measurement techniques, data reduction schemes, and analysis methods. 2 laboratories. Prerequisite: AERO 302, AERO 306, ENGL 149.

### AERO 310 Air and Space (4)

### GE Area F

Technological innovations that have led to modern aircraft and spacecraft as viewed from an historical perspective. Development of aerodynamics, propulsion systems, light-weight structures, and control systems. How aviation has affected, and been affected by, history. Impact of aviation on society, including civil and military aircraft/spacecraft. Federal regulation of aviation, including air traffic control and airlines. Future developments in air and space technology. 4 lectures. Prerequisite: Junior standing and completion of GE Area B. *Crosslisted as AERO/HNRS 310.* Fulfills GE Area F.

### AERO 320 Fundamentals of Guidance and Control (4)

Introduction to state-space and transfer function models for aircraft, spacecraft, missiles, and helicopters. Elementary classical and modern analysis techniques using computers. 4 lectures. Prerequisite: AERO 215, AERO 300. Concurrent: ME 212.

### AERO 331 Aerospace Structural Analysis I (4)

Deflection analysis. Principles of fictitious displacement, virtual work, and unit load method. Energy methods: Castigliano's theorem, Maxwell-Betti reciprocal theorem, minimum principles, Rayleigh-Ritz's method and Galerkin's method. Stress analysis of aircraft and spacecraft components. 4 lectures. Prerequisite: AERO 300, CE 207, and ME 212.

### AERO 360 Creative Problem Solving in Engineering Design (2)

The creative problem solving process for an engineering design team. How to explore context and causes as part of defining a design problem; the principles of brainstorming, synthesis, and judgment. Role of iteration, implementation, and communication. Importance of a diverse view, including: customers, products, processes, systems, ethics, and professional responsibility. Team-based applications to case studies and real-world engineering design problems. 2 laboratories. Prerequisite: PSY 350.

### AERO 400 Special Problems for Advanced Undergraduates (1–4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units. **Prerequisite: Consent of instructor. Effective Winter 2011.**

### AERO 401 Propulsion Systems (4)

Power plant types, components, characteristics, and requirements. Principles of thrust and energy utilization. Thermodynamic processes and performance of turboprop, turboshaft, turbofan, turbojet, ramjet, and rocket engines. 3 lectures, 1 laboratory. Prerequisite: AERO 303, CHEM 124.

### AERO 405 Supersonic and Hypersonic Aerodynamics (4)

Review of gas dynamics, shock-wave and boundary-layer interaction, aerodynamic design. 2-dimensional supersonic flows around thin airfoil; finite wing in supersonic flow. Local surface inclination methods for high-speed flight, boundary-layer and aerodynamic heating, viscous interactions. 4 lectures. Prerequisite: AERO 303, AERO 306.

### AERO 407 Reentry Aerodynamics (4)

Near planet environments. Transition from orbital to aero-dynamic motion. Aerodynamic heating and effects on design. 4 lectures. Prerequisite: AERO 405. Concurrent: AERO 451.

### AERO 409 Flight Test (4)

Overview of flight tests, test equations, and supporting facilities. Principles of team-centered flight testing with applications to performance, stability and control, and avionics systems testing. Test planning, instrumentation, data analysis and reports. 2 lectures, 2 laboratories. Prerequisite: AERO 306. Concurrent: AERO 320.

### AERO 416 Principles of Rotary Wing Flight (4)

Introduction to analysis of rotary wing aircraft. Overview of avionics systems. Performance figures of merit. Stability and control of helicopters. Equations of motion for forward flight. 4 lectures. Prerequisite: AERO 306, AERO 300.

### AERO 419 Simulation of Aerospace Vehicles and Systems (4)

Overview of flight simulators, aerospace avionics systems, and supporting facilities including simulation equations for flight mechanics and land navigation. Team-centered projects, reports, and presentations are emphasized with a strong focus on computer simulation of piloted flight. 2 lectures, 2 laboratories. Prerequisite: AERO 420.

### AERO 420 Stability and Control of Aerospace Vehicles (4)

Stability and control derivatives, reference frames, steady-state static analysis and perturbed dynamic analysis for aircraft and spacecraft. Transfer function, state-space, and modal representations of system dynamics in response to control inputs. Design guidelines and introduction to augmentation systems. 4 lectures. Prerequisite: AERO 306, AERO 320, and ME 212.

**AERO 421 Experimental Integrated Control System Analysis (1)**

Implementation of elementary control analysis techniques to design and build control systems for integrated aerospace vehicles, structures and thermal systems. Analysis of sensors and actuators as applied to control problems and data acquisition. Extended use of modern computational controller design tools and data analysis. 1 laboratory. Prerequisite: AERO 420.

**AERO 425 Aircraft Performance (4)**

Fundamentals of propeller and jet aircraft performance. Steady and accelerated flight. Equations of motion. Level flight, gliding, climbing, driftdown. Takeoff and landing. Federal Aviation Regulations (FARs). Range and endurance. Payload-range diagram. Maneuvering. V-n diagram. Turning and pull-ups. Stall and spin behavior. Energy methods. 4 lectures. Prerequisite: ME 212, AERO 306, AERO 300. *New course, effective Fall 2010.*

**AERO 431 Aerospace Structural Analysis II (4)**

Basic equations of elasticity with applications to typical aerospace structures. Concepts studied include analysis of aircraft and aerospace structures; airworthiness and airframe loads; structural constraints; elementary aeroelasticity; structural instability; introduction to modern fatigue; fracture mechanics; and composite structures analysis. 4 lectures. Prerequisite: AERO 331.

**AERO 432 Advanced Composite Structures Analysis (4)**

Review of isotropic material behavior. Behavior of unidirectional fiber composites. Properties of short-fiber composites and orthotropic lamina. Analysis of laminated composites. Stresses and strains of composites. Strength and hygrothermal behavior of composite materials. 3 lectures, 1 laboratory. Prerequisite: AERO 331.

**AERO 433 Experimental Stress Analysis (1)**

Employing the knowledge of stress analysis and aerospace structural analysis in an individual and group design project dealing with aerospace structures. 1 laboratory. Prerequisite: AERO 331, AERO 431.

**AERO 435 Aerospace Numerical Analysis (4)**

Taylor series. Finite difference calculus. Interpolation and extrapolation. Finite difference method. Basic equations of elasticity. Global stiffness matrix. Rayleigh-Ritz method. Galerkin method. Bernoulli-Euler beam element. Finite element formulation. Dynamic analysis. 3 lectures, 1 laboratory. Prerequisite: AERO 300, AERO 331.

**AERO 443, 444, 445 Aircraft Design I, II, III (4) (3) (3)**

Preliminary layout of a typical aircraft vehicle using design and calculation techniques developed in previous aerospace engineering courses. Design of a flight vehicle, including its structures and systems. Preparation of necessary drawings and a report. AERO 443: 2 lectures, 2 laboratories. AERO 444 and AERO 445: 3 laboratories. Prerequisite: Senior standing, IME 144, AERO 215, AERO 303, AERO 306, AERO 331, AERO 405, AERO 420, AERO 431. Concurrent: AERO 401. Open to students enrolled in the multidisciplinary design minor.

**AERO 446 Introduction to Space Systems (4)**

Basic satellite types and their applications. Major subsystems of a satellite system. Space environment, propulsion system, power system, structural design, spacecraft dynamics and attitude control, orbit mechanics, thermal control, communications, and ground segments. Spacecraft integration and testing. May also be available to offsite locations (Distance Education). 4 lectures. Prerequisite: ME 212, AERO 320.

**AERO 447, 448, 449 Spacecraft Design I, II, III (4) (3) (3)**

Preliminary layout of typical space vehicle using design and calculation techniques developed in previous aerospace engineering courses. Design of selected components and preparation of necessary drawings. AERO 447: 2 lectures, 2 laboratories. AERO 448 and AERO 449: 3 laboratories. Prerequisite: IME 144, AERO 215, AERO 303, AERO 331, AERO 420, AERO 431, AERO 446, AERO 451, senior standing. Concurrent: AERO 401. Open to students enrolled in the multidisciplinary design minor.

**AERO 450 Introduction to Aerospace Systems Engineering (4)**

Aerospace systems and subsystems. Systems integration. Development of system requirements. Analysis, modeling and simulation of complex systems. Project management. Cost analysis. Optimization and trade studies. 4 lectures. Prerequisite: Senior standing or consent of instructor.

**AERO 451 Spaceflight Dynamics I (4)**

Motion of a body in a central force field. Keplerian orbits. Orbital maneuvers. Launch vehicle trajectories. Rigid spacecraft attitude dynamics. Kinematic

variables: Euler angles and quaternions. 4 lectures. Prerequisite: ME 212, AERO 215, AERO 300, AERO 320.

**AERO 452 Spaceflight Dynamics II (4)**

Orbital motion, perturbing forces. Asphericity of the Earth, aerodynamic drag, third-body tidal forces, etc. Encke and Cowell solution techniques. Restricted 3-body problem. Satellite attitude dynamics, rigid body-symmetric and asymmetric semirigid bodies. Attitude control, spinning/fixed gravity gradient. 4 lectures. Prerequisite: AERO 451.

**AERO 461, 462 Senior Project I, II (2) (3)**

Selection and completion of a project which is typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 150 hours total time. Prerequisite: Senior standing.

**AERO 463, 464 Senior Project Laboratory I, II (2) (3)**

Selection and completion of a project by individuals or team which is typical of problems which graduates must solve in their fields of employment. Project involves, but is not limited to, physical modeling and testing of integrated design and may include students from other disciplines. Formulation of outline, literature review, and project schedule. AERO 463: 2 laboratories. AERO 464: 3 laboratories. Prerequisite: Senior standing. Note: although AERO 463, 464 substitute for AERO 461, 462, students may not use repeat credit for the purpose of increasing GPA.

**AERO 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**AERO 471 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

**AERO 493 Cooperative Education Experience (2) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 6 units. Prerequisite: Sophomore standing and consent of instructor.

**AERO 494 Cooperative Education Experience (6) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 18 units. Prerequisite: Sophomore standing and consent of instructor.

**AERO 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units. Prerequisite: Sophomore standing and consent of instructor.

**AERO 500 Individual Study (1-4)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Total credit limited to 12 units. Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

**AERO 510 Systems Engineering I (4)**

Project management. Scheduling and budgeting. Queuing theory. Process control and life-cycle cost analysis. Contracts and negotiation. 4 lectures. Prerequisite: Graduate standing or consent of instructor. *Crosslisted as AERO/IME 510.*

**AERO 511 Systems Engineering II (4)**

Risk management. Design strategies to meet system/mission requirements. Design for supportability, manufacturability, reliability, etc. Quality function development and quality control concepts. 4 lectures. Prerequisite: AERO 510 or IME 510, graduate standing or consent of instructor. *Crosslisted as AERO/IME 511.*



**AERO 512 Aerospace Vehicle Software Applications (4)**

Computer system requirements for aerospace vehicles. Typical aerospace vehicle computer architectures. Software testing, verification and validation. Vehicle automatic systems. Risks and benefits of vehicle autonomous operations. Integration of software with vehicle subsystems. Software development cost/schedule estimation. 4 lectures. Prerequisite: AERO 450, AERO 446. Graduate standing or consent of instructor.

**AERO 515 Continuum Mechanics (4)**

Vectors and tensors stress analysis. Analysis of deformation. Velocity fields and compatibility conditions. Constitutive equations. Isotropy. Mechanical properties of real fluids and solids. Field equations and boundary conditions in fluid mechanics problems and applications in elasticity. Active remodeling of structures. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**AERO 517 Multidisciplinary Design and Optimization (4)**

Numerical optimization applied to the design of complex systems. Multi-criteria decision making, unconstrained and constrained optimization methods, system sensitivity analysis, system decomposition techniques, and multidisciplinary design optimization. 4 lectures. Prerequisite: Familiarity with programming in Matlab. Graduate standing or consent of instructor. *New course, effective Spring 2010.*

**AERO 519 Fundamentals of Vehicle Dynamics and Control (4)**

Fundamentals of particle and rigid body dynamics as they apply to aerospace vehicles. Kinematic variables and coordinate transformations. Attitude dynamics. Fundamentals of feedback control and its application to aerospace systems. Stability analysis. Numerical simulation. 4 lectures. Prerequisite: Graduate standing or consent of instructor. Not open to students with credit in AERO 451 and AERO 452.

**AERO 520 Applied Airplane Aerodynamics (4)**

Fundamentals of analytic aerodynamics; potential flow, Kutta-Joukowski theorem. Schwarz-Christoffel transformation, lifting line theory, thin wing theory, three-dimensional lift and drag of wings, slender body theory. Panel methods. Boundary-layer effects on aerodynamics. Viscous flow. 4 seminars. Prerequisite: AERO 306, MATH 502, graduate standing or consent of instructor.

**AERO 521 Missile and Launch Vehicle Aerodynamics (4)**

The aerodynamics of missile configurations in subsonic, transonic, supersonic, and hypersonic flows. Slender bodies and wings at high angles of attack. Asymmetric flow separation and vortex shedding. Wing-body interactions. Control effectiveness. Drag prediction methods and aerodynamic heating. The impact of low observability on aerodynamic design. Missile configuration design. 4 lectures. Prerequisite: AERO 405, graduate standing, or consent of instructor.

**AERO 522 Boundary-Layer Theory (4)**

Concept of boundary-layer. Boundary-layer equations, similarity transformation, integral and differential methods for steady, two-dimensional laminar and turbulent boundary layers. 4 lectures. Prerequisite: AERO 302, graduate standing or consent of instructor.

**AERO 523 Turbulence (4)**

Flow physics of turbulence. Turbulence scales and structures. Reynolds equations. Vorticity dynamics. Energy production, convection, and dissipation. Similarity rules and turbulence modeling for jets, wakes, mixing and boundary layers. Effect of turbulence on noise, combustion, heat transfer, and flow control. 4 lectures. Prerequisite: AERO 302, graduate standing or consent of instructor.

**AERO 524 Low Gravity Fluid Dynamics and Heat Transfer (4)**

Low gravity environment. Mass, momentum and energy transport equations. Free and forced convections. Materials processing. Two-phase flows. Combustion and flame propagation. Turbulence. Fluid management in space. Students are expected to do self-study and make a presentation for the seminar. 3 lectures, 1 seminar. Prerequisite: AERO 301, AERO 302, and AERO 303, graduate standing or consent of instructor.

**AERO 525 Computational Fluid Dynamics (4)**

Classification of partial differential equations. Numerical methods applicable to the solution of elliptic, parabolic, and hyperbolic partial differential equations. Consideration of accuracy and stability of numerical methods. Application to the fundamental equations of fluid dynamics, grid generation, turbulence modeling. 4 lectures. Prerequisite: AERO 303, graduate standing or consent of instructor.

**AERO 526 Spacecraft Thermal/Fluid Control (4)**

Satellite thermal/fluid control hardware. Governing equations for flow and heat transfer. Surface tension and liquid/vapor interface. Heat transfer by free convection, forced convection and radiation in low-gravity environment. Heat pipes. Capillary-pumped loops. Cryogenic systems. Fluid management in space.

4 lectures. Prerequisite: AERO 301, AERO 302, and AERO 303, or graduate standing.

**AERO 530 Inelastic Structural Analysis (4)**

Inelastic stress analysis. Yield criteria. Strain hardening. Plastic straining and bending. Elastic-plastic problems. Plastic instability. Slip-line fields for plains. Plastic strain problems and analysis and introduction to viscoplasticity. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**AERO 532 Advanced Aerospace Composite Design (4)**

Behavior of composite materials. Bending, buckling, and vibration of laminated plates. Fatigue and fracture mechanics analysis of composite structures. Optimum design of composite pressure vessels. 2 seminars, 2 laboratories. Prerequisite: Graduate standing or consent of instructor.

**AERO 533 Finite Elements for Aerospace Structural Analysis (4)**

Overview of theoretical and applied methods of finite element analysis for aerospace structures including composite and light weight structures. Topics include basic equations of elasticity, solutions of linear systems of equations transformation, global stiffness matrix, Bernoulli-Euler element, plane stress triangles, finite element formulation, isoparametric elements, alternative formulation, eigenvalue problems and dynamic analysis. 3 lectures, 1 laboratory. Prerequisite: AERO 431.

**AERO 534 Aerospace Structural Dynamics Analysis (4)**

Fundamentals of structural dynamics and aeroelasticity of flight vehicles. Undamped and damped, free and forced vibration of a single and multi degree-of-freedom linear systems. Finite elements and vibrational analysis. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**AERO 535 Advanced Aerospace Structural Analysis (4)**

Types of failure. Theories of failure. Stability of structures. Advanced flight vehicle and fracture mechanics analysis and design. Fundamentals and applications of modern fatigue analysis in the aerospace industry. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**AERO 540 Elements of Rocket Propulsion (4)**

Thrust and impulse equations, propellant composition and mixture ratios, nozzle expansion ratios, solid and liquid propellant combustion, internal ballistics, thermo-chemical computations, chemical kinetics, and combustion instability, nozzle design and exhaust plumes. 4 seminars. Prerequisite: AERO 303, AERO 401, graduate standing or consent of instructor.

**AERO 541 Air Breathing Propulsion (4)**

Aerothermodynamics of propulsion systems, power plant selection and design, on-off design performance, component characterization, component design, component matching, optimization, and introduction to power plant and airframe integration systems for aircraft. 4 seminars. Prerequisite: AERO 401, graduate standing or consent of instructor.

**AERO 550 Analysis and Design of Flight Control Systems (4)**

Fundamental principles of flight control design and the application of the Cooper-Harper test and evaluation tool to modern aerospace vehicles. Human factors, issues, and automation, case study of the space shuttle. 3 lectures, 1 laboratory. Prerequisite: AERO 420, graduate standing or consent of instructor.

**AERO 551 Global Positioning Satellite Navigation Systems (4)**

Principles of Global Positioning Satellite navigation systems. Kalman filter design and application to integrated navigation and guidance systems. Statistical evaluation and test methods in aerospace. Interactive computer simulations. 3 lectures, 1 laboratory. Prerequisite: AERO 420, graduate standing or consent of instructor.

**AERO 552 Advanced Control of Spacecraft and Aircraft (4)**

Model following and digital control of aerospace craft, including dynamic estimation of vehicle states using Kalman filters and adaptive compensation. Team-centered projects involving optimal attitude control in deep space, hovering vehicles, and aeroelastic systems. Survey of non-linear, fuzzy, and neural net controllers for aerospace applications. 2 lectures, 2 laboratories. Prerequisite: AERO 420, graduate standing or consent of instructor.

**AERO 553 Advanced Linear Control Theory (4)**

Advanced linear control theory techniques and analytic and computational analysis. State space system representation, solutions to linear dynamic systems, stability analysis, full-state and output feedback, controllability and observability and advanced control topics. Computational methods applied to problems in stability and control of dynamic systems. 4 lectures. Prerequisite: AERO 320, graduate standing or consent of instructor.

**AERO 555 Piloted Flying Qualities of Aerospace Vehicles (4)**

Flying qualities prediction from flight test data and reduced-order analytical models of vehicles, systems, and human pilots. Application of the Cooper-Harper flight test scale to fly-by-wire aircraft, the space shuttle, and remotely controlled vehicles include rotorcraft. Team-centered projects, reports, and presentations are required. 2 lectures, 2 laboratories. Prerequisite: AERO 420.

**AERO 557 Advanced Orbital Mechanics (4)**

N-body orbit interactions, computer simulations, orbit determination, orbit and transfer optimization, libration points, halo orbits, and orbit perturbations. 4 lectures. Prerequisite: AERO 451, graduate standing, or consent of instructor.  
*New course, effective Spring 2011.*

**AERO 560 Spacecraft Dynamics and Control (4)**

Orbit determination and control. Orbit maneuvering and rendezvous. Attitude control of rigid spacecraft via reaction wheels, control moment gyros and thrusters. Modeling, analysis and control of flexible spacecraft. 4 lectures. Prerequisite: AERO 420, AERO 452, AERO 553, graduate standing or consent of instructor.

**AERO 561 Vehicle Integration and Testing (2)**

Space vehicle integration requirements and procedures. Clean room requirements and operations. Quality control and inspection. Qualification and acceptance testing requirements. Test equipment. Vibration and shock testing. Space environment and thermal-vac testing. Development of test procedures. 1 lecture, 1 laboratory. Prerequisite: AERO 446. AERO 450 recommended. Graduate standing or consent of instructor.

**AERO 562 Space Operations (2)**

Launch operations and vehicle integration with launch vehicle. In-orbit operations and maneuvers. Spacecraft tracking. Telemetry and command. Ground systems. Failure detection and identification. Emergency operations. 1 lecture, 1 laboratory. Prerequisite: AERO 446. AERO 450 recommended. Graduate standing or consent of instructor.

**AERO 565 Advanced Topics in Aircraft Design (4)**

Application of advanced analytic engineering methods to aircraft design problems. Analysis and synthesis of advanced topics related to design of aircraft. 4 lectures. Prerequisite: AERO 522, AERO 530 and AERO 550, graduate standing or consent of instructor. Concurrent: AERO 520.

**AERO 566 Advanced Topics in Spacecraft Design (4)**

Application of advanced engineering tools to the design of space vehicles. System architecture and mission design. Concept of operations. Requirements development and flow down. System and subsystems trade studies and preliminary design. 4 lectures. Prerequisite: AERO 450, AERO 446, graduate standing or consent of instructor.

**AERO 567 Launch Vehicle and Missile Design (4)**

Basic launch vehicle/missile types. Launch vehicle subsystems and their interactions. Vehicle requirements development and flow down. Payload accommodations. System and subsystems trade studies and preliminary design. 4 lectures. Prerequisite: AERO 401, AERO 450, AERO 446, graduate standing or consent of instructor.

**AERO 570 Selected Advanced Topics (4)**

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 4 lectures. Prerequisite: Graduate standing or consent of instructor.

**AERO 571 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Graduate standing or consent of instructor.

**AERO 572 Topics in Aircraft Manufacturing and Fabrication (1)**

Selected topics for assembling aircraft and aircraft components, including empennage, wing fuselage, engine, flight controls, avionics, finishing work, and flight testing. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor.

**AERO 593 Cooperative Education Experience (2) (CR/NC)**

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**AERO 594 Cooperative Education Experience (6) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**AERO 595 Cooperative Education Experience (12) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**AERO 599 Thesis (Design Project) (1-9)**

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis. Prerequisite: Graduate standing.

## 2009-11 Cal Poly Catalog

**Aerospace Engineering Department**  
**Flowchart**

**BS AEROSPACE ENGINEERING**

- ☐ 60 units upper division      ☐ GWR  
 ☐ 2.0 GPA      ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major, support or concentration courses  
 may be taken as credit/no credit.

**MAJOR COURSES**

AERO 121 Aerospace Fundamentals.....	2
AERO 215 Introduction to Aerospace Design.....	2
AERO 300 Aerospace Engineering Analysis.....	5
AERO 301, 302, 303 Aerothermodynamics .....	4,4,4
AERO 304 Experimental Aerothermodynamics .....	2
AERO 306 Aerodynamics and Flight Performance .....	4
AERO 307 Experimental Aerodynamics .....	2
AERO 320 Fundamentals of Guidance and Control .....	4
AERO 331 Aerospace Structural Analysis I .....	4
AERO 401 Propulsion Systems .....	4
AERO 420 Stability/Control of Aerospace Vehicles .....	4
AERO 431 Aerospace Structural Analysis II.....	4
AERO 433 Experimental Stress Analysis .....	1
AERO 446 Introduction to Space Systems .....	4
AERO 461, 462 Senior Project I, II or	
AERO 463, 464 Senior Project Laboratory I, II .....	2,3
CE 204 Mechanics of Materials I.....	3
CE 207 Mechanics of Materials II .....	3
EE 201, 251 Electric Circuit Theory and Lab.....	3,1
Concentration courses (see below).....	22
	<b>91</b>

**SUPPORT COURSES**

BIO 213 and ENGR/BRAE 213 (B2)*.....	2,2
CHEM 124 Gen Chem for Engineering (B3/B4)* ...	4
EE 321, 361 Electronics and Lab.....	3,1
ENGL 149 Technical Writing for Engineers (A3)* .....	4
IME 144 Intro Design and Manufacturing .....	4
MATE 210 Materials Engineering.....	3
MATH 141, 142 Calculus I, II (B1)* .....	4,4
MATH 143 Calculus III (Add'l Area B)* .....	4
MATH 241 Calculus IV.....	4
MATH 244 Linear Analysis I .....	4
ME 211 Engineering Statics.....	3
ME 212 Engineering Dynamics .....	3
PHYS 131 General Physics I or <b>PHYS 141 General</b>	4
<b>Physics IA</b> (Add'l Area B)* (5/23/12).....	
PHYS 132, 133 General Physics II, III.....	4,4
STAT 312 Statistical Methods for Engineers (B6)* .....	4
	<b>65</b>

**GENERAL EDUCATION (GE)**

72 units required, 32 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 8 units required at the 300 level.

**Area A Communication (8 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing * 4	
units in Support.....	0

**Area B Science and Mathematics (no add'l units req'd)**

B1 Mathematics/Statistics * 8 units in Support....	0
B2 Life Science * 4 units in Support.....	0
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	
B5 (requirement for Liberal Arts students only)	
B6 Upper-division Area B * 4 units in Support....	0
Additional Area B units* 8 units in Support.....	0

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
	<b>40</b>

<b>FREE ELECTIVES</b> .....	<b>0</b>
	<b>196</b>

**CONCENTRATIONS (select one)****Aeronautics Concentration**

AERO 405 Supersonic/Hypersonic Aerodynamics ....	4
AERO 443, 444, 445 Aircraft Design I, II, III.....	4,3,3
<sup>1</sup> Aeronautics approved electives.....	8

Select 8 units from the following:

AERO 407, 409, 416, 419, **425**, 432, 435, 450,  
 452, 470, 510, 511, 512, 515, **517**, 519, 520,  
 521, 522, 523, 524, 525, 526, 530, 532, 533,  
 534, 535, 540, 541, 550, 551, 552, 553, 555,  
**557**, 560, 561, 562, 565, 566, 567.

AERO 360, 570, 571 require a petition.

(5/2/11)

**22**

**Astronautics Concentration**

AERO 451 Spaceflight Dynamics I.....	4
AERO 447, 448, 449 Spacecraft Design I, II, III .....	4,3,3
<sup>1</sup> Astronautics approved electives.....	8

Select 8 units from the Aeronautics approved  
 electives list, above.

**22**

<sup>1</sup> Consultation with advisor is recommended prior to selecting  
 approved electives; bear in mind your selections may impact  
 pursuit of post-baccalaureate studies and/or goals.



**2009-11 Cal Poly Catalog****Agribusiness Department****BS AGRICULTURAL BUSINESS**

☐ 60 units upper division      ☐ GWR

☐ 2.0 GPA      ☐ USCP

\* = Required in Support; also satisfies GE

**MAJOR COURSES**

AGB 101 Introduction to Agribusiness .....	4
AGB 202 Sales, Communication, Leadership .....	4
AGB 212 Agricultural Economics.....	4
AGB 214 Agribusiness Financial Accounting.....	4
AGB 301 Food and Fiber Marketing.....	4
AGB 310 Agribusiness Credit and Finance.....	4
AGB 312 Agricultural Policy .....	4
AGB 313 Agricultural Economic Analysis .....	4
AGB 401 Managing Cultural Diversity in Agricultural Labor Relations (USCP).....	4
AGB 460 Research Methodology in Agribusiness (2) & AGB 461 Senior Project (2) <i>or</i> AGB 462 Senior Project (4) <i>or</i> AGB 463 Senior Project (4) <i>or</i> AGB 464 Senior Project (4) (6/14/13) .....	4
Concentration courses (see below) .....	28
	<b>68</b>

**SUPPORT COURSES**

BUS 207 Business Law .....	4
CHEM 110 World of Chem/Essentials (B3 & B4)* .....	4
Life science elective with lab (B2*) .....	4
<sup>1</sup> ECON 222 Macroeconomics (D2)* .....	4
<sup>2</sup> MATH 221 Calculus for Business & Econ. (B1)* .....	4
STAT 221 Probability/Statistical Inference (5) (B1)* <i>or</i> STAT 251 Stat Inference for Mgmt I (4) (6/13/13) .....	4-5
Any ASCI, PM <i>or</i> DSCI course .....	4
SS 121 Introductory Soil Science.....	4
Any FRSC, CRSC, HCS, PPSC, <b>EHS</b> <i>or</i> VGSC course (6/10/11) .....	4
AG 315/BRAE 340/BRAE 348/NR 312/NR 317/ NR 321/FSN 319 (Area F)* .....	4
<i>or any GE Area F course (8/18/11)</i> .....	4
Agricultural science electives .....	12
12 units in Agriculture with course prefixes other than AGB, AGC, AGED, <del>REC</del> RPTA, MSL and ERSC (except if crosslisted with SS). No AG prefixes except AG 315, AG 339, AG 360 and AG 450. No more than a combined total of 4 units in enterprise projects, special problems, internship and AG 243. (Corrected effective Summer 2009)	

**GENERAL EDUCATION (GE)**

72 units required, 24 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
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A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (no add'l units req'd)**

B1 Mathematics/Statistics * 8 units in Support.....	0
B2 Life Science * 4 units in Support.....	0
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy * 4 units in Support .....	0
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division)**

* 4 units in Support .....	0
	<b>48</b>

<b>FREE ELECTIVES</b> .....	<b>11-12</b>
	<b>180</b>

**CONCENTRATIONS or****INDIVIDUALIZED COURSE OF STUDY (select one)****Agribusiness Finance and Appraisal Concentration**

AGB 322 Principles of Agribusiness Management .....	4
AGB 324 Agric. Property Management and Sales...	4
AGB 326 Rural Property Appraisal .....	4
AGB 331 Farm Accounting <i>or</i> AGB 323 Agribusiness Managerial Accounting.....	4
AGB 410 Agricultural Lending.....	4
ECON 337 Money, Banking, and Credit.....	4
<sup>3</sup> Approved electives: Any 300-400 level AGB/BUS <i>or</i> foreign language (any level) course(s).....	4
	<b>28</b>

**Agribusiness Management Concentration**

AGB 321 Farm Records.....	4
AGB 322 Principles of Agribusiness Management .....	4
AGB 331 Farm Accounting <i>or</i> AGB 323 Agribusiness Managerial Accounting.....	4
AGB 433 Agricultural Price Analysis .....	4

**52-53**

<sup>1</sup> AGB majors: AGB 212 is prerequisite for ECON 222, not ECON 221.

<sup>2</sup> Prerequisite: Passing score on appropriate Mathematics Placement Examination, or MATH 118 or equivalent.

<sup>3</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

AGB 435 Linear Programming in Agriculture .....	4
AGB 456/404/452 .....	4
<sup>3</sup> Approved electives: Any 300-400 level AGB/BUS or foreign language (any level) course(s).....	4
	<u>28</u>

**Agribusiness Marketing Concentration**

AGB 318 Global Agricultural Marketing/Trade .....	4
AGB 323 Agribusiness Managerial Accounting .....	4
AGB 405 Agribus. Marketing Research Methods....	4
AGB 406 Agribusiness Marketing Planning <i>or</i> AGB 407 Agribusiness Marketing Plan Internship .....	4
AGB 421 Agribusiness Operations Analysis <i>or</i> AGB 433 Agricultural Price Analysis.....	4
AGB 450 Agribusiness Strategy Formulation .....	4
<sup>1</sup> Approved electives: Any 300-400 level AGB/BUS or foreign language (any level) course(s).....	4
	<u>28</u>

**Agribusiness Policy Concentration**

AGB 315 Land Economics.....	4
AGB 323 Agribusiness Managerial Accounting <i>or</i> AGB 435 Linear Programming .....	4
AGB 370 World Food Economy .....	4
AGB 409 California Agricultural Law .....	4
AGB 412 Advanced Agricultural Policy .....	4
AGB 421 Agribusiness Operations Analysis <i>or</i> AGB 433 Agricultural Price Analysis .....	4
<sup>1</sup> Approved electives: Any 300-400 level AGB/BUS or foreign language (any level) course(s).....	4
	<u>28</u>

**International Agribusiness Management Concentration**

AGB 318 Global Agricultural Marketing and Trade .....	4
AGB 323 Agribusiness Managerial Accounting .....	4
AGB 370 World Food Economy .....	4
AGB 422 Logistics in Global Agribusiness.....	4
AGB 450 Agribusiness Strategy Formulation <i>or</i> AGB 451 Strategy and Cases in International Agribusiness .....	4
BUS 433 International Finance .....	4
<sup>1</sup> Approved electives: Any 300-400 level AGB/BUS or foreign language (any level) course(s).....	4
	<u>28</u>

**Individualized Course of Study**

Advisor and department head pre-approval of courses is required .....	28
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<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

**2009-11 Cal Poly Catalog**  
**Agricultural Education & Communication**  
**Department**

***New program, effective Fall 2010***

**MASTER OF AGRICULTURAL EDUCATION**

**General Characteristics**

The Master of Agricultural Education program provides students with the opportunity to focus their graduate study in agricultural education, with an emphasis on preparing candidates for positions as teachers of agricultural education in public schools. The degree is a non-thesis, terminal program that provides practitioners with opportunities for professional development. At least one year of successful high school or community college teaching is required for completion of this degree program. Working with their advisor and graduate committee, students generally complete projects for coursework in the program that enhance their employment settings, or assist them to become compliant with statewide standards in agricultural education.

**Prerequisites**

For consideration as a graduate student, an applicant will have completed a bachelor's degree from an accredited college or university with a minimum grade point average of 2.75 in the last 90 quarter units. An applicant who meets these standards but lacks prerequisite coursework may be admitted as a conditionally classified student and must make up any deficiencies before advancement to classified graduate standing. An applicant not meeting these academic standards, but who meets the basic CSU standards of a grade point average of 2.5 in the last 90 quarter units attempted, may be conditionally admitted.

All applicants who do not speak and write English as their primary language are required to complete the Test of English as a Foreign Language (TOEFL), with a minimum score of 550, and the Test of Written English (TWE), with a minimum score of 4.5.

**Program of Study**

Graduate students must file a formal study plan for the degree with the Graduate Coordinator of the College of Agriculture, Food and Environmental Sciences no later than the end of the quarter in which the 12th unit of approved courses is completed. The formal program of study must include at least 45 units of committee-approved graduate coursework; at least half of the units required by the committee as reflected on the formal study plan must be at the 500 level. Students should refer to the course descriptions in the catalog for credit limitations of individual courses; for example, total credit for AG 500, Individual Study, is limited to six units. All candidates must meet the current Graduation Writing Requirement.

All students are required to pass an oral comprehensive examination which is normally given during the final quarter of the program of study. A written comprehensive exam is required of all students in the Master of Agricultural Education degree program.

**Required Courses**

AGED 520 Program Develop/Agric Education .....	3
AGED 522 Instructional Prog/Agric Mechanics .....	3
AGED 539 Internship .....	6

**Approved electives..... 33**

Any 400- and 500-level courses approved by the student's graduate committee. No fewer than 11 units must be at the 500 level. Students are required to complete one year of successful teaching prior to the comprehensive written and oral examinations.

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**2009-11 Cal Poly Catalog****Agricultural Education & Communication  
Department****BS AGRICULTURAL SCIENCE**

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                              ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major, support or concentration courses  
may be taken as credit/no credit.

**MAJOR COURSES**

AGED 102 Intro. to Agricultural Education or AGC 102 Orientation to Agricultural Communication.....	2
AGED 404 Agricultural Leadership.....	3
AGC 426 Presentation Methods in Agricultural Communication or EDUC 412 Schooling in a Democratic Society.....	4
AGED 460 Research Methodology in Agricultural Education and Communication.....	1
AGED/AGC 461 Senior Project.....	1
AGED/AGC 462 Senior Project.....	1
AG 360/ASCI 476/AG 450/AG 452 (2/28/11).....	3
AGB 202 Communication, Leadership and Management Skills for Agribusiness .....	4
AGB 301 Food and Fiber Marketing.....	4
AGB 401 Managing Cultural Diversity in Agricultural Labor Relations (USCP).....	4
ASCI 112 Principles of Animal Science.....	4
BRAE 121 Agricultural Mechanics.....	2
BRAE 141 Agricultural Machinery Safety.....	3
CRSC 123 Forage Crops or CRSC 132 California Field Crops or HCS 120 (5/7/10) (4/7/11).....	4
DSCI 230 General Dairy Husbandry .....	4
DSCI 231 General Dairy Manufacturing (3) and DSCI 232 Gen Dairy Mfg Lab (1), or FSN 230 Elements of Food Processing (4) .....	4
EHS 230 Environmental Horticulture .....	4
FRSC 230/VGSC 230/VGSC 190.....	4
PM 225 Introduction to Poultry Management .....	4
SS 121 Introductory Soil Science.....	4
Advisor approved electives .....	0 -7
(Corrected 5/20/10)	
Concentration courses (see below) .....	22
	<b>86 -93</b>

**SUPPORT COURSES**

CHEM 110 World of Chem/Essentials (B3 & B4)*	4
BRAE 340 Irrigation Water Management or BRAE 348 Energy for a Sustainable Society (Area F)* (2/28/12).....	4
MATH 118 Pre-Calculus Algebra (B1)*.....	4
(MATH 116 & MATH 117 substitute)	
NR 308 Fire and Safety or NR 323 Human Dimensions in Natural Resources Management (D5)* .....	4

- <sup>1</sup> Approved electives (Corrected 5/20/10) ..... 26 -27  
12-20 units must be 300-400 level depending  
on concentration. Career area programs may  
be selected from teaching agriculture, agri-  
cultural communication, or individualized:

**Teaching Agriculture**

BUS 212 or AGB 214 or AGB 321 (4), (3/16/15)  
AGED 330 (6) or AGED 303 (4) & AGED 350 (2),  
AGED 410 (2), (8/29/13)  
EDUC 410 (4), EDUC 414 (4),  
Plus six units from any of the following (if BUS  
212 is taken, then 4 units of 300-400 required):  
Any course with a prefix in AG, AGB, ASCI,  
BRAE, CRSC, DSCI, ERSC, FRSC, FSN, HCS,  
NR, PM, PPSC, RPTA, SS, VGSC, VS, WVIT;  
AGED 220; BUS 207; IME 142,  
ECON 201, 222; KINE 250, 255, 305;  
PHYS 121, 131

**Agricultural Communications**

AGC 339 (6), AGC 407 (4),  
JOUR 203 (4), JOUR 205 (4),  
COMS 301 (4),  
Plus one of the following:  
ENGL 310; GRC 377;  
JOUR 312, 331; RPTA 320, 420

**Individualized**

Courses that meet the requirements leading to a  
minor at Cal Poly. 12 to 20 units must be at the  
300-400 level to meet graduate requirements.

**42 -43****GENERAL EDUCATION (GE)**

72 units required, 16 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (8 units)**

B1 Mathematics/Statistics * 4 units in Support plus	4
B2 Life Science.....	4
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404)	
Note: POLS 112 is required for teaching credential candidates .....	4

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved  
electives; bear in mind your selections may impact pursuit of post-  
baccalaureate studies and/or goals.

D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) <b>Note: KINE 250 is required for teaching credential candidates</b> .....	4
D5 Upper-division elective *4 units in Support.....	0
<b>Area F Technology Elective (upper division)</b> * 4 units in Support.....	0
	<b>56</b>

**FREE ELECTIVES**

<b>Note: Electives within the College (CAFES), excluding AGED courses, are required for teaching credential candidates.</b> .....	<b>8 -0</b>
	<b>192</b>

**CONCENTRATIONS (select one)****Agricultural Engineering Technology Concentration**

BRAE 133 Engineering Design Graphics .....	2
BRAE 237 Intro to Engineering Surveying .....	2
BRAE 321 Agricultural Safety .....	3
BRAE 335 Internal Combustion Engines .....	4
<sup>1</sup> Approved electives (3 units at 300–400 level) .....	11
<i>Select 11 units from the following:</i>	
BRAE 129, 142, 151, 152, 231, 239, 240, 301, 324, 331, 337, 348, 438, 439, 481	
	<b>22</b>

**Agricultural Supplies and Services Concentration**

AGB 212 Agricultural Economics.....	4
AGB 310 Agribusiness Credit and Finance.....	4
AGB 312 Agricultural Policy .....	4
<sup>1</sup> Approved electives (2 units at 300–400 level) .....	10
<i>Select 10 units from the following:</i>	
AGB 214, 303, 313, 314, 318, 322, 323, 331, 370, 404, 409, 410, 427, 440, 443, 445, 455	
	<b>22</b>

**Animal Science Concentration**

Select two: ASCI 221, 222, 223 .....	4,4
ASCI 220 Intro Animal Nutrition and Feeding <i>or DSCI 101 Dairy Feeds and Feeding (5/27/10)</i> .....	4
DSCI 330 Artificial Insemination and Embryo Biotechnology .....	4
<sup>1</sup> Approved electives .....	6
<i>Select 6 units from the following:</i>	
ASCI 311, 326, 329, 384, 412, 413, 415, 425, 430, 476, 480; ASCI/PM 305, 325, 330, 342; DSCI 301, 333, 435	
	<b>22</b>

**Crop and Soil Science Concentration**

ERSC 202 Soil Erosion and Water Conservation ....	4
FRSC 230 California Fruit Growing <i>or</i> VGSC 230 Introduction to Vegetable Science (Select course not taken in major column) .....	4
PPSC 311 Agricultural Entomology .....	4
SS 221 Fertilizers .....	4
<sup>1</sup> Approved electives .....	6
<i>Select 6 units from the following:</i>	
CRSC 333, 421, 445; CRSC/FRSC 422; FRSC 342; HCS 421; VGSC 423, 424	

**22****Forestry and Natural Resources Concentration**

BIO 227 Wildlife Conservation Biology.....	4
NR 142 Environmental Management .....	3
NR 208 Dendrology .....	4
NR 306 Natural Resource Ecology and Habitat Management .....	4
<sup>1</sup> Approved electives .....	7
<i>Select 7 units from the following:</i>	
NR 312, 320, 321, 402; NR/CRP 404, 408; NR/ES 308 or NR 323; NR/ES 360; NR/GEOG/LA 317; NR/LA 318	

**22****Ornamental Horticulture Concentration**

EHS 123 Landscape Installation and Maintenance	4
HCS 120 Principles of Horticulture and Crop Science .....	4
HCS 124 Plant Propagation .....	4
EHS 438 Teaching Methods in Environmental Horticulture .....	4
<sup>1</sup> Approved electives .....	6
<i>Select 6 units from the following:</i>	
EHS 324, 325, 337, 343, 402, 421, 422, 424, 433, 434; EHS/RPTA 430	

**22**

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.



**2009-11 Cal Poly Catalog**  
**BioResource and Agricultural**  
**Engineering Dept**

**BS AGRICULTURAL SYSTEMS  
MANAGEMENT**

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                      ☐ USCP

\* = Required in Major/Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

BRAE 128 Careers in Bioresource/Agric. Engr .....	2
BRAE 129 Laboratory Skills and Safety .....	1
BRAE 133 Engineering Design Graphics .....	2
BRAE 141 Agricultural Machinery Safety .....	3
BRAE 142 Agric Power and Machinery Mgt .....	4
BRAE 151 CAD for Agricultural Engineering .....	1
BRAE 203 Agricultural Systems Analysis .....	3
BRAE 237 Intro to Engineering Surveying or	
BRAE 239 Engineering Surveying .....	2/4
BRAE 301 Hydraulic/Mechanical Power Systems	4
BRAE 321 Agricultural Safety .....	3
BRAE 324 Principles Agricultural Electrification ...	4
BRAE 340 Irrigation Water Management .....	4
BRAE 342 Agricultural Materials .....	4
BRAE 343 Mechanical Systems Analysis .....	4
BRAE 348 Energy for a Sustainable Society	
(Area F)* .....	4
BRAE 418 Agricultural Systems Management I .....	4
BRAE 419 Agricultural Systems Management II .....	4
BRAE 425 Computer Controls for Agriculture .....	3
BRAE 432 Agricultural Buildings .....	4
BRAE 460 Senior Project Organization .....	1
BRAE 461 Senior Project I .....	2
BRAE 462 Senior Project II .....	2
<sup>1</sup> Approved electives .....	16

Select 16 units from the following, with a minimum of 8 units upper division, and no more than 4 units internship or enterprise:  
any AGB course eligible for the AGB minor;  
AGED 202, 330;  
any ASCI course except ASCI 101, 200, 212, 400, 412, 413, 425;  
BRAE 152, 236, 302, 331, 335, **337**, 344, 345, 405, 435, 438, 439, 440, 447, 448, 532; (**4/19/12**)  
any DSCI course except DSCI 123;  
CHEM 212;  
any course in CM minor;  
any CRSC course;  
any FRSC course;  
FNR 306, 318, 408, 416;  
FSN 125, 204, 230, 270 **or 370**, 275, 323, 330, 334, 341, 354, 444; (**6/13/13**)  
any HCS course except HCS 110;  
IME 141, 142, 143, 144, 157, 319, 320;  
IT 260, 327, 330, 341;

any PPSC course except PPSC 110;  
any PM course;  
SS 221;  
any VGSC course;  
any WVIT course except WVIT 101

Total units for MAJOR COURSES:

**81/83**

**SUPPORT COURSES**

AGB 212 Agricultural Economics .....	4
AGB 301 Food and Fiber Marketing .....	4
AGB 310 Agribusiness Credit and Finance .....	4
AGB 401 Managing Cultural Diversity in	
Agricultural Labor .....	4
BUS 212 Financial Accounting for Nonbusiness	
Majors <b>or AGB 214 Agribusiness Financial</b>	
<b>Accounting or</b> AGB 321 Farm Records	
( <b>12/13/12</b> ) .....	4
CHEM 110 World of Chemistry - Essentials <b>or</b>	
CHEM 111 Survey of Chemistry (B3 & B4)* .....	4/5
CSC 110/CSC 113/CSC 232 .....	3
ENGL 148 Reasoning, Argumentation, and	
Professional Writing <b>or ENGL 145 Reasoning,</b>	
<b>Argumentation and Writing (A3)* (6/23/09)</b> .....	4
MATH 118 Pre-Calculus Algebra (B1)* .....	4
MATH 119 Pre-Calculus Trigonometry (B1)* .....	4
PHYS 121 College Physics I .....	4
SS 121 Introductory Soil Science .....	4
Animal or plant production course .....	3
Any ASCI, CRSC, DSCI, FRSC, HCS, PM,	
PPSC, VGSC course except for internship or	
enterprise courses.	

**50/51**

**GENERAL EDUCATION (GE)**

72 units required, 20 of which are specified in Major/Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (8 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing * 4	
units in Support .....	0

**Area B Science and Mathematics (4 units)**

B1 Mathematics/Statistics * 8 units in Support .....	0
B2 Life Science .....	4
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division)**

* 4 units in Major .....	0
	<u>52</u>

<b>FREE ELECTIVES</b> .....	<u>0</u>
	<b>183</b>



**2009-11 Cal Poly Catalog****Animal Science Department****BS ANIMAL SCIENCE**

- ☐ 60 units upper division ☐ GWR  
☐ 2.0 GPA ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major or support courses  
may be taken as credit/no credit.

**MAJOR COURSES**

ASCI 101 Introduction to the Animal Sciences.....	2
ASCI 112 Principles of Animal Science.....	4
ASCI 211 Meat Science .....	4
ASCI 220 Intro. Animal Nutrition and Feeding .....	4
ASCI 304 Animal Breeding .....	3
ASCI 320/CHEM 313/CHEM 371.....	4-5
ASCI 351 Reproductive Physiology.....	4
<del>ASCI 461 Senior Project Planning.....</del>	<del>1</del>
<del>ASCI 462 Senior Project.....</del>	<del>2</del>
<del>ASCI 476 Issues in Animal Agriculture.....</del>	<del>3</del>
ASCI 476 (3), or ASCI 477 (3), or ASCI 478 (3), or ASCI 461, 462 (1) (2), or ASCI 479 (3) (5/25/10)(5/31/12) .....	3
ASCI <del>363-463</del> Undergraduate Seminar ( <i>Winter 2011</i> ) .	2
VS/ASCI 229 Anatomy and Physiology of Farm Animals.....	4
Production courses (select one from each of the three categories):.....	12
<u>Ruminants</u> : ASCI 221 Intro. Beef Prod. (4) or ASCI 223 Syst. Sheep Prod. (4)	
<u>Nonruminants</u> : PM/ASCI 225 Intro. Poultry Mgmt (4) or ASCI 222 Syst. Swine Prod. (4)	
<u>Companion Animals</u> : ASCI 224 Equine Science (4) or ASCI 227 Companion Animal Sci. (4)	
Nutrition (select one).....	3-4
ASCI 346, 350, 355, 420; DSCI 301	
Physiology (select one).....	3-5
ASCI 333, 347, 366, 405, 406; DSCI 330; VS/ASCI 438, 440	
Technology/Management (select two).....	6-9
AG 360/AG 450; ASCI 310, 311, 329, 384, 403, 406, 410, 415, 450, 455; PM/ASCI 325, 330, 342; VS/ASCI 312, 440 (3/24/14) (12/11/14)	
Approved electives. ....	<del>28-35</del>
Select courses from a career elective area (CEA); see Approved Electives Guide, below.	31-38
	<b>96</b>

**SUPPORT COURSES**

BIO 111 General Biology or BIO 161 Intro to Cellular and Molecular Biology (B2 & B4)*.....	4
BIO 302/BIO 303/BIO 351 .....	4/5
CHEM 111/127 Survey of Chemistry (B3&B4)*.....	5/4
CHEM 312 Survey of Organic Chemistry or CHEM 316 Organic Chemistry ( <i>transfer</i> <i>equivalents</i> CHEM 212, 216) .....	5
MATH 118 Pre-Calculus Algebra ( <i>MATH 116 &amp;</i> <i>117 substitute</i> ) or MATH 161 Calculus Life Sciences I (B1)* .....	4

**21-23****GENERAL EDUCATION (GE)**

72 units required, 12 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (4 units)**

B1 Mathematics/Statistics * 4 units in Support plus	4
B2 Life Science * 4 units in Support.....	0
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division) (4 units) ..****4****60****FREE ELECTIVES.....****1-3****180****Approved Electives Guide**

Approved electives have been categorized by career area to guide students in their selections. Advisor approval of electives is not required, but consultation with an advisor is recommended. Bear in mind that selection may impact pursuit of post-baccalaureate studies and/or goals.

**Approved Career Elective Areas..... 31-38**

Select Career Elective Area (CEA) of choice:

**Pre-Veterinary Medicine Career Elective Area**

a) Core (26 units):

BIO 161<sup>†</sup>, 162, 303<sup>†</sup>, 351<sup>†</sup>;

CHEM 128, 129, 317;

PHYS 121, 122;

b) Select 5-12 units from:

ASCI 315<sup>†</sup>, 320<sup>†</sup>, 333<sup>†</sup>, 339<sup>††</sup>, 347<sup>†</sup>,

366<sup>†</sup>, 405<sup>†</sup>, 420<sup>†</sup>;

ASCI/PM 290/490<sup>††</sup>;

CHEM 127<sup>†</sup>, 318, 371<sup>†</sup>, 372;

DSCI 330<sup>†</sup>;

MATH/HNRS 141/MATH 161(B1);

MATH/HNRS 142/MATH 162 (B1);

MCRO 221; PHYS 123;

STAT 218 (B1); VS/ASCI 438<sup>†</sup>, 440<sup>†</sup>

<sup>†</sup> If any of these courses is taken to meet a major/support requirement, it cannot be double-counted as an approved elective.

<sup>††</sup> A maximum of 6 units of CR/NC courses may be counted toward the degree.

*Biotechnology Career Elective Area*

ASCI 339<sup>††</sup>, 366<sup>†</sup>, 403<sup>†</sup>, 405<sup>†</sup>, 406<sup>†</sup>;  
 ASCI/PM 290/490<sup>††</sup>; ASCI/VS 440<sup>†</sup>;  
 BIO 161<sup>†</sup>, 162, 351<sup>†</sup>;  
 BIO/CHEM 375, 476;  
 CHEM 127<sup>†</sup> 128, 129, 316<sup>†</sup>, 317, 373, 377,  
 474, 477, 478;  
 MCRO 221, 224, 225;  
 SCM 201

*Food Animal Production Career Elective Area*

AG 360<sup>†</sup> (GE Area F);  
 AGB 321, 322, 401 (USCP);  
 ASCI 221<sup>†</sup>, 222<sup>†</sup>, 223<sup>†</sup>, 226,  
 311<sup>†</sup>, 329<sup>†</sup>, 339<sup>††</sup>, 450<sup>†</sup>;  
 ASCI/PM 225<sup>†</sup>, 290/490<sup>††</sup>;  
 BIO 427;  
 CRSC 123;  
 DSCI 230;  
 NR 142; NR/LA 318;  
 SPAN 101;  
 SS 121;  
 VS/ASCI 312<sup>†</sup>

*Comparative Animal Biology Studies Career Elective Area*

ASCI 339<sup>††</sup>;  
 ASCI/PM 290/490<sup>††</sup>;  
 ASCI/VS 203, 321;  
 BIO 113, 162, 227, 263, 325, 327;  
 PSY 458;  
 ZOO 321, 323, 341, 425, 437

*Equine Science Career Elective Area*

ASCI 214, 224<sup>†</sup>, 228, 265, 315<sup>†</sup>,  
 324, 329<sup>†</sup>, 333<sup>†</sup>, 339<sup>††</sup>, 344, 345, 346<sup>†</sup>,  
 347<sup>†</sup>, 455<sup>†</sup>;  
 ASCI/PM 290/490<sup>††</sup>

*Poultry Management Career Elective Area*

a) Core (24 units):  
 ASCI 330<sup>†</sup>, 350<sup>†</sup>, 415<sup>†</sup>;  
 ASCI/PM 225<sup>†</sup>, 325<sup>†</sup>, 342  
 b) Select 7-14 units from:  
 AGB 310, 317, 409;  
 ASCI 339<sup>††</sup>;  
 ASCI/PM 290/490<sup>††</sup>;  
 ASCI/VS 440<sup>†</sup>;  
 BUS 207, 212, 346;  
 ENGL 310;  
 FSN 270, 275, 323, 334, 335

*Rangeland Resource Management Career Elective Area*

AG 360<sup>†</sup> (GE Area F);  
 ASCI 311<sup>†</sup>, 329<sup>†</sup>; ASCI/PM 290/490<sup>††</sup>;  
 BIO 263, 435;  
 NR 306, 320, 335, 418;  
 NR/CRP 404; NR/LA 318;  
 SS 121, 321

*Meat Science Career Elective Area*

ASCI 216, 339<sup>††</sup>, 384<sup>†</sup>, 415<sup>†</sup>,  
 425, 480;  
 ASCI/PM 290/490<sup>††</sup>;  
 FSN 125, 270, 275;  
 MCRO 221, 421

*Agribusiness Career Elective Area*

a) Core (28 units):  
 AGB 212, 301, 310, 312, 322, 401 (USCP);  
 AGB 214/AGB 321/BUS 212  
 b) Select 3-10 units from:  
 AGB 313, 315;  
 ASCI 311<sup>†</sup>, 329<sup>†</sup>, 384<sup>†</sup>, 415<sup>†</sup>;  
 ASCI/PM 290/490<sup>††</sup>

<sup>†</sup> If any of these courses is taken to meet a major/support requirement, it cannot be double-counted as an approved elective.

<sup>††</sup> A maximum of 6 units of CR/NC courses may be counted toward the degree.

**2009-11 Cal Poly Catalog****Social Sciences Department****BS ANTHROPOLOGY and GEOGRAPHY**

☐ 60 units upper division

☐ GWR

☐ 2.0 GPA

☐ USCP

\* = Satisfies General Education requirement

Note: No major, support or concentration courses may be taken as credit/no credit.

**MAJOR COURSES**

ANT 201 Cultural Anthropology (D3)* .....	4
ANT 202 World Prehistory .....	4
ANT 250 Biological Anthropology (B2)* .....	4
ANT 360 Human Cultural Adaptations .....	4
GEOG 150 Intro. to Cultural Geography .....	4
GEOG 250 Physical Geography .....	4
GEOG 308 Global Geography .....	4
GEOG 318 Applications in GIS .....	4
GEOG 333 Human Impact on the Earth .....	4
ANT/GEOG 455 Anthropology-Geography Research Design and Methods .....	4
ANT 465/GEOG 465 Internship .....	4
(or approved study abroad course)	
Methodological elective (select one): .....	4
GEOG 317 (Area F)*, 328, 440; ANT 310, 311	
Regional Geography elective (select one): .....	4
GEOG 300, 340, 360, 370	
ANT electives (300-400 level) .....	8
GEOG elective (300-400 level) .....	4
Concentration or individualized course of study (at least 16 units 300-400 level) .....	28
STAT 217/221 Intro. Statistics (B1)* .....	4
ANT 461 and ANT 462 Senior Project I, II or GEOG 461 and GEOG 462 Senior Project I, II...	2,2
	<b>100</b>

**GENERAL EDUCATION (GE)**

72 units required; 12 units are in Major.

→See page 56 for complete GE course listing.

→Minimum of 12 units required at the 300-400 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (12 units)**

B1 Mathematics/Statistics * 4 units in Major .....	4
B2 Life Science * 4 units in Major .....	0
B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	
B5 elective .....	4

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions * 4 units in Major .....	0
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective (Not ANT or GEOG courses) .....	4

**Area F Technology Elective (upper division) .....****60****FREE ELECTIVES .....****20****180****CONCENTRATION OR INDIVIDUALIZED COURSE OF STUDY (select one)****Cross-Cultural Studies and International Development Concentration**

GEOG 408 Geography of Development .....	4
SOC 309 The World System and Its Problems .....	4
ANT 401 Culture and Health .....	4
Problems and Issues courses to be selected from: ...	16
ANT 330, 345; BUS 302; CRP 334 (D5); ECON 325 (D5); GEOG 301, 328, 370, 440; HIST 314, 417 or 316, 430; HUM 310 (C4); POLS 325 (D5) or POLS 328, 333 (Area F); SOC 431; WGS 320 (D5); foreign language (121 or 201) or credit for a comparable level of proficiency	

**(8/30/13)****28****Environmental Studies and Sustainability Concentration**

GEOG 301 Geography of Resource Utilization .....	4
GEOG 325 Climate and Humanity .....	4
GEOG 328 Applications in Remote Sensing .....	4
GEOG 414 Global and Regional Climatology .....	4
Any two of the following specialized electives: .....	8

BIO 113 (B2&B4), 114 (B2&B4); BRAE 415,  
ERSC 202, 223, 323; GEOG 415, GEOL 201,  
203 (B5), 204, 205 (B3); LA 221; PSC 201 (**B5**  
**DS**); SS 121 (B5) **Corrected 11/18/10**

Any one of the following electives: .....

4

AG 360 (F); ANT 312; BIO 112 (B5), 227 (B2);  
BRAE 348 (F); CRP 336, EDES 406; ENVE 330;  
ES/NR 308 (D5); ME 321 (F) or PSC 320 (F)

**28****Human Ecology Concentration**

ANT 345 Human Behavioral Ecology .....	4
ANT 401 Culture and Health .....	4
GEOG 325 Climate and Humanity .....	4
Applications and Issues courses to be selected from:	16
ANT 309, 310, 311, 312, 320, 325, 330, 344, 415 (USCP); GEOG 301, 317 (F), 340, 370, 414, 415, 440 .....	

**28**

**Teaching Concentration**

EDUC 300 Introduction to Teaching .....	3
ANT/GEOG 400 Special Problems .....	1
<i>Two of the following:</i> .....	8
GEOG 300, 340, 360, 370	
<i>One of the following:</i> .....	4
PSY 306, SOC 306, 316 (USCP), 406	
<i>Any three of the following electives:</i> .....	12
ANT 330, 415 (USCP); ECON 304; HIST 320, 321, 322; POLS 343 (USCP)	
	<hr/>
	28

**Individualized Course of Study** ..... 28

## 2009-11 Cal Poly Catalog

### Architectural Engineering Department

#### ARCE–ARCHITECTURAL ENGINEERING

Note: All ARCE majors must obtain a grade of C- or better in ARCE courses that are prerequisites for other ARCE courses.

##### ARCE 211 Structures I (3)

Introduction to the role of structures in the making of buildings. Introduction to statics and creation of simple three-dimensional structures. Development of skills to analyze structures composed of axial force (truss) members. 2 lectures, 1 activity. Prerequisite: For ARCE majors: PHYS 131, MATH 142; for ARCH and CM majors: PHYS 121 or PHYS 131, MATH 142 or MATH 182.

##### ARCE 212 Structures II (3)

Introduction to the role of structures in the making of buildings. Introduction to shear and moment diagrams using the principles of statics and the application of the diagrams to simple three-dimensional structures. Development of skills, particularly free body diagrams, to analyze structures composed of bending (beams) members. 2 lectures, 1 activity. Prerequisite: ARCE 211.

##### ARCE 221 Elementary Structures (3)

Forces on building structures. Static equilibrium and stability of structural systems. Shear and bending moment diagrams. 3 lectures. Prerequisite: PHYS 131, MATH 142.

##### ARCE 222 Introduction to Mechanics of Structural Members (3)

Stress-strain relationships. Stresses and deformations in structural members due to axial force, shear, torsion, and moment. 3 lectures. Prerequisite: ARCE 221.

##### ARCE 223 Mechanics of Structural Members (4)

Advanced topics of stresses in beams. Plastic bending, unsymmetrical bending. Combined stresses. Stress transformation. Buckling. Deflection of beams. Material test laboratory. 3 lectures, 1 laboratory. Prerequisite: ARCE 212 or ARCE 222. Concurrent: ARCE 351.

##### ARCE 225 Dynamics (3)

Dynamics of particles and rigid bodies. Introduction to vibrations of spring/mass/damper systems. 3 lectures. Prerequisite: ARCE 211 or ARCE 221 and MATH 241.

##### ARCE 226 Structural Systems for Architects (3)

Description, behavior and comparison of structural building systems. Concepts of structural stability, load flow, framing schemes and building configuration related to vertical and lateral loads. For architecture and construction management students. 3 lectures. Prerequisite: ARCE 212 or ARCE 222.

##### ARCE 227 Structures III (2)

Continuation of selected concepts covered in ARCE 211 and ARCE 212. Advanced topics in two-dimensional and three-dimensional equilibrium of structural building systems. 2 lectures. Prerequisite: ARCE 222 or ARCE 212.

##### ARCE 240 Additional Engineering Laboratory (1–2)

Total credit limited to 4 units, with a maximum of 2 units per quarter. 1 or 2 laboratories.

##### ARCE 257 Structural CAD for Building Design (2)

Emphasis on the use of computer graphics software to represent a building's structural system and its individual elements. 1 lecture, 1 laboratory. Prerequisite: ARCH 123 or ARCH 133, CM 211. *Change effective Winter 2011.*

##### ARCE 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### ARCE 302 Structural Analysis (4)

Analysis of statically indeterminate structures using virtual work, slope deflection, the force method and moment distribution. Analysis of structural systems using approximate methods and influence lines. 4 lectures. Prerequisite: ARCE 223 and ARCE 227. Concurrent: ARCE 352.

##### ARCE 303 Steel Design I (3)

Analysis and design of steel structural members subjected to bending, shear and axial forces. 3 lectures. Prerequisite: ARCE 227. Corequisite: ARCE 302 and ARCE 371.

##### ARCE 304 Timber Design (3)

Analysis and design of timber structural members subjected to bending, shear, and axial forces. Wood diaphragms, shear walls and their connections. 3 lectures. Prerequisite: ARCE 223, ARCE 227, and ARCE 371.

##### ARCE 305 Masonry Design (2)

Design of load-bearing walls, shear walls, columns and beams in masonry. 2 lectures. Prerequisite: ARCE 223, ARCE 227, and ARCE 371.

##### ARCE 306 Matrix Analysis of Structures (3)

Analysis of statically indeterminate structures by direct stiffness method including continuous beams, plane trusses, and frames. Introduction to finite-element methods. 3 lectures. Prerequisite: ARCE 302. Concurrent: ARCE 353.

##### ARCE 311 Structures for Landscape Architects (3)

Structural concepts related to landscape architecture. Design of retaining walls, decks, trellises, bridges and large-scale covered spaces. 3 lectures.

##### ARCE 315 Small Scale Structures (4)

Introduction to structures that use timber and steel as the primary construction material. Introduction to gravity load carrying systems and lateral load resisting systems using steel and timber elements. Development of skills to analyze structures using free body diagrams and the concept of load flow. 4 lectures. Prerequisite: ARCE 226.

##### ARCE 316 Large Scale Structures (4)

Introduction to structures that use steel and concrete as the primary construction material. Introduction to gravity load carrying systems and lateral load resisting systems using steel and concrete elements. Development of skills to analyze structures using free body diagrams and the concept of load flow. 4 lectures. Prerequisite: ARCE 315.

##### ARCE 321 Timber Structural Systems (3)

Concepts related to system behavior; selection; design and construction specific to timber structures. Preliminary member design and detailing. Load flow implications related to building configurations; including vertical and lateral load resisting elements. For architecture and construction management students. 3 lectures. Prerequisite: ARCE 226. May not be taken concurrently with ARCE 322 or ARCE 323.

##### ARCE 322 Steel Structural Systems (3)

Concepts related to system behavior; selection; design and construction specific to steel structures. Preliminary member design and detailing. Load flow implications related to building configurations; including vertical and lateral force resisting elements. For architecture and construction management students. 3 lectures. Prerequisite: ARCE 226. May not be taken concurrently with ARCE 321 or ARCE 323.

##### ARCE 323 Concrete Structural Systems (3)

Concepts related to system behavior; selection; design and construction specific to concrete structures. Preliminary member design and detailing. Load flow implications related to building configurations; including vertical and lateral force resisting elements. Introduction to issues related to foundation design. For architecture and construction management students. 3 lectures. Prerequisite: ARCE 226. May not be taken concurrently with ARCE 321 or ARCE 322.

##### ARCE 351 Structural Computing Analysis I (1)

Computer calculations, programming basics and technical reporting. Emphasis on use of spreadsheets as a tool to analyze structural elements. 1 laboratory. Prerequisite: ARCE 212 or ARCE 222. Concurrent: ARCE 223.

##### ARCE 352 Structural Computing Analysis II (1)

Computer calculations, programming and technical reporting. Emphasis on use of two-dimensional structural analysis software to analyze a building's structural system and its individual elements. 1 laboratory. Prerequisite: ARCE 223, ARCE 351, CSC 231 or CSC 234 or approved equivalent. Concurrent: ARCE 302.

##### ARCE 353 Structural Computing Analysis III (1)

Emphasis on the use of nonplanar structural analysis software to analyze a building's structural system and its individual elements. 1 laboratory. Prerequisite: ARCE 302, ARCE 352. Concurrent: ARCE 306.

##### ARCE 371 Structural Systems Laboratory (3)

Studies in the relationship of structural framing to overall building geometry. Emphasis on the stability of structural configurations, calculation of building loads and development of a complete gravity and lateral load path. 3 laboratories. Prerequisite: ARCE 223, ARCE 227, and third year standing in Architectural Engineering. Corequisite: ARCE 302.

##### ARCE 372 Steel Structures Design Laboratory (3)

Steel framed project incorporating structural system configuration and selection, structural analysis for gravity and lateral loads, and construction drawings and



specifications. Integration of building services and architectural design, constructability issues, and relationships between construction methods and cost. 3 laboratories. Prerequisite: ARCE 257, ARCE 302, ARCE 303, ARCE 352 and ARCE 371. Cannot be taken concurrently with ARCE 451 or ARCE 452.

**ARCE 400 Special Problems for Advanced Undergraduates (1–2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

**ARCE 403 Advanced Steel Structures Laboratory (3)**

Advanced topics in design and construction of steel structures, such as: plate girders, plastic design of beams and frames, and composite beam design, load and resistance factor design, and advanced topics related to moment frames and braced frames. 3 laboratories. Prerequisite: ARCE 303.

**ARCE 412 Dynamics of Framed Structures (3)**

Analysis of structures subjected to dynamic loads with single- and multi-degrees of freedom. Development of techniques for analysis of structures in response to time varying loads. 3 lectures. Prerequisite: ARCE 225 or ME 212, MATH 244, and ARCE 306.

**ARCE 414 Precast Concrete (3)**

Precast and prestressed concrete principles, materials and techniques of construction. Design of basic precast elements and connections and prestressed concrete fundamentals as applied to precast concrete. Design potentials, aesthetics, cost and construction time as related to buildings and other structures. 3 laboratories. Prerequisite: ARCE 444.

**ARCE 415 Interdisciplinary Capstone Project (5)**

Team based interdisciplinary capstone / senior project course. Analysis and evaluation of interdisciplinary challenges associated with integrating the design and construction processes to deliver a project with respect to the design, budget, schedule, quality, and performance expectations of a client. 5 laboratories. Prerequisite: ARCE 303, ARCE 304, ARCE 305, ARCE 444, ARCE 372 or ARCE 451, or consent of instructor. *New course, effective Spring 2010.*

**ARCE 421 Soil Mechanics (3)**

Principles of soil mechanics, including rudiments of geology, soil classification, gravimetric and volumetric relations, compaction, methods and testing, shear strength of soil and strength theories. 2 lectures, 1 laboratory. Prerequisite: ARCE 212 or ARCE 222, GEOL 201.

**ARCE 422 Foundation Design (3)**

Soil-bearing capacity; sizing and design of spread footings. Design and analysis of earth-retaining structures. Analysis of the stability of slopes. 3 lectures. Prerequisite: ARCE 421.

**ARCE 423 Advanced Foundation Design (3)**

Design, analysis, and construction issues related to shallow and deep foundation systems, mat foundations, retaining walls, and grade beams. Studies investigation the impact of sub-grade structural systems on building behavior and cost. 3 laboratories. Prerequisite: ARCE 422 and ARCE 444.

**ARCE 444 Reinforced Concrete Laboratory (3)**

Theory and design of basic reinforced concrete elements: non-slender columns, beams, tee beams and one way slabs. 3 laboratories. Prerequisite: ARCE 371 and ARCE 302.

**ARCE 445 Prestressed Concrete Design Laboratory (3)**

Design and analysis of prestressed concrete structures. 3 laboratories. Prerequisite: ARCE 444.

**ARCE 446 Advanced Structural Systems Laboratory (3)**

Concepts and issues involved in the design of complex structures including tall buildings, shells, arches and tension structures. 3 laboratories. Prerequisite: ARCE 226 or ARCE 371.

**ARCE 447 Advanced Reinforced Concrete Laboratory (3)**

Advanced topics in the design of reinforced concrete structures with emphasis on isolated and combined foundations, retaining walls, seismic-resistant ductile frames and yield line theory. 3 laboratories. Prerequisite: ARCE 444.

**ARCE 448 Seismic Rehabilitation Laboratory (3)**

Overview of the general rehabilitation process and philosophy. Evaluation and analysis of existing structures to determine expected performance due to seismic loads. Development of basic rehabilitation strategies for buildings. 3 laboratories. Prerequisite: ARCE 303, ARCE 304, ARCE 305, ARCE 412, ARCE 444.

**ARCE 449 Cold Formed Steel Design Laboratory (3)**

Analysis and design of cold formed steel structural members subjected to bending, shear, and axial forces. Project based design and constructability of cold formed structural systems including gravity framing, diaphragms, shear walls and their connections. 3 laboratories. Prerequisite: ARCE 303 and ARCE 451. *New course, effective Spring 2010.*

**ARCE 451 Timber and Masonry Structures Design and Constructability Laboratory (3)**

Timber and masonry framed project incorporating structural system configuration and selection, structural analysis for gravity and lateral loads, and construction drawings and specifications. Integration of building services and architectural design, constructability issues, and relationships between construction methods and cost. 3 laboratories. Prerequisite: ARCE 257, ARCE 304, ARCE 305, and ARCE 371. Cannot be taken concurrently with ARCE 372 or ARCE 452.

**ARCE 452 Concrete Structures Design and Constructability Laboratory (3)**

Cast in place concrete framed project incorporating structural system configuration and selection, structural analysis for gravity and lateral loads, and construction drawings and specifications. Integration of building services and architectural design, constructability issues, and relationships between construction methods and cost. 3 laboratories. Prerequisite: ARCE 257, ARCE 444, and ARCE 372 or ARCE 451. Cannot be taken concurrently with ARCE 372 or ARCE 451.

**ARCE 453 Senior Project Laboratory (3)**

Projects by individuals or teams under faculty supervision that go beyond topics covered in the ARCE curriculum. Projects may include analysis, design, experimental testing, research, or construction. Interdisciplinary projects encouraged. 3 laboratories. Prerequisite: ARCE 371, ARCE 451 or ARCE 452, ARCE 483.

**ARCE 460 Collaborative Design Laboratory (2–4)**

Investigation of the collaborative nature of the design process as it relates to the structural engineer and architect. Development of skills necessary to create a successful design team through the development of specific projects. Total credit limited to 4–2 units. **4–2 laboratories.** Prerequisite: ARCE 371 and ARCE 372 or ARCE 451 or ARCE 452. *Change effective Winter 2010.*

**ARCE 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

**ARCE 471 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Consent of instructor.

**ARCE 473 Advanced Timber and Masonry Structures Laboratory (3)**

Emphasis on long span industrial/warehouse type buildings. Use of steel in timber/masonry construction and constructability. Holes in diaphragms, out-of-plane wall behavior and sub-diaphragms, perforated wood and masonry shear walls, pre-manufactured shear walls, masonry retaining walls, connections including post-installed anchors. 3 laboratories. Prerequisite: ARCE 372, ARCE 422, ARCE 444 and ARCE 451. *New course, effective Spring 2010.*

**ARCE 480 Senior Seminar (1)**

Discussion of selected topics that are of current interest to the structural engineering profession. 1 seminar. Prerequisite: Senior standing.

**ARCE 483 Seismic Analysis and Design (4)**

Introduction to dynamic response analysis of building structures with emphasis on earthquake ground motion. Earthquake resistant design of buildings in accordance with building codes. Application of computer programs and physical models for seismic design. Laboratory studies utilizing physical models for studying the behavior of building structures subjected to simulated ground motions. 3 lectures, 1 activity. Prerequisite: ARCE 372, ARCE 412.

**ARCE 485 Cooperative Education Experience (6) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. No major credit allowed; total credit limited to 12 units. Credit/No Credit grading only. Credits do not count toward graduation in

the ARCE Degree Program. Prerequisite: Sophomore standing and consent of department head.

#### **ARCE 490 History of Structures (3)**

Understanding the social, scientific, and symbolic importance of landmark structures. Emphasis on post industrial revolution structures; Gothic cathedrals also studied. 3 lectures. Prerequisite: Junior standing.

#### **ARCE 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. No major credit allowed; total credit limited to 24 units. Credit/No Credit grading only. Credits to not count toward graduation in the ARCE Degree Program. Prerequisite: Sophomore standing and consent of instructor.

#### **ARCE 501 Advanced Structural Mechanics (3)**

Principles, concepts, and techniques of advanced structural mechanics. Studies of displacement, strain, stress, strain-displacement relation and constitutive models in three dimensions. Failure criteria. Introduction into energy principles and approximate solutions. 3 lectures. Prerequisite: ARCE 306, ARCE 353.

#### **ARCE 502 Nonlinear Structural Behavior I (3)**

Principles, concepts, and behavior of structures loaded beyond their linear-elastic limit. Elastic-plastic behavior of truss, beam, and frame structures. Buckling and post-buckling behavior of columns. Behavior of beam-columns and the principle of superposition. Second-order elastic behavior of frames. 3 lectures. Prerequisite: ARCE 306 and ARCE 353.

#### **ARCE 503 Nonlinear Structural Behavior II (3)**

Principles, concepts, and techniques of nonlinear structural analysis currently used in practice. Classification of nonlinear problem types. Investigation of typical iterative solution strategies. Studies in material and geometric nonlinearities in spring, truss, and frame elements. Use of current nonlinear analysis software. 3 lectures. Prerequisite: ARCE 502.

#### **ARCE 504 Finite Element Method for Building Structures (3)**

Basic concepts of equilibrium and compatibility. Stiffness and flexibility properties of various types of finite elements. Development and application of displacement and force methods. Elastic stability and dynamic response of buildings to earthquake, wind, and moving loads. Use of finite-element computer programs. 3 seminars. Prerequisite: MATH 244, ARCE 306, ARCE 501.

#### **ARCE 511 Structural Systems Behavior (3)**

Design, performance, and construction issues related to structural systems. Further development of design and analysis techniques necessary for performance based engineering of structural systems. Assessment of advantages and limitations of different structural forms and systems. 3 laboratories. Prerequisite: ARCE 371, ARCE 403, ARCE 452, ARCE 483.

#### **ARCE 521 Architectural Structures (3)**

Static and dynamic loads, structural equilibrium and stability, structural configurations and systems, response to dynamic loads, behavior of structures. 2 seminars, 1 activity. Prerequisite: Graduate standing in Architecture.

#### **ARCE 522 Structural Systems (3)**

Exploration of the relationship between structural systems and architectural form. Understanding of structural stability and structural order is developed through construction of a series of small scale models. Historical perspectives are presented along with the effects of available materials and technology on structural possibilities. 3 seminars. Prerequisite: Graduate standing in Architecture.

#### **ARCE 523 Seismic Design for Architects (3)**

Introduction to the earthquake resistant design of buildings. Observed behavior of buildings during earthquakes. Recent developments of seismic design procedures, provisions, and building codes. Influence of architectural form on seismic response. 3 lectures. Prerequisite: Graduate standing in Architecture.

#### **ARCE 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Graduate standing or consent of instructor.

#### **ARCE 571 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Graduate standing or consent of instructor.

#### **ARCE 598 Structural Engineering Design Project (3)**

Independent development, research, and conclusion of a graduate project by individuals or teams specializing in the area of architectural or structural engineering. Projects may include graduate students from other disciplines. Students shall enroll in 3 quarters. Total credit limited to 9 units. 3 laboratories. Prerequisite: ARCE 371, ARCE 403, ARCE 452, ARCE 483.



## 2009-11 Cal Poly Catalog

### [Architecture Department](#)

#### ARCH-ARCHITECTURE

##### **ARCH 101 Survey of Architectural Education and Practice (1-2) (CR/NC)**

Exploration of the major paradigms which have guided the development of architectural education and the profession. Survey of the roles of the architects and an introduction to curricula and programs designed to prepare students for careers in architecture. Credit/No Credit grading only. **Total credit limited to 3 units. 1 lecture. 2-lectures. Change effective Summer 2009.**

##### **ARCH 105 Architectural Practice 1 (1)**

Shop safety, machine and tool operation and small-scale design and construction. 1 laboratory. Corequisite: ARCH 121 or ARCH 131.

##### **ARCH 106 Materials of Construction (2)**

Use and application of construction processes and materials. 2 lectures.

##### **ARCH 111 Introduction to Drawing and Perspective (3)**

Basic techniques used in graphic communication. Orthographic and isometric projection. Mechanical perspective, shades and shadows. 3 laboratories.

##### **ARCH 121 Design and Drawing 1.1 (3)**

An introduction to the issues, concepts, processes and skills pertaining to two- and three-dimensional design and the freehand and constructed representation and visual communication of ideas, objects and environments. 3 laboratories. Concurrent: EDES 101.

##### **ARCH 122 Design and Drawing 1.2 (3)**

Continuation of ARCH 121 plus the issues, concepts, processes and skills pertaining to color theory and the design and visual communication of architectural space. 3 laboratories. Prerequisite: ARCH 121 or ARCH 131.

##### **ARCH 123 Design and Drawing 1.3 (3)**

Continuation of ARCH 121 and ARCH 122 plus the issues, concepts, processes and skills pertaining to the analysis and design of architectural form, space and organizations. 3 laboratories. Prerequisite: ARCH 122 or ARCH 132.

##### **ARCH 131 Design and Visual Communication 1.1 (4)**

An introduction to the issues, concepts, processes and skills pertaining to two- and three-dimensional design and the freehand, constructed and digital representation and visual communication of ideas, objects and environments. Purchase of a laptop computer, software and peripherals is highly recommended to participate in this course. 4 laboratories. Corequisite: ARCH 105; concurrent: EDES 101.

##### **ARCH 132 Design and Visual Communication 1.2 (4)**

Continuation of ARCH 131 plus the issues, concepts, processes and skills pertaining to color theory and the design and visual communication of architectural space. Purchase of a laptop computer, software and peripherals is highly recommended to participate in this course. 4 laboratories. Prerequisite: ARCH 131.

##### **ARCH 133 Design and Visual Communication 1.3 (4)**

Continuation of ARCH 131 and ARCH 132 plus the issues, concepts, processes and skills pertaining to the analysis and design of architectural form, space and organizations. Purchase of a laptop computer, software and peripherals is highly recommended to participate in this course. 4 laboratories. Prerequisite: ARCH 132.

##### **ARCH 160 Digital Tools for Architecture (4)**

Substantive introduction to the use of digital tools in architectural design and visual communication in the areas of 3-D modeling, 2-D drawing, image editing and page layout. 4 seminars.

##### **ARCH 202 Creative Problem-Solving (3)**

Techniques for stimulating creative behavior applied to general and environmental problems. Development of problem-solving and decision-making skills and knowledge. 3 lectures.

##### **ARCH 204 Architectural Theory (3)**

Theories of architectural design. 3 lectures. Prerequisite: EDES 101.

##### **ARCH 207 Environmental Control Systems 1 (4)**

Theory and application of climate, energy use and comfort as determinants of architectural form in small-scale buildings. Emphasis on architectural methods of ventilating, cooling, heating, and lighting for envelope-load dominated buildings. 2 lectures, 2 activities. Concurrent: ARCH 253.

##### **ARCH 217 History of World Architecture:**

###### **Prehistory – Middle Ages (4)**

GE C3

Architecture and urbanism in the ancient world, from prehistory to the Middle Ages. Social, cultural and physical conditions that influenced the built environment to the Mediterranean basin, plus Europe, Asia, Africa and Pre-Columbian America. 4 lectures. Fulfills GE C3.

##### **ARCH 218 History of World Architecture:**

###### **Middle Ages – 18th Century (4)**

GE C3

World architecture and urbanism from the Middle Ages until the end of the 18th century Baroque. Social, cultural and physical conditions which influenced the built environment of Europe, Asia, and the Pre-Columbian and Colonial Americas. 4 lectures. Fulfills GE C3.

##### **ARCH 219 History of World Architecture:**

###### **18th Century – Present (4)**

GE C3

Architecture and urbanism of the modern world, from the 18th century to the present. Social, cultural and physical conditions influencing the built environment of Europe, Asia, Africa and the Americas. 4 lectures. Fulfills GE C3.

##### **ARCH 221 Architectural Design Fundamentals 2.1 (3)**

Continuation of ARCH 123 or ARCH 133 in terms of materiality, structure and function and the theories, concepts, processes and skills pertaining to the design of architectural form, space and organizations. 3 laboratories. Prerequisite: ARCH 123 or ARCH 133.

##### **ARCH 222 Architectural Design Fundamentals 2.2 (3)**

Continuation of ARCH 221 plus the theories, concepts, processes and skills pertaining to site, context and climate as determinants that shape the built environment. 3 laboratories. Prerequisite: ARCH 221.

##### **ARCH 231 Architectural Practice (3)**

Wood construction methods and processes. Construction documents used as communication medium for such methods and processes. 1 lecture, 2 activities. Prerequisite: ARCH 106 plus ARCH 122 or ARCH 132 or ARCH 111. Corequisite: ARCH 252.

##### **ARCH 240 Additional Architectural Laboratory (1-2)**

Total credit limited to 4 units, with a maximum of 2 units per quarter. 1 or 2 laboratories.

##### **ARCH 241 Architectural Practice 2.1 (4)**

The language, principles and materials of construction with an emphasis on the origin, history, and application of traditional and emergent materials. 2 lectures, 2 activities. Prerequisite: ARCH 123 or ARCH 133. Corequisite: ARCH 251.

##### **ARCH 242 Architectural Practice 2.2 (4)**

A continuation of ARCH 241 with an emphasis on the fundamental aspects of construction systems and the basics of construction documentation. 2 lectures, 2 activities. Prerequisite: ARCH 241. Corequisite: ARCH 252.

##### **ARCH 250 Computer Applications (3)**

Introduction to the application of computers in architecture. History of computing and its use in architectural practice, hardware options, operating systems, electronic mail, databases, programming languages, graphics systems, survey and use of selected applications in architecture. 2 lectures, 1 laboratory.

##### **ARCH 251 Architectural Design 2.1 (5)**

Continuation of ARCH 123 or ARCH 133 in terms of materiality and the theories, concepts, processes and skills pertaining to the analysis and design of architectural form, space and organizations to communicate intended concepts and meanings. 5 laboratories. Prerequisite: ARCH 123 or ARCH 133; corequisite: ARCH 241.

##### **ARCH 252 Architectural Design 2.2 (5)**

Continuation of ARCH 251 plus the theories, concepts, processes and skills pertaining to light, construction and function as determinants that shape the built environment and support the communication of intended concepts and meanings. 5 laboratories. Prerequisite: ARCH 251, ARCH 241; corequisite: ARCH 242.

##### **ARCH 253 Architectural Design 2.3 (5)**

Continuation of ARCH 251 and ARCH 252 plus the theories, concepts, processes and skills pertaining to context, structure and climate as determinants that shape the built environment and support the communication of intended concepts and meanings. 5 laboratories. Prerequisite: ARCH 252, ARCH 242 and ARCH 160; corequisite: ARCH 207.

##### **ARCH 270 Selected Topics (1-4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Open to first-, second-, third-year students. Total credit limited to 8 units. 1 to 4 lectures.

**ARCH 302 Theories of Architectural Design (3)**

Theories of architecture and their application in architectural design. 3 lectures. Prerequisite: ARCH 253.

**ARCH 307 Environmental Control Systems 2 (4)**

Theory and application of climate, energy use and comfort as determinants of architectural form in large-scale buildings. Emphasis on architectural and mechanical methods of ventilating, cooling, heating, lighting, acoustics, and water and waste systems for internal-load dominated buildings. 2 lectures, 2 activities. Prerequisite: ARCH 207. Concurrent: ARCH 352.

**ARCH 310 Architectural Design Methods and Theories (4)**

Analysis of design process, methods of analysis, synthesis, and evaluation in design. Relation between methods used and theories of design. 4 lectures. Prerequisite: ARCH 253.

**ARCH 313 Advanced Delineation (2)**

Development of proficiency in architectural presentation. Projects and critiques. 2 laboratories. Prerequisite: ARCH 253.

**ARCH 316 California Architecture and the California Dream (3)**

Development of California Architecture as the symbolic expression of the myth of the California Dream. Focus on tracing California's unique contribution to architecture and urban patterns in the United States. 3 lectures. Prerequisite: ENGL 134.

**ARCH 320 Topics in Architectural History (4)****GE C4**

In-depth examination of a significant region, movement or period in architectural history, theory and criticism. The material covered will vary depending upon the topic. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 lectures. Prerequisite: Junior standing; GE Area A1 and one of the following Area C3 courses: ARCH 217, 218, 219, or ART 112. Fulfills GE C4 except for Architecture majors.

**ARCH 326 Native American Architecture and Place (4)****GE C4 USCP**

The role of culture and setting in the construction of spatial, material and landscape concepts and artifacts, through the introduction of selected North American cultures, with focus from 1300 AD through contemporary time. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A, C1 and C2. *Crosslisted as ARCH/ES 326.* Fulfills GE C4 and USCP.

**ARCH 337 Photographic Presentation (2)**

Media presentations in architecture with emphasis on black and white and color print photographic presentations, formats, and techniques applicable to architecture subjects and to design communication. 1 lecture, 1 laboratory. Prerequisite: ARCH 123 or ARCH 133.

**ARCH 339 Video Presentations in Architecture (2) (CR/NC)**

Media presentations in architecture with emphasis on video format and creative camera and editing techniques as applicable to subjects in architecture and design communication. Open to students in CAED. Credit/ No Credit grading only. 1 lecture, 1 laboratory. Prerequisite: ARCH 123 or ARCH 133.

**ARCH 340 Architectural Photography (4)**

Photography specifically related to architecture and design. Advancement of students' technical skills in communicating design through the medium of photography. 2 lectures, 2 laboratories. Prerequisite: ARCH 337.

**ARCH 341 Architectural Practice 3.1 (4)**

Concepts, methods and processes pertaining to the detailing and construction of masonry, steel, concrete and combination structures. 2 lectures, 2 activities. Prerequisite: ARCH 242 and ARCH 253. Corequisite: ARCH 351.

**ARCH 342 Architectural Practice 3.2 (4)**

Continuation of ARCH 341 content plus the concepts, methods and processes pertaining to the preparation of outline specifications, production of design development drawings, life safety, systems integration and cost estimating. 2 lectures, 2 activities. Prerequisite: ARCH 341. Corequisite: ARCH 353.

**ARCH 351 Architectural Design 3.1 (5)**

Continuation of ARCH 253. Development and exploration of architectural theories, building systems, and design processes involved in creating appropriate architecture on a sensitive site; implications of the site as building form generator. 5 laboratories. Prerequisite: ARCE 212, ARCH 253, ARCH 207 and PHYS 122 or PHYS 132, or consent of department head. Corequisite: ARCH 341.

**ARCH 352 Architectural Design 3.2 (5)**

Continuation of ARCH 351. Development and exploration of architectural theories, building systems, and design processes involved in creating appropriate sustainable architecture with an emphasis on ecological and environmental

concerns. 5 laboratories. Prerequisite: ARCH 351, ARCH 341. Corequisite: ARCH 307.

**ARCH 353 Architectural Design 3.3 (5)**

Continuation of ARCH 352. Development and exploration of architectural theories, building systems, and design processes involved in creating appropriate architecture with an emphasis on socio-cultural and space planning/life safety concerns. 5 laboratories. Prerequisite: ARCH 352, ARCH 307. Corequisite: ARCH 342.

**ARCH 363 Off-Campus Orientation Seminar (2) (CR/NC)**

Preparation for off-campus architectural study programs includes cultural orientation, an introduction to basic language skills, travel and housing protocols as well as academic and financial advising. Credit/No Credit grading only. Total credit limited to 4 units, with a maximum of 2 units per quarter. 2 seminars. Prerequisite: Consent of instructor.

**ARCH 400 Special Problems for Advanced Undergraduates (1–2) (CR/NC)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Credit/No Credit grading only. **Prerequisite: Consent of instructor. Effective Winter 2011.**

**ARCH 401 Toward a Barrier-Free Environment (3)**

Exploring the interface between the built environment and human behavior. Physical and psychological design determinants. Attitudes towards deviancy, accessible environments and persons with disabilities. Legal, ethical, human factors. 3 lectures. Prerequisite: Junior standing or consent of instructor.

**ARCH 407 Environmental Control Systems 3 (4)**

Theory and application of mechanical and electrical systems for comfort. Emphasis on internal-load dominated buildings. Consideration of artificial lighting, H.V.A.C. systems, acoustics, water and waste systems. 4 lectures. Prerequisite: ARCH 307.

**ARCH 413 The Built Environment: Issues and Education (3)**

Identification of major issues in the design and creation of the built environment. Strategies for developing instructional units related to critical thinking and problem solving in the K-12 school setting. 1 lecture, 2 activities. Prerequisite: Junior standing.

**ARCH 420 Seminar in Architectural History, Theory and Criticism (4)**

Special topics based on the exploration of specific approaches, periods of time, and cultural or geographic areas. The Schedule of Classes will list topic selected. Total credit limited to 12 units; repeatable in same term. 4 seminars. Prerequisite: 4th year standing and ARCH 217, ARCH 218, and ARCH 219, or consent of instructor.

**ARCH 443 Professional Practice (4)**

A critical analysis of the roles and responsibilities of the architect in providing comprehensive services to the client from project acquisition and inception to project delivery and closeout and the process and requirements for internship development and attaining registration. 2 lectures, 2 activities. Prerequisite: ARCH 342, ARCH 353.

**ARCH 445 Urban Design in Architecture (3)**

Design role of the urban architect. Economic, environmental and technological forces impacting on architectural practice in urban areas. 3 lectures. Prerequisite: ENGL 134.

**ARCH 446 The Small Scale Master Builder (4)**

Principles of practice as owner-designer-builder, selling or leasing products. Comparison with traditional practice. Potential income, constraints on design decisions, and ethics. Analysis of factors and methods relevant to such practice, including financing, taxes, accounting, market analysis, and development potential. Starting with little or no capital. 4 lectures. Prerequisite: Fourth-year standing.

**ARCH 447 Design Regulations (4)**

Practical application of fundamental zoning, subdivision, design/development standards, and building codes in the design review process, either in the form of a proposed development project or preparation of ordinances, codes, standards, and/or guidelines to apply to a project. 4 lectures. Prerequisite: Senior standing, or graduate standing, or consent of instructor. *Crosslisted as ARCH/CRP 447.*

**ARCH 450 Digital Design and Visualization (5)**

Theory, principles and techniques of computer aided architectural or product design, visualization, and digital animation. Utilization of desk-top computers and 2-D and 3-D software as integrated tools for development of a comprehensive computer enhanced design process. 5 laboratories. Prerequisite: For architecture majors, all prerequisites required by the year and course level

for which the student is seeking credit; for non-architecture majors, junior standing or permission of instructor; for local professionals not seeking academic credit, permission of instructor.

#### **ARCH 451 Architectural Design 4.1 (5)**

Problems of increasing architectural complexity involving the comprehensive integration of architectural theory, design processes, and building systems with emphasis placed on multifunction singular buildings. 5 laboratories. Prerequisite: ARCE 316, ARCH 353, ARCH 342, or consent of department head.

#### **ARCH 452 Architectural Design 4.2 (5)**

Problems of increasing architectural complexity involving the comprehensive integration of architectural theory, design processes, and building systems with emphasis placed on multibuilding, multifunctional projects. 5 laboratories. Prerequisite: ARCE 316, ARCH 353, ARCH 342, or consent of department head.

#### **ARCH 453 Architectural Design 4.3 (5)**

Problems of increasing architectural complexity involving the comprehensive integration of architectural theory, design processes, and building systems with emphasis placed on multifunctional projects in an urban context. Total credit limited to 10 units and may substitute for ARCH 451 or ARCH 452. 5 laboratories. Prerequisite: ARCE 316, ARCH 353, ARCH 342, or consent of department head.

#### **ARCH 457 Computer Graphics in Architecture (4)**

Two-dimensional drawing systems in architectural practice with particular emphasis on office productivity in the production side of the design process; includes drawing database administration, local area networks, management and cost issues. 2 lectures, 2 laboratories. Prerequisite: Fourth year standing.

#### **ARCH 460 Advanced Computer Graphics in Architecture (3)**

Advanced methods in the application of computer graphics and multi-media techniques in architectural design. 2 lectures, 1 activity. Prerequisite: ARCH 133 or ARCH 160 or consent of instructor.

#### **ARCH 461 Advanced Computer-Aided Design in Architecture (3)**

Advanced applications of computers in architectural design with emphasis on utilizing intelligent tools in the design process. 2 lectures, 1 activity. Prerequisite: ARCH 457 or equivalent and consent of instructor.

#### **ARCH 462 Topics in Architectural Practice (3-4)**

Selected topics addressing various aspects of Architectural Practice for advanced students in CAED. Topics may include strategic planning, managing quality, ethics, and legal considerations. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 6-8 units; repeatable in same term. 3-4 lectures. Prerequisite: ARCH 342 or consent of instructor. *Changed effective Summer 2009.*

#### **ARCH 463 Undergraduate Seminar (2) (CR/NC)**

Discussion and lectures on problems of practice in architecture. Total credit limited to 6 units. 2 seminars. Prerequisite: Fourth-year standing in architecture. Credit/No Credit grading only.

#### **ARCH 464 Computer Applications in Design (3)**

Exposure to all aspects of two-dimensional computer-aided design. Introduction to three-dimensional CAD through the use of AUTOCAD 12 software. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 3 lectures. Prerequisite: Junior standing and current participation in Washington Alexandria Architectural Consortium off-campus program.

#### **ARCH 465 Design Related Media (3)**

The role of various media of visual communication as tools of documentation, analysis and creation in the design visual environment. Skills in graphics, photography, product design, film, video techniques, and printmaking graphics will be developed in specific relation to environmental design study and presentation. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 3 lectures. Prerequisite: Junior standing and current participation in Washington Alexandria Architectural Consortium off-campus program.

#### **ARCH 466 Topics in Architectural History and Theory (3)**

Design from its beginning with the crafts design period to its expression of industrial design in its present form. Various stages in the evolution of design explored through analyzing the influences and contributions of leading artists. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 3 lectures. Prerequisite: Junior standing and current participation in Washington Alexandria Architectural Consortium off-campus program.

#### **ARCH 467 Undergraduate Research (3)**

Architecture and urban theoretical intentions and results in the context of the Capitol of the United States – Washington, DC. This theoretical and historical study will not occur within the confines of the classroom, but directly within the

“laboratory” of the city. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 3 lectures. Prerequisite: Junior standing and current participation in Washington Alexandria Architectural Consortium off-campus program.

#### **ARCH 468 Advanced Environmental Building Systems (3)**

Technologies which provide a “well building” environment by engaging in: weather protection; thermal/moisture control; natural and artificial lighting; and electrical and other “energy source” utility service. 3 lectures. Prerequisite: Junior standing and current participation in Washington Alexandria Architectural Consortium off-campus program.

#### **ARCH 469 Topics in Design Methods (3)**

Relationship of art and architecture addressed to encourage critical debate. Historically, the “art” and the “architecture” were not as polarized as today. Both historical perspective and practical issues concerning collaboration. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 3 lectures. Prerequisite: Junior standing and current participation in the Washington Alexandria Architectural Consortium off-campus program.

#### **ARCH 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

#### **ARCH 471 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

#### **ARCH 472 Housing Concepts (3-4)**

For students preparing for further study relating to housing, development density, and community design. Concepts of housing and community introduced in the context of triple bottom line development. Addresses housing design concepts and objectives; current theories in housing form; mixed-use projects; housing affordability; and fundamentals of economic development. 3-4 lectures. Prerequisite: Third-year standing or consent of instructor.

#### **ARCH 477 Advanced Topics in Environmental Architecture (4)**

Theory and application of methods used to address energy and ecological issues of integrated building and site design. The Schedule of Classes will list topic selected. Total credit limited to 12 units, repeatable in same term. 4 seminars. Prerequisite: ARCH 307.

#### **ARCH 480 Special Studies in Architecture (1-12)**

Special issues and problems through research, field trips, design projects, and other forms of investigation and involvement. Course requirements are determined prior to each individual project through a contractual agreement between students and department. The departmental Off Campus Study Guidelines apply except when superseded by guidelines and practices of the London Study Program of the College of Liberal Arts. Total credit limited to 36 units. Prerequisite: Junior standing.

#### **ARCH 481 Senior Architectural Design Project (5)**

Comprehensive building design and research project in an architectural concentration area. Demonstration of professional competency in integration of architectural theory, principles and practice with creative, organizational and technical abilities in architectural programming, design and design research. Total credit limited to 15 units. 5 laboratories. Prerequisite: 5th-year standing or consent of department head.

#### **ARCH 485 Cooperative Education Experience (4 or 8) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid. Formal report and evaluation by work supervisor required. Major credit limited to 20 units; total credit limited to 24 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

#### **ARCH 486 Internship Education Experience (4 or 8) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are unpaid and usually require relocation. Formal report and evaluation by work supervisor required. Major credit limited to 20 units; total credit limited to 24 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

#### **ARCH 492 Senior Design Thesis (3)**

Development of the framework and format of a thesis project proposal related to the specific design option. Work to include: research topic, intent, scope, methodology, assumptions, outline of work program and documentation. To be

taken concurrently with first quarter of ARCH 481. 3 seminars. Prerequisite: 5th year standing or consent of instructor.

**ARCH 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid. Formal report and evaluation by work supervisor required. Major credit limited to 20 units; total credit limited to 24 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**ARCH 496 Internship Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are unpaid and usually require relocation. Formal report and evaluation by work supervisor required. Major credit limited to 20 units; total credit limited to 24 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**ARCH 501 Environmental Control Systems (3)**

Comparative analysis and evaluation of mechanical and electrical building systems in high-rise and special purpose low-rise buildings. 3 seminars. Prerequisite: ARCH 407.

**ARCH 510, 511 Environmental Design Methods 1, 2 (3) (3)**

Application of systematic, step-by-step procedures to rational and intuitive judgmental tasks. Methods for formulation, idea production, evaluation, and testing applied to planning, testing, design information systems, communication between designer and client, user participation in design, and other current topics. 511 focuses on specific problem area among topics and may be repeated up to 9 units. 3 lectures. Prerequisite: Graduate standing.

**ARCH 513 Natural Architectural Lighting (3)**

Perception and awareness of light; natural light as generator of urban spaces and building forms. Principles of design in lighting fundamentals and techniques. 3 lectures. Prerequisite: ARCH 407 or consent of instructor.

**ARCH 519 Theory of Architecture (3)**

Comparative analysis of the major historic influences which have contributed to the development of architectural design theories. The Schedule of Classes will list topic selected. Total credit limited to 9 units. 1 lecture, 2 seminars. Prerequisite: ~~ARCH 319 or~~ graduate standing. *Change effective Winter 2011.*

**ARCH 521 Graduate Architectural Design Project (5)**

Comprehensive building design and research project in an architectural concentration area. Demonstration of professional competency in integration of architectural theory, principles and practice with creative, organizational and technical abilities in architectural programming, design and design research. Total credit limited to 15 units. 5 laboratories. Prerequisite: ARCH 407, ARCH 451, ARCH 452, ARCH 453 and 5th-year standing.

**ARCH 531 Habitability (3)**

Habitability standards and concepts significant for architectural design and practice. Behavioral analysis of habitats, facilities and urban systems. Design and development of structures and systems responsive to human needs. Habitability and environmental specifications, human factors, human engineering, behavioral sciences. 3 seminars. Prerequisite: ~~ARCH 303, ARCH 453, or consent of instructor~~ Graduate standing. *Change effective Winter 2011.*

**ARCH 532 Quantitative Methods in Architecture (3)**

Roles of research in environmental design analysis. Approaches to research, hypothesis testing, data banks, and information systems for design. Use of research findings in various decision-making systems. 3 seminars. Prerequisite: Graduate standing.

**ARCH 533 Architectural Programming (3)**

Information management in the design process. Techniques for gathering, analyzing, and transforming data for use as design information. Variety of approaches to pre-design planning. 3 seminars. Prerequisite: ARCH 453.

**ARCH 537 Principles of Development (3)**

Theory and application of the architect's role in real estate development. Topics include financing, corporate structuring, feasibilities, market studies, and proposal presentation. Emphasis on the influence of design on the success of the development process. 3 seminars. Prerequisite: Graduate standing in Architecture, or consent of instructor.

**ARCH 551 Architectural Design (5)**

Professional initiative and responsibility in integrating architectural design theory and practice with fields influencing the total environment. Building types considered as the coordinating factor. Total credit limited to 15 units with no more than 5 units in any one quarter. 5 laboratories. Prerequisite: Graduate standing.

**ARCH 561 Advanced Design (3)**

Continuation of ARCH 551. Advanced studies integrating architectural design theory and practice with fields influencing the shaping of the total environment. Total credit limited to 9 units. 3 laboratories. Prerequisite: Graduate standing.

**ARCH 563 Professional Seminar (2)**

Problems and topics in the field of the architectural profession. Seminar drawn upon expertise of visiting professionals in addition to topics presented by regular faculty and students. 2 seminars. Prerequisite: Graduate standing.

**ARCH 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Graduate standing or consent of instructor.

**ARCH 580 Seminar in Theory of Architecture (3)**

Directed group study of selected topics in the theory of architecture for graduate students. The Schedule of Classes will list topic selected. Total credit limited to 9 units. 3 seminars. Prerequisite: ARCH 453.

**ARCH 592 Graduate Design Thesis (3)**

Development of the framework and format of a thesis project proposal related to the specific design option. Work to include: research topic, intent, scope, methodology, assumptions, outline of work program and documentation. To be taken concurrently with first quarter of ARCH 521. 3 seminars. Prerequisite: 5th year standing or consent of instructor.

**ARCH 598 Master's Design Project (3-6)**

Completion of a master project demonstrating in-depth research ability at a graduate level. Total credit limited to 9 units. 3 or 6 laboratories. Prerequisite: Consent of graduate advisor.

**ARCH 599 Master's Thesis (1-9)**

Completion of a thesis embodying original research in an area of environmental design. Total credit limited to 9 units. Prerequisite: Consent of graduate advisor.



**2009-11 Cal Poly Catalog****Architectural Engineering Department****BS ARCHITECTURAL ENGINEERING**

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                      ☐ USCP

\* = Required in Support; also satisfies GE

*Note: No major or support courses may be taken as credit/no credit.*

*Note: All ARCE majors must obtain a grade of C- or better in ARCE courses that are prerequisites for other ARCE courses.*

**MAJOR COURSES**

ARCE 211 Structures I.....	3
ARCE 212 Structures II.....	3
ARCE 223 Mechanics of Structural Members .....	4
ARCE 225 Dynamics or ME 212 Engrg Dynamics .	3
ARCE 227 Structures III .....	2
ARCE 257 Structural CAD for Building Design ....	2
ARCE 302 Structural Analysis .....	4
ARCE 303 Steel Design .....	3
ARCE 304 Timber Design .....	3
ARCE 305 Masonry Design .....	2
ARCE 306 Matrix Analysis of Structures .....	3
ARCE 351, 352, 353 Structural Computing Analysis I, II, III .....	1,1,1
ARCE 371 Structural Systems Laboratory .....	3
ARCE 372 Steel Structures Design Laboratory.....	3
ARCE 412 Dynamics of Framed Structures .....	3
ARCE 421 Soil Mechanics.....	3
ARCE 422 Foundation Design .....	3
ARCE 444 Reinforced Concrete Lab .....	3
ARCE 451 Timber/Masonry Structures Design and Constructability Laboratory .....	3
ARCE 452 Concrete Structures Design and Constructability Laboratory .....	3
ARCE 453 Senior Project Laboratory.....	3
ARCE 483 Seismic Analysis and Design .....	4
Advanced structural electives.....	6
<i>Select 6 units from:</i>	
ARCE 403, 410, 414, 423, 445, 446, 447, 448, 471, 475 (5/2/13)(3/12/14)	
Professional elective: STAT 312 Statistical Methods for Engineers or STAT 321 Probability and Statistics for Engineers and Scientists.....	4
	<b>76</b>

**SUPPORT COURSES**

ARCH 105 Professional Practice 1 or ARCE 354 Numerical Analysis Laboratory (2/7/13) .....	1
ARCH 106 Materials of Construction.....	2
ARCH 121, 122, 123 Design and Drawing 1.1, 1.2, and 1.3 ARCH 131, 132, 133 1.1, 1.2, 1.3	3,3,3 4,4,4
ARCH 221 Architectural Design Fundamentals .....	3
(5/24/10)	
ARCE 260 or ARCH 217/ARCH 218/ARCH 219 (C3)* (2/7/13).....	4

BRAE 237 Intro to Engineering Surveying .....	2
CHEM 124 General Chem/Engr Discipline (B3/B4)*	4
CM 211 Construction Contract Documents .....	4
CM 332 Evaluation of Cost Alternatives or IME 314 Engineering Economics .....	3
CSC 231 Fortran for Engineering Students or CSC 234 C and UNIX (3) .....	2
CSC 341 Numerical Engineering Analysis or approved equivalent (B6)* .....	4
EDES 101 Intro to Architecture and Env Design ....	2
EE 201 Electrical Circuit Theory.....	3
GEOL 201 Physical Geology.....	3
MATH 141, 142 Calculus I, II (B1)* .....	4,4
MATH 143 Calculus III (Add'l Area B)* .....	4
MATH 241 Calculus IV .....	4
MATH 244 Linear Analysis I .....	4
ME 302 Thermodynamics.....	3
ME 341 Fluid Mechanics.....	3
PHYS 141 General Physics IA (Add'l Area B)* .....	4
PHYS 132, 133 General Physics .....	4,4

**84****GENERAL EDUCATION (GE)**

72 units required, 28 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 8 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (4 units)**

B1 Mathematics/Statistics * 8 units in Support .....	0
B2 Life Science .....	4
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	
B5 (not required of Engineering)	
B6 Upper-division Area B * 4 units in Support .....	0
Additional Area B units* 8 units in Support .....	0

**Area C Arts and Humanities (12 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts * 4 units in Support.....	0
C4 Upper-division elective .....	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4

**44****FREE ELECTIVES.....****0****204**

**2009-11 Cal Poly Catalog****Architecture Department****BACHELOR OF ARCHITECTURE**

☐ 60 units upper division ☐ GWR

☐ 2.0 GPA ☐ USCP

\* = Required in Major/Support; also satisfies GE

Note: No major or support courses  
may be taken as credit/no credit.**MAJOR COURSES**~~ARCH 105 Architectural Practice I~~ ARCH 101

Survey of Arch. Education and Practice..... 1,1,1

~~ARCH 121, 122, 123 (3)(3)(3) & ARCH 160 (4)~~~~or~~ ARCH 131, 132, 133 (4)(4)(4) ..... 12

ARCH 207 Environmental Control Systems 1..... 4

ARCH 217 History of Architecture (C3)\* ..... 4

ARCH 218 History of Architecture (Area C)\* ..... 4

ARCH 219 History of Architecture ..... 4

ARCH 241, 242 Architectural Practice 2.1, 2.2..... 4,4

ARCH 251, 252, 253 Arch. Design 2.1, 2.2, 2.3 ..... 5,5,5

ARCH 307 Environmental Control Systems 2..... 4

ARCH 341, 342 Architectural Practice 3.1, 3.2..... 4,4

ARCH 351, 352, 353 Arch. Design 3.1, 3.2, 3.3 ..... 5,5,5

ARCH 420 Seminar in Architectural History,

Theory and Criticism *or* ARCH 320 Topics in

Architectural History ..... 4

ARCH 443 Professional Practice ..... 4

ARCH 451, 452, 453 Arch. Design 4.1, 4.2, 4.3 .... 5,5,5

ARCH 481 Senior Arch Design Project..... 5,5,5

ARCH 492 Senior Design Thesis..... 3

~~120~~ ~~122~~**SUPPORT COURSES**

ARCE 211 Structures I..... 3

ARCE 212 Structures II ..... 3

ARCE 226 Structural Systems for Architects ..... 3

ARCE 315 Small Scale Buildings..... 4

ARCE 316 Large Scale Buildings..... 4

EDES 101 Intro to Architecture and Env Design .... 2

MATH 141 Calculus I (B1)\* ..... 4

MATH 182 Calculus for Architecture and

Construction Management (MATH 142 Calculus

II substitutes) (B1)\* ..... 4

<sup>1</sup> PHYS 121/PHYS 141 (B3)\* ..... 4PHYS 122 College Physics II *or* PHYS 132

General Physics II..... 4

Professional Electives ..... ~~20~~

May include: 16

Any EDES, ARCH, ARCE, CM, CRP, LA *or*  
ART course.Any course included in any College of  
Architecture and Environmental Design  
minor, *or* the ART minor.~~55~~ ~~51~~**GENERAL EDUCATION (GE)**

72 units required, 20 of which are specified in Major/Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing ..... 4

A2 Oral Communication ..... 4

A3 Reasoning, Argumentation, and Writing..... 4

**Area B Science and Mathematics (4 units)**

B1 Mathematics/Statistics \* 8 units in Support .... 0

<sup>1</sup> B2 Life Science..... 4

B3 Physical Science \* 4 units in Support..... 0

<sup>1</sup> B4 One lab taken in either PHYS 121 (see  
Support) or a B2 course with lab component**Area C Arts and Humanities (12 units)**

C1 Literature ..... 4

C2 Philosophy ..... 4

C3 Fine/Performing Arts \* 4 units in Major ..... 0

C4 Upper-division elective ..... 4

Area C elective \* 4 units in Major ..... 0

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) ..... 4

D2 Political Economy ..... 4

D3 Comparative Social Institutions ..... 4

D4 Self Development (CSU Area E) ..... 4

D5 Upper-division elective ..... 4

**Area F Technology Elective (upper division)**

(4 units) ..... 4

52**FREE ELECTIVES ..... 0**(5/29/09) ~~227~~ ~~225~~<sup>1</sup> PHYS 121 has a lab (B4). If PHYS 141 is taken, then take a B2 Life  
Science course with a lab (B4).

## 2009-11 Cal Poly Catalog

### Art and Design Department

#### ART

##### **ART 101 The Fundamentals of Drawing (4) GE C3**

Introduction to the artistic practice and cultural value of drawing from the Renaissance to the 21<sup>st</sup> Century. Emphasis and expansion of the practical skills of observation, rendering, and understanding the signs of meaning produced in visual art. Development of formal techniques, media experimentation, and content creation through personal expression. Exercises to encourage growth in technical skill, conceptual innovation, critical thinking, and visual communication. 3 lectures, 1 laboratory. Fulfills GE C3.

##### **ART 105 Foundation: Color Theory (4)**

Beginning color theory covering hue, value, intensity and complementary mixtures. Spatial effects, cultural context and psychological aspects of color. 3 lectures, 1 laboratory.

##### **ART 106 Foundation: 2-Dimensional Design (4)**

Elements and principles of design, the interrelationship between form and content and creative problem solving strategies. 3 lectures, 1 laboratory. Prerequisite: ART 105.

##### **ART 107 Foundation: 3-Dimensional Design (4)**

Elements, principles and criticism of three-dimensional design. Historical, contemporary and multidisciplinary topics. 3 lectures, 1 laboratory. Prerequisite: ART 106.

##### **ART 111 Introduction to Art (4) GE C3**

Designed to acquaint the non-art major with painting, sculpture, drawing, crafts, architecture and printmaking. Development of vocabulary, analytic skills, and research techniques for the understanding of art objects. 4 lectures. Fulfills GE C3.

##### **ART 112 Survey of Western Art (4) GE C3**

History of major art movements in western civilization from ancient art to the twentieth century. Representative periods of western culture, such as the ancient world, the Middle Ages, the Renaissance, and the modern world. 4 lectures. Fulfills GE C3.

##### **ART 121 Basic Digital Photography (4)**

Fundamental techniques in photography. Mechanics of digital cameras and equipment, optics, composition, filters, and subject content. Understanding photographic principles. Digital camera required. 3 lectures, 1 laboratory.

##### **ART 148 Beginning Sculpture (4) GE C3**

Exploration of three dimensional form through problems in modeling, casting, carving, and techniques of assembly. Historical and contemporary concepts as applied to the discipline of sculptural styles. 3 lectures, 1 laboratory. Fulfills GE C3.

##### **ART 182 Photographic Manipulation and Design (4)**

Introduction to photographic image manipulation software for design, photography and studio students. Fundamental technical skills of current software and their potential for content creation, invention and expression. 3 lectures, 1 laboratory.

##### **ART 183 Digital Illustration and Design (4)**

Introduction to digital illustration. Fundamental technical skills and their potential for content creation, invention and expression. 3 lectures, 1 laboratory. Prerequisite: ART 182.

##### **ART 184 Digital Book Making and Design (4)**

Introduction to book making. Fundamental technical skills of current software as well as their potential for content creation, invention, and expression. Desktop publishing as well as the creation of fine art books. 3 lectures, 1 laboratory. Prerequisite: ART 182.

##### **ART 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

##### **ART 201 Intermediate Drawing (4)**

Development of additional drawing techniques with emphasis on form content, pictorial space, B/W media, color, mixed media and composition. 3 lectures, 1 laboratory. Prerequisite: ART 101, 106, or consent of instructor.

##### **ART 203 Art Theory and Practice (4)**

Contemporary issues in art and design, linking "ideas" to development of concepts. Emphasis on individual creative process, and problem solving. Focus on contemporary critical thinking regarding aesthetics, techniques, and vocabulary. 3 lectures, 1 laboratory. Prerequisite: ART 101 and ART 106, or consent of instructor.

##### **ART 209 Beginning Painting (4)**

Introduction to technical and formal problems in painting. Exploration of pictorial space, light, and color from observation. Physical characteristics of paint, various tools, studio methods, and styles of painting. 3 lectures, 1 laboratory. Prerequisite: ART 101 and ART 105 or consent of instructor.

##### **ART 211 Art History--Ancient to Renaissance (4)**

Development of art from antiquity to the early stages of the Renaissance in Europe. Particular emphasis on European art with appropriate references to sources from antiquity which have been particularly influential on European painting and sculpture. Comparison of relevant parallel examples of the art of non-European cultures. 4 lectures.

##### **ART 212 Art History--Renaissance through Baroque Eras (4)**

The significant visual expressions of Northern and Southern European art of the Renaissance and Baroque period. Relevant parallel examples of the art of non-European cultures. 4 lectures.

##### **ART 222 Black and White Photography (4)**

Control of tonal range using 35mm cameras and available daylight illumination. Assignments encourage development of composition and visual communication skills. Emphasis on "photographic seeing" and professional quality enlargements. 2 lectures, 2 laboratories.

##### **ART 224 Introduction to Artificial Lighting for Photography (4)**

Studio lighting is used to introduce the student to contemporary professional studio photography. Quality developing and printing skills are required. Introduction to current examples of professional studio lighting. 3 lectures, 1 laboratory. Prerequisite: ART 222.

##### **ART 227 Lifestyle Photography (4)**

Studio and environmental portraiture. Emphasis on light ratios/patterns; posing; personality portrayal. 3 lectures, 1 laboratory. Prerequisite: ART 224. *Formerly ART 327.*

##### **ART 237 Graphic Design I (4)**

Exploration of the technical and conceptual underpinnings of graphic design. Focus on the design process and how raw ideas are translated into professional work. For Art and Design majors only. 3 lectures, 1 laboratory. Prerequisite: ART 107 and ART 184, or consent of instructor. *Formerly ART 232.*

##### **ART 238 Typography I (4)**

Fundamentals of theory, practice, technology and history of typography. Exercises include the study of letterforms, type with image, proportion and grids, hierarchy, and legibility. For Art and Design majors only. 3 lectures, 1 laboratory. Prerequisite: ART 237 or consent of instructor. *Formerly ART 331.*

##### **ART 241 Introduction to Glass Fusing and Forming (4)**

Studio course in the creative processes of fusing, forming, and assembling glass. Introduction to the use of line, color, and texture related to glass as a transparent or opaque material. Total credit limited to 8 units. 1 lecture, 3 activities. Prerequisite: ART 101 and ART 107 or ART 148 or consent of instructor.

##### **ART 245 Ceramics I (4)**

Studio course in basic clay working with emphasis on design quality, hand building, and use of the potter's wheel. 3 lectures, 1 laboratory. Prerequisite: ART 107 or consent of instructor.

##### **ART 260 Art Critique and Discourse (4)**

Developing an individual "body" of artwork. Rigorous critiques, lectures, and seminar-style discussions aimed at forming a "process" for discussing artwork. Art writing, research, and individual conceptual and formal development. 4 lectures. Prerequisite: ART 101 and ART 107.

##### **ART 270 Selected Topics (1-4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### **ART 301 Advanced Drawing (4)**

Development of advanced methods and techniques in rendering form, composing pictorial space, expanding formats, color, content, and contemporary issues in drawing as a discipline. Emphasis on problem-solving and finished works for a



student's portfolio. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: ART 201, ART 203 and ART 209, or consent of instructor.

#### **ART 302 Life Drawing I (4)**

Development of advanced drawing methods and techniques in the study of the human form and structure as it relates to proportion, anatomical analysis, and figure/ground relationships. Understanding materials, techniques, and ideas in the practice of contemporary figure drawing. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: ART 201 or consent of instructor. *Change effective Summer 2010.*

#### **ART 309 Intermediate Painting (4)**

Continuation of study of technical and formal problems in painting. Emphasis on the creative process, development of individual ideas, and the connection between form and content. Contemporary issues in painting introduced. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: ART 209, or consent of instructor.

#### **ART 310 Art History--American Art (4)**

Major historical periods of American art from the colonial period to the present. Special emphasis will be given to the broader notion of American art as a process of developing an identity of the varied historical and sociological forces that have shaped images in American art. 4 lectures. Prerequisite: One lower division art history course or consent of instructor.

#### **ART 311 Art History--Nineteenth Century Art (4)**

**GE C4**

History of painting and sculpture from the French Revolution to the beginning of the 20th century. Focuses on significant movements such as Neo-Classicism, Romanticism, Realism, Impressionism and Post-Impressionism. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and ART 111 or ART 112. Fulfills GE C4 except for Art and Design majors.

#### **ART 312 Art History--Modern Art, 1900-1945 (4)**

History of visual arts from the beginning to the middle of the twentieth century. Focus on significant European movements such as Fauvism, German Expressionism, Cubism, Dada, and Surrealism, as well as American Modernism. 4 lectures. Prerequisite: ART 211 or ART 212 or consent of instructor.

#### **ART 313 Design History (4)**

Survey of design from the Victorian era to the present, including major philosophies and movements, political, social, cultural, and technological trends that influenced designers in the 20<sup>th</sup> century. 4 lectures. Prerequisite: Any lower division art history course.

#### **ART 314 History of Photography (4)**

**GE C4**

In-depth survey of the artistic and cultural achievements in photography from its invention to the present day. Significant photographers, the evolution of aesthetic criteria in the context of other visual arts as well as social/cultural impact. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C3. Fulfills GE C4 except for Art and Design majors.

#### **ART 315 Art History--Art Since 1945 (4)**

History of visual art from 1945 to the present. Focus on significant movements such as Abstract, Expressionism, Pop art, minimalism, conceptual art, earthworks, feminism, and postmodernism. Also focus on new media such as performance, video, and installation. 4 lectures. Prerequisite: ART 211 or ART 212, or consent of instructor.

#### **ART 316 Women as Subject and Object in Art History (4)**

Exploration of the role of women in the visual arts. Women as artists, women as portrayed in art, and feminist theory as it applies to the study of the visual arts and art history. 4 lectures. Prerequisite: ART 111, ART 112 or consent of instructor. *Crosslisted as ART/WGS 316.*

#### **ART 317 Asian Art Survey (4)**

Survey of the traditional arts of Asia – primarily India, China and Japan. Emphasis on the connections between the visual arts in Asia and the philosophical, social and cultural environments in which they arose. 4 lectures. Prerequisite: ART 111 or ART 112, or ART 211, or consent of instructor.

#### **ART 318 Asian Art Topics: National, Religious, and Intellectual Movements (4)**

**GE C4**

In-depth examination of significant art movements in Asia. Each topic will focus on the development of art in Asia within the context of a specific geographical or theoretical framework. Details will vary depending on topic. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C3. Fulfills GE C4 except for Art and Design majors.

#### **ART 324 Photographic Expression (4)**

Emphasis on personal expression and developing style, introduction to symbology, visual source development and the work of contemporary creative photographers. 2 lectures, 2 laboratories. Prerequisite: ART 222.

#### **ART 325 Advanced Camera Techniques (4)**

Advanced camera techniques using large format film and/or digital cameras. Use of architectural exteriors, interiors, landscapes and simple studio set-ups to assist mastery of large format cameras. Other topics include perspective and sharpness correction, lighting (available and artificial), digital imaging and studio equipment. High quality imaging for commercial application emphasized. 3 lectures, 1 laboratory. Prerequisite: ART 224.

#### **ART 329 Editorial Photography (4)**

Creating, lighting and executing editorial assignments. Producing photography for corporate needs, i.e. annual reports, brochures and in-house publications. Emphasis on selecting subject matter and handling lights. 3 lectures, 1 laboratory. Prerequisite: ART 325.

#### **ART 330 Book Arts (4)**

Numerous traditional book structures and derivations including accordion, pamphlet, stab, and multiple signature construction. Emphasis on both craftsmanship and experimentation. Hands-on experience and a broad historical overview of paper and book arts. 3 lectures, 1 laboratory. Prerequisite: ART 107, or consent of instructor.

#### **ART 334 Illustration I: Techniques and Tools (4)**

Introduction to the basic practices of commercial illustration as used in the visual communications industry. Emphasis on the generation of ideas, rendering techniques and tools, and self marketing methods, with an overview of the history of illustration. 3 lectures, 1 laboratory. Prerequisite: ART 101 or consent of instructor.

#### **ART 336 Exhibition Design/Museum Studies (4)**

Theory and applied principles of exhibition design for art objects in the museum or gallery setting. Class responsible for planning and installing actual gallery exhibitions. 3 lectures, 1 laboratory. Prerequisite: ART 107, or consent of instructor.

#### **ART 337 Graphic Design II (4)**

Exploration of identity design problems through the use of symbolism and metaphor. Design and implementation of corporate logos. For Art and Design majors only. 3 lectures, 1 laboratory. Prerequisite: ART 237. *Formerly ART 333.*

#### **ART 338 Typography II (4)**

Exploration of typography in the form of text. Application of different typefaces, composition, layout and page systems for the design of periodicals and books. For Art and Design majors only. 3 lectures, 1 laboratory. Prerequisite: ART 238. *Formerly ART 433.*

#### **ART 341 Glassblowing (4)**

Survey of history of glass and introduction to contemporary glass art, presented through visual examples in slide/lecture format. Development of tools and forming processes introduced while student develops 3-dimensional projects. Total credit limited to 8 units. 3 lectures, 1 activity. Prerequisite: ART 101, ART 148 and ART 241; or consent of instructor.

#### **ART 345 Ceramics II (4)**

Studio course in hand, wheel, mold, extruder, jigger, and press forming skills. Design of single and multiple forms and kiln firing procedures. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: ART 107 and ART 148, or ART 245, or consent of instructor.

#### **ART 348 Intermediate Sculpture (4)**

Intermediate sculpture course in expressive use of form with modeling, casting, carving, and/or assembly. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: ART 107 and ART 148, or consent of instructor.

#### **ART 353 Intermedia/Art (4)**

Studio course emphasizing individual and collaborative creative exploration with project content derived from student's experience. Focus on using traditional as well as new genres of artistic expression such as site specific installations, video art, book works, and performance art. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: ART 101, ART 106, and ART 148, or consent of instructor.

#### **ART 360 Professional Practices (2)**

Professional practices in the art, photography, and design fields, including legal and ethical issues, taxes, contracts, fees and copyrights. Current job opportunities are researched and a business plan is prepared. Course lectures augmented by

visiting professionals. For Art and Design majors only. 2 lectures. Prerequisite: Junior standing. *Formerly ART 460.*

**ART 370 Michelangelo (4)** **GE C4**  
The art and life of Michelangelo (1475-1564), the renowned painter, sculptor, architect, and poet, with reference to early biographies, his artistic development, and the demands of his patrons. 4 lectures. Prerequisite: Completion of GE Areas A and ART 111 or ART 112 or ART 211 or ART 212. Fulfills GE C4 except for Art and Design majors. *New course, effective Winter 2010.*

**ART 371 Topics in Renaissance Art (4)** **GE C4**  
A thematic analysis of Renaissance Art (1300-1600) with special attention paid to politics, patronage, myth, religion, and the development of new genres and subject matter. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 lectures. Prerequisite: Completion of GE Area A; ART 111 or ART 112. Fulfills GE C4 except for Art and Design majors. *New course, effective Spring 2010.*

**ART 380 Design Principles for the Web (4)**  
Exploration of design principles in the development of websites that are interactive, dynamic, and visually imaginative. Emphasis on color, typography, organization, and content. For Art and Design majors only. 3 lectures, 1 laboratory. Prerequisite: ART 237.

**ART 383 Digital Video (4)**  
Video and computer generated multimedia presentation scripting, editing, storyboarding and sound cutting. Emphasis on effective communication using presentation techniques and application software to create high impact applications. 2 lectures, 2 laboratories. Prerequisite: ART 182. *Formerly ART 483.*

**ART 384 Digital 3D Modeling and Design (4)**  
Development of skills and techniques in the use of three-dimensional design and modeling via digital technology. Capabilities of current software in the design and modeling of three-dimensional form. 2 lectures, 2 activities. Prerequisite: ART 107 and ART 182, or consent of instructor. *Formerly ART 335.*

**ART 388 Web Design (4)**  
Planning and implementation of web sites. Focus on site structure, navigation, HTML, animation, and design considerations. Art and Design majors only. 3 lectures, 1 laboratory. Prerequisite: ART 182, ~~ART 238~~, or consent of instructor. *Formerly ART 487. Change effective Summer 2010 (ART 238 as prerequisite rescinded, effective Summer 2010).*

**ART 400 Special Problems for Advanced Undergraduates (1-2)**  
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing and consent of instructor.

**ART 402 Life Drawing II (4)**  
Advanced problems in life drawing. Advanced methods and techniques in the study of the human form as it relates to proportion, anatomy analysis and composition. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: ART 302

**ART 406 Contemporary Issues in Painting (4)**  
Focused investigation into contemporary topics in painting, with connections made to traditional approaches. Formal concerns (color, space, light, composition) balanced with conceptual development. Topics may include, but are not limited to, the human figure, landscape, and technological influences. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: ART 309 or consent of instructor.

**ART 409 Advanced Painting (4)**  
Advanced problems in painting. Emphasis on the creative process from concept to finished art. Investigation of traditional, non-traditional and explorative work. to encourage development of personal approach. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: ART 309, or consent of instructor.

**ART 410 Art History Methodologies and Research (4)**  
Current and historical methods for the study of art history including formalism, social history, semiotics, feminism, cultural diversity. Completion of a major research paper or writing project on an art historical topic. 4 seminars. Prerequisite: Completion of GE Area A and two art or architectural history courses, including one at the 300- or 400-level.

**ART 425 Contemporary Photography Seminar (2)**  
Survey of significant photographers and developments in the field since 1950. The interaction between photography and the other visual arts as well as its social impact during this period. Student presentations on selected research topics. Total credit limited to 4 units. 2 seminars. Prerequisite: ART 314. *Formerly ART 465.*

**ART 427 Advertising Photography (4)**  
Applied principles of design and color to produce a photograph that sells an idea, product, or service. Both traditional and digital applications used. Joint projects with ART 432, Advertising Design. Emphasis on thinking, planning, interpreting, and presenting an idea photographically. 3 lectures, 1 laboratory. Prerequisite: ART 325 and senior standing.

**ART 432 Advertising Design (4)**  
Development of print advertising from concept to final presentation. Emphasis on art direction, photo direction and copywriting. For Art and Design majors only. Computer applications are required for appropriate problems. 3 lectures, 1 laboratory. Prerequisite: ART 337 and senior standing or consent of instructor.

**ART 434 Illustration II (4)**  
Advanced development of concepts and illustration techniques and skills, both as analogue and digital, for use in a variety of graphic design applications such as editorial/publication, retail, educational, technical, or advertising purposes. For Art and Design majors only. 3 lectures, 1 laboratory. Prerequisite: ART 334, ART 209, or consent of instructor.

**ART 437 Graphic Design III (4)**  
Advanced graphic design. The creation of basic 3-D structures, and the application of graphics in 3-D environments (such as package design and signage). Emphasis on integrative communication activity of all elements including: color, graphics, 3-D forms, typography, and constructions, and includes market research. For Art and Design majors only. 3 lectures, 1 laboratory. Prerequisite: ART 337 and ART 338. *Formerly ART 431. Change effective Summer 2010.*

**ART 438 Typography III (4)**  
Advanced exploration of communication and structural aspects of typography. Focus on experimentation and expressively using type to enhance meaning. For Art and Design majors only. 3 lectures, 1 laboratory. Prerequisite: ART 338 or consent of instructor. *Formerly ART 430.*

**ART 439 Type in Motion (4)**  
Sequential organization of typographic information in time and how ideas such as intonation, proximity, pacing, rhythm and progression can influence and shape meaning. Focus on animated typography for a range of applications. For Art and Design majors only. 3 lectures, 1 laboratory. Prerequisite: ART 438, ART 488.

**ART 440 Advanced Selected Topics in Glass (4)**  
Continued exploration into the expressive use of glass as a creative medium. Topics may include glass casting, glass blowing, cane work, mold making, and kiln work. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 2 lectures, 2 activities. Prerequisite: ART 241 or ART 341, or consent of instructor.

**ART 448 Advanced Topics in Sculpture (4)**  
Studio course specializing in three-dimensional form. Materials include clay, plaster, metal, or wood. Course content will be selected from various topics that are representational, abstraction, non-objective, or conceptual. The Schedule of Classes will list topic selected. Total credit limited to 8 units; may be in same term. 3 lectures, 1 laboratory. Prerequisite: ART 348.

**ART 461 Senior Project (2)**  
Selection and completion of a project under faculty supervision. Minimum of 90 hours time. Results presented in a formal report. Prerequisite: Senior standing and ~~ART 460-360~~. *Corrected effective Summer 2009.*

**ART 462 Senior Portfolio Project (2)**  
Preparation of portfolio system for entrance into the professional job market or graduate school. 2 activities. Prerequisite: Senior standing and ART ~~461~~ 360. *Change effective Winter 2010.*

**ART 468 Portfolio Production (1)**  
Physical production of final portfolio for the graduating senior. 1 laboratory. Prerequisite: Senior standing; concurrent enrollment in ART 462 required. *Formerly ART 428.*

**ART 470 Selected Advanced Topics (1-4)**  
Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**ART 471 Selected Advanced Laboratory (1-4)**  
Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

**ART 474 Collaborative Studio: Rendering, Animation and Modeling (4)**

A collaborative visualization and design studio focusing on rendering, animation and modeling. Modeling and animation software for design conceptualization and expression. Collaboration in teams. Total credit limited to 8 units. 2 lectures, 2 activities. Prerequisite: ART 384 or consent of instructor.

**ART 484 Animation, Video, and Interactive Design (4)**

Creation of in-depth animations and interactive presentations. Advanced scripting, storyboarding, video production, and interactive communication techniques. 3 lectures, 1 laboratory. Prerequisite: ART 182.

**ART 486 Photography: Image and Idea (4)**

Advanced communication and expression through primarily digital methods. Emphasis on the development of conceptual skills and problem solving methods and technical skills aimed toward the development of a creative voice. Analysis of contemporary practice in the field of photography and other visual media. 3 lectures, 1 laboratory. Prerequisite: ART 222, ART 314.

**ART 488 Advanced Web Design (4)**

Conceptual and technical objectives: the development of the theoretical skills necessary to design a successful web user interface, information architecture and visual identity for digital projects, and the development of technical skills necessary to design advanced interactivity with Macromedia Flash and JavaScript. 3 lectures, 1 laboratory. Prerequisite: Art and Design majors only, ART 388, or consent of instructor.

**ART 489 Advanced Interactive Media Art (4)**

Advanced topics in the digital media field such as interface design, information architecture techniques, digital typography and interactive storytelling. Survey of new applications of design for the new media, and the development of digital portfolio pieces. 3 lectures, 1 laboratory. Prerequisite: ART 488, or consent of instructor.

**ART 494 Cooperative Education Experience (6) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 12 units; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**ART 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 12 units; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**2009-11 Cal Poly Catalog****Art and Design Department****BFA ART AND DESIGN**

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                      ☐ USCP

\* = Required in Major; also satisfies GE

**MAJOR COURSES**

ART 101 The Fundamentals of Drawing (C3)* .....	4
ART 105 Foundation: Color Theory .....	4
ART 106 Foundation: 2-Dimensional Design.....	4
ART 107 Foundation: 3-Dimensional Design.....	4
ART 182 Photographic Manipulation and Design ...	4
ART 203 Art Theory and Practice.....	4
ART 209 Beginning Painting .....	4
ART 211 Art History: Ancient-Renaissance or	
ART 212 Art History: Renaissance-Baroque .....	4
ART 222 Black and White Photography .....	4
ART 260 Critique and Discourse .....	4
ART 312 Art History-Modern Art, 1900-1945 or	
ART 315 Art History-Art Since 1945.....	4
Art History. Select two courses from the following	
upper division art history courses not already	
required in major core or concentration.....	4,4
ART 310, 311 <del>(C4)</del> , 312, 313, 314 <del>(C4)</del> , 315,	
316, 317, 318 <del>(C4)</del> , 370, 371 <i>Corrected 5/21/09</i>	
ART 360 Professional Practices .....	2
<del>ART 461 Senior Project 10/19/09</del> .....	<del>2</del>
ART 462 Senior Portfolio Project .....	2
Concentration courses (see below).....	60

**118 116****GENERAL EDUCATION (GE)**

72 units required, 4 of which are specified in Major.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (20 units)**

B1 Mathematics/Statistics .....	8
B2 Life Science .....	4
B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	
B5 elective	
Area B elective (select one course from B1-B5)...	4

**Area C Arts and Humanities (12 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts *4 units in Major.....	0
C4 Upper-division elective (No ART courses) .....	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division)**

(4 units) .....	4
	<b>68</b>

<b>FREE ELECTIVES</b> .....	<b>0</b>
	<b>186 184</b>

**CONCENTRATIONS (select one)****Graphic Design Concentration**

ART 183 Digital Illustration and Design.....	4
ART 184 Digital Book Making and Design .....	4
ART 201 Intermediate Drawing .....	4
ART 237 Graphic Design I.....	4
ART 238 Typography I .....	4
ART 313 Design History .....	4
ART 337 Graphic Design II .....	4
ART 338 Typography II .....	4
ART 380 Design Principles for the Web .....	4
ART 437 Graphic Design III .....	4
ART 438 Typography III.....	4
ART 468 Portfolio Production.....	1
Select at least one of the following courses: .....	4
ART 302, 330, 334, 384, 388, 432, 434, 439,	
488, 489	

Select 11 units (at least 6 units must be upper-	
division) from: .....	11
Any ART course not already in the major core,	
GRC 101, GRC 203, GRC 337	

**60****Photography Concentration**

ART 224 Introduction to Artificial Lighting for	
Photography .....	4
ART 227 Lifestyle Photography .....	4
ART 314 History of Photography <del>(C4)</del> .....	4
<i>Corrected 7/30/09</i>	
ART 324 Photographic Expression .....	4
ART 325 Advanced Camera Techniques .....	4
ART 329 Editorial Photography .....	4
ART 383 Digital Video .....	4
ART 427 Advertising Photography .....	4
ART 468 Portfolio Production.....	1
ART 486 Photography: Image and Idea .....	4
GRC 331 Color Management .....	4

Select 19 units from: Any ART course not	
already required in the major core .....	19
	<b>60</b>

**Studio Art Concentration**

ART 148 Beginning Sculpture <del>(C3)</del> .....	4
<i>Corrected 10/29/09</i>	
ART 201 Intermediate Drawing .....	4
ART 211 Art History-Ancient to Renaissance <i>or</i> ART 212 Art History-Renaissance through Ba- roque Era (whichever not taken in major core) ...	4
ART 245 Ceramics I <i>or</i> ART 348 Intermediate Sculpture.....	4
ART 301 Advanced Drawing.....	4
ART 302 Life Drawing I.....	4
ART 309 Intermediate Painting .....	4
ART 312 Art History-Modern Art, 1900-1945 <i>or</i> ART 315 Art History-Art Since 1945 (whichever not taken in major core).....	4
Select 12 units (300-400 level) from these Studio Art courses: .....	12
ART 336, 341, 345, 348, 353, 402, 406, 409, 440, 448	
Any ART course not already required in the major core (See course descriptions for repeatable units) .....	<u>16</u>
	60

**2009-11 Cal Poly Catalog****Art and Design Department****ART HISTORY MINOR**

Courses consist of a required core and advisor approved electives. The courses include art and architectural history. Students, working with an advisor, select their area(s) of interest. Advisors are: Elizabeth Adan, Giancarlo Fiorenza, or Jean Wetzel.

	<i>Units</i>
<i>Select one survey course in Art History .....</i>	4
ART 112 Survey of Western Art (C3)	
ART 211 Art History–Ancient to Renaissance	
ART 212 Art History–Renaissance through Baroque Eras	
<i>Select one survey course in Architecture.....</i>	4
ARCH 217 History of World Architecture: Prehistory–Middle Ages (C3)	
ARCH 218 History of World Architecture: Middle Ages–18 <sup>th</sup> Century (C3)	
ARCH 219 History of World Architecture: 18 <sup>th</sup> Century–Present (C3)	
<i>Select one 300-level Non-Western Course .....</i>	4
ART 317, 318 (C4), ARCH 320 (C4) (depending on topic)	
<i>Select one 300-level Western Course .....</i>	4
ART 310, 311 (C4), 312, 315, <b>370 (C4) (Effective Winter 2010)</b> , <b>371 (C4) (Effective Spring 2010)</b> , ARCH 320 (C4) (depending on topic), ART/WGS 316	
<i>One 400-level Art History Methods/Research Course .....</i>	4
ART 410 Art History Methodologies and Research	
<i>Electives .....</i>	8
Western or non-Western, architecture or art history classes, at the 300-400 level:	
ART 310, 311 (C4), 312, 315, 316, 317, 318, <b>370 (C4)</b> , <b>371 (C4)</b> ;	
ARCH 320, 420	

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## 2009-11 Cal Poly Catalog

### Animal Science Department

#### ASCI-ANIMAL SCIENCE

##### **ASCI 101 Introduction to the Animal Sciences (2) (CR/NC)**

Economic, environmental and societal impact of the livestock, poultry and horse industries. Basic terminology, anatomy, and physical requirements of animals. Career and academic planning. Co-curricular, extra-curricular, and post-graduate opportunities. Required of all first-time students in the Animal Science Department. Credit/No Credit grading only. 2 lectures.

##### **ASCI 112 Principles of Animal Science (4)**

**GE B2**

Economic and environmental roles of animal production and companionship to society. Introductory nutrition, genetics, reproduction, behavior, growth and development, animal products, biosecurity, and food processing and safety of animals. 4 lectures. Fulfills GE B2 except for ASCI and AGSC majors.

##### **ASCI 200 Special Problems for Undergraduates (2-3) (CR/NC)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 3 units per quarter. Credit/No Credit grading only. Prerequisite: Consent of instructor.

##### **ASCI 203 Animal Parasitology (3)**

Identification, life cycles, prevention and control of the common external and internal parasites causing economic loss in livestock. 3 lectures. Prerequisite: BIO 111 or BIO 161. *Crosslisted as ASCI/VS 203.*

##### **ASCI 211 Meat Science (4)**

Muscle food processing methods and operations. Conversion of muscle to meat. Meat inspection, grading, composition, curing, preservation, food safety and related topics. Carcass beef, pork, and lamb processed into consumer ready products. 3 lectures, 1 laboratory.

##### **ASCI 212 Livestock Show Management (3)**

Application of the management and operations of Cal Poly's Western Bonanza Livestock Show. Principles and procedures in planning, organizing, financing, promoting and managing a major livestock show and the fair industry. Total credit limited to 6 units. 1 lecture, 2 activities. Not open to students with credit for ASCI 412 or ASCI 413.

##### **ASCI 214 Equine Management (2)**

Application of safety, risk reduction, horsemanship skills. Develop a working equine/human relationship. Selection and application of nutrition, equipment, preventive health and farrier program, and equitation skills. 2 laboratories. Prerequisite: Consent of instructor.

##### **ASCI 216 Meat Grading and Evaluation (2)**

Factors related to carcass quality and yield. USDA meat grading principles and practices. Judging of carcass and wholesale cuts. Field trip to meat packing plants required. 1 lecture, 1 laboratory. Prerequisite: ASCI 211.

##### **ASCI 220 Introductory Animal Nutrition and Feeding (4)**

Nutrient digestion and absorption; basic functions of major nutrient classes; NRC feed classification and feedstuff characteristics; Van Soest system of fiber analysis and practical applications; feed processing: effects on feeds and nutrient availability; nutrient requirements of animals; diet formulation techniques. 3 lectures, 1 laboratory. Prerequisite: ASCI 112.

##### **ASCI 221 Introduction to Beef Production (4)**

Survey of industry characteristics, breeds, market classes, production systems, and current issues facing the beef industry. 3 lectures, 1 laboratory. Prerequisite: ASCI 112 or ASCI 231.

##### **ASCI 222 Systems of Swine Production (4)**

Structure of the pork industry in the U.S.; production standards and new technologies; breed systems. Market classification, product quality and quality assurance. Swine behavior and husbandry systems; biosecurity, health and feeding systems and management. 3 lectures, 1 laboratory. Prerequisite: ASCI 112 or ASCI 231.

##### **ASCI 223 Systems of Sheep Management (4)**

Sheep industry overview, populations, trends, cultural implications, breed identification, nutritional, reproductive, health, and marketing management of sheep. 3 lectures, 1 laboratory. Prerequisite: ASCI 112 or ASCI 231.

##### **ASCI 224 Equine Science (4)**

History, status of the horse industry, breeds. Application of management skills, safety, conformation evaluation, hoof and leg conformation and care. Understanding equine behavior. Insurance and tax ramifications. Pedigree analysis. Alternate therapies. 3 lectures, 1 laboratory. Prerequisite: ASCI 112 or ASCI 231.

##### **ASCI 225 Introduction to Poultry Management (4)**

Introduction to modern techniques in poultry production, processing, marketing and price discovery. Consumption trends, breeds and consumer grades. Laboratory application of management skills, health care, keeping of production and accounting records and processing techniques. 3 lectures, 1 laboratory. *Crosslisted as ASCI/PM 225.*

##### **ASCI 226 Livestock Evaluation (3)**

Utilization of objective and subjective estimation measures in establishing economic worth of domestic animals of the three meat animal species and horses. 1 lecture, 2 laboratories.

##### **ASCI 227 Companion Animal Science (4)**

Companion animal anatomy and physiology, reproduction, nutrition, behavior, management, common parasites, and infectious diseases. Scientific method in studying the human-animal bond. Application of biological concepts to problems related to companion animals. Trends in pet industry including animal welfare issues. 3 lectures, 1 laboratory. Prerequisite: ASCI 112.

##### **ASCI 228 Equine Evaluation (2)**

Appraisal of equine breeds at halter and in performance classes. Evaluate horse classes, decide their order of placement, and then orally justify these decisions to a judge. The relationship of equine anatomy and physiology on competitive performance. 2 laboratories.

##### **ASCI 229 Anatomy and Physiology of Farm Animals (4)**

Comprehensive overview of the principal systems of farm animals using an integrative, systemic approach to learning the homeostasis of mammalian organisms so the information can be applied to their daily care and management. 3 lectures, 1 laboratory. Prerequisite: BIO 111 or BIO 161. *Crosslisted as ASCI/VS 229.*

##### **ASCI 231 General Animal Science (3)**

Relationship of animal agriculture to society and the economy and their role for human use and consumption. Discussion of nutrition, reproduction and management of beef cattle, sheep, swine and horses. Credit not allowed for Animal Science majors. 3 lectures.

##### **ASCI 232 General Animal Science Laboratory (1)**

Basic handling skills of livestock; introductory selection of livestock; basic feedstuff identification and processing; and health care practices. 1 laboratory.

##### **ASCI 260 Preparation of Livestock for Shows and Sales (3)**

Techniques, equipment and knowledge necessary in order to properly condition, groom, and present beef cattle or horses for evaluation and merchandising. 3 activities.

##### **ASCI 265 Equine Behavior and Training (3)**

Training of weanling and yearling horses at halter. Selection of proper attire for the handler and equipment for the horse. Application of safe, behavioral training techniques enabling the horse to accept handling, farrier and health care. 3 activities.

##### **ASCI 270 Selected Topics (1-4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### **ASCI 290 Animal Production and Management Enterprise (1-5) (CR/NC)**

Beginning field experience in animal production systems. May include health, nutrition, reproduction, management, processing, budgeting, and/or marketing exercises. Total degree credit for ASCI 290/ASCI 490 limited to 6 units. Credit/No Credit grading only. 1-5 lectures. Prerequisite: Consent of instructor. *Crosslisted as ASCI/PM 290.*

##### **ASCI 304 Animal Genomics (3)**

Application of genetic principles for domestic animal improvement. Improving animal performance and health through use of genetic markers and diagnostics, gene mapping, and related current technologies. 3 lectures. Prerequisite: BIO 302 or BIO 303 or BIO 351.

##### **ASCI 305 Game Bird Propagation and Management (3)**

Habitat needs, management and propagation of North American game bird species in the wild and in captivity. Reproduction, nutrition and maintenance of



flock health as practiced by commercial game bird operations. 3 lectures.  
Prerequisite: ASCI/PM 225. *Crosslisted as ASCI/PM 305.*

#### **ASCI 310 Technical Veterinary Skills (4)**

Restraint and handling of animals, physical examination, necropsy procedure, basic wound management, applied pharmacology. Reproduction and herd health programs. 3 lectures, 1 laboratory. Prerequisite: VS/ASCI 229. *Crosslisted as ASCI/VS 310.*

#### **ASCI 311 Advanced Beef Cattle System Management (4)**

Management principles for the sustainability of commercial beef cattle operations. Systems approach for goal setting, financial analysis, range management, breeding systems, nutrition, health programs, marketing, and production practices to enhance profitability of commercial cow-calf operations. 3 lectures, 1 laboratory. Prerequisite: ASCI 221 or consent of instructor.

#### **ASCI 312 Production Medicine (3)**

Basic disease concepts. Fundamentals of immunology and therapeutics. Disease prevention principles, infectious and non-infectious. Pre-harvest food safety and milk and meat quality assurance. Herd health management programs for production efficiency and product quality. 3 lectures. Prerequisite: ASCI 221 or ASCI 223; PM/ASCI 225 or ASCI 222; ASCI 224 or ASCI 227; and VS/ASCI 229. *Crosslisted as ASCI/VS 312.*

#### **ASCI 315 Equine Biomechanics (4)**

Anatomy and physiology of the equine hoof and limb. An understanding of the art and science of the farrier's work. Evaluation of proper hoof care, trimming, and shoeing. Foot and leg conformation as it relates to sound locomotion. 3 lectures, 1 activity. Prerequisite: ASCI 224 or equivalent. Recommended: VS/ASCI 229.

#### **ASCI 320 Physiological Chemistry of Animals (4)**

Interactions between the biological and chemical reactions in livestock. Physiology explained at the organ, tissue and cellular level as it relates to the whole animal system. 4 lectures. Prerequisite: CHEM 312 or CHEM 316, VS/ASCI 229.

#### **ASCI 321 Zoonoses and Veterinary Public Health Concerns (4)**

Public health concerns including: animal and bird diseases which may be transmitted to people; pre-harvest food safety and handling concerns; and environmental public health hazards. 3 lectures, 1 activity. Prerequisite: BIO 111 or BIO 161. *Crosslisted as ASCI/VS 321.*

#### **ASCI 324 Advanced Equine Evaluation (2)**

Appraising the relative merit of individual horses in halter and performance through the application, development and refinement of deductive and inductive logical processes. Oral and written expression of the selection rationale. 2 laboratories. Prerequisite: ASCI 228 or consent of instructor.

#### **ASCI 325 Egg Production, Processing and Distribution (4)**

Management of replacement pullets and laying hens including flock scheduling, vaccination and handling procedures, nutrition management, costs of operation and production projections. Quality determination, processing, sales and distribution of shell eggs and egg products. 3 lectures, 1 laboratory. Prerequisite: ASCI/PM 225. *Crosslisted as ASCI/PM 325.*

#### **ASCI 326 Advanced Livestock Evaluation (2)**

Application of deductive and inductive logical processes in appraising the relative merit of individual animals within a group sample. Oral expression of the selection rationale. 2 laboratories. Prerequisite: ASCI 226.

#### **ASCI 329 Principles of Range Management (4-3-)**

Characteristics, history and multiple uses of rangeland. Principles of range plant physiology and ecology in relation to range condition, trend, utilization and improvement practices. Principles of proper grazing practices and nutrition of livestock. 3 lectures, 1 laboratory. Prerequisite: One course each in soil science, animal science and botany or crop science. *Change effective Winter 2011.*

#### **ASCI 330 Poultry Meat Production and Processing (4)**

Modern production techniques for the poultry meat industry. Management of hatcheries, broiler and/or turkey meat production, processing and further processing. 3 lectures, 1 laboratory. Prerequisite: ASCI/PM 225. *Crosslisted as ASCI/PM 330.*

#### **ASCI 333 Equine Reproduction (5)**

Management of the breeding farm, breeding problems, diseases, study of estrus cycles, servicing the mare, handling stallions. Breeding systems, teasing, embryo transfer, ultrasound pregnancy diagnosis, new developments in breeding technology. 4 lectures, 1 laboratory. Prerequisite: ASCI 224 and VS/ASCI 229.

#### **ASCI 339 Internship in Animal Science (1-12) (CR/NC)**

Selected Animal Science students will spend up to 12 weeks with an approved agricultural firm engaged in production or related business. Time will be spent applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Consent of internship instructor.

#### **ASCI 342 Poultry Business Management (4)**

Organization and management of vertically integrated poultry operations. Personnel management, cash flow analysis, cash vs. accrual accounting, structuring of financial statements, projecting product outputs and cash flow needs, employee benefit programs and insurance needs for poultry companies. 4 lectures. Prerequisite: ASCI/PM 225 or consent of instructor. *Crosslisted as ASCI/PM 342.*

#### **ASCI 344 Equine and Human Communication (3)**

Behavior of the horse and its relationship with people. Learning, motivation, social behavior and communication with techniques to improve the safety and understanding between people and horses. 3 activities. Prerequisites: ASCI 214, or consent of instructor.

#### **ASCI 345 Equine Behavior Modification (5)**

Advanced principles of equine behavior modification for training young horses under saddle. Identifying differences in individual horse's attitudes, techniques to teach horses to respond to different stimuli, management of young equine athlete. 5 activities. Prerequisite: ASCI 344 and consent of instructor.

#### **ASCI 346 Equine Nutrition (4)**

Equine digestion, diet development considerations and evaluations, nutritional management, and the relationship of respective topics to recommended feeding practices, research data, and nutritional portfolios. Information is based on recent advances in horse nutrition and the National Research Council's Nutrient Requirements for Horses. 3 lectures, 1 laboratory. Prerequisite: ASCI 220 and ASCI 224.

#### **ASCI 347 Equine Exercise Physiology (3)**

Applied physiology of the exercising horse. Examine different physiological systems: muscular, cardiovascular, respiratory, and nutritional. Gait analysis, lameness, and treatment. The athletic horse: sports medicine, conditioning, drugs, and necropsy evaluation. A distance learning course. 3 lectures. Prerequisite: ASCI 224 and VS/ASCI 229 or consent of instructor.

#### **ASCI 350 Applied Nonruminant Nutrition (4)**

Comparison of nonruminant and ruminant digestive systems, nutrient requirements, risk management for ingredients, formulation and nutritional management. Influence of growth and production curves, consumption patterns, and feeding management in commercial poultry and swine industries. Feed manufacturing and governmental regulations. 3 lectures, 1 laboratory. Prerequisite: ASCI 220 or DSCI 101.

#### **ASCI 351 Reproductive Physiology (4)**

Reproductive anatomy of male and female farm animals. General endocrinology and systemic physiology. Endocrine system effects on the various aspects of reproduction, such as: gametogenesis, estrus, gestation, parturition, mothering and seasonality. Introduction to reproductive biotechnology and embryo manipulation. 3 lectures, 1 laboratory. Prerequisite: VS/ASCI 229.

#### **ASCI 355 Ruminant Nutrition (4)**

Digestive physiology and nutrition of ruminants. Anatomy and physiology of the digestive tract. Rumen microbial fermentation. Nitrogen utilization and metabolism. Energy partitioning. Net energy system. Range livestock and feedlot nutrition. Supplementation. Common metabolic and nutritional dysfunctions. Diet formulation. 3 lectures, 1 laboratory. Prerequisite: ASCI 220; ASCI 320 or CHEM 313 or CHEM 371.

#### **ASCI 360 Poultry Industry Seminar (3)**

New trends, management techniques and governmental regulations, special problems and research developments related to the poultry industry. 3 seminars. Prerequisite: PM/ASCI 225, PM/ASCI 330 and VS/ASCI 440. *Crosslisted as ASCI/PM 360.*

#### **ASCI 363-463 Undergraduate Seminar (2)**

Major developments in the chosen field of the student. Discussion of new developments, policies, practices, and procedures. Each individual is responsible for the development and presentation of a topic in the chosen field, *résumé, and cover letter*. 2 seminars. Prerequisite: *Junior Senior-standing and ASCI-462. Change effective Winter 2011.*

**ASCI 366 Veterinary Pharmacology (4)**

Investigation of pharmacological principles applied to animal systems. Overview of drugs acting on the nervous, endocrine, circulatory, urinary systems, and reproductive systems, specialty areas of pharmacology, and pharmacogenomics of livestock and companion animals. 3 lectures, 1 activity. Prerequisite: CHEM 111 or CHEM 127, and ASCI 229.

**ASCI 384 Processed Meat Products (4)**

Physical, chemical and functional characteristics of meat food raw materials. Science and technology of value-added processing including curing, sausage manufacture, low moisture products, and restructuring. Quality assurance and related current industry topics. 3 lectures, 1 laboratory. Prerequisite: ASCI 211 and junior standing.

**ASCI 400 Special Problems for Advanced Undergraduates (2–4) (CR/NC)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 4 units per quarter. Credit/No Credit grading only. Prerequisite: consent of instructor.

**ASCI 403 Applied Biotechnology in Animal Science (5)**

Coverage of current resources, techniques and methodologies used in animal research and biotechnology as well as experimental design, model assessment, and data interpretation with application to an experimental setting in the laboratory. 3 lectures, 2 laboratories. Prerequisite: BIO 161, BIO 162, upper division genetics course or consent of instructor.

**ASCI 405 Domestic Livestock Endocrinology (4)**

Endocrine system and its role in the homeostasis of the animal. Use of hormones in increasing productivity of domestic animals. Endocrinology of reproduction, growth, metabolism and immunology. Discussions of cost-benefit relationships in the use of hormones. 4 lectures. Prerequisite: VS/ASCI 229.

**ASCI 406 Applied Animal Embryology (5)**

Technology of promoting oocyte development, fertilization, culturing, cryopreservation and micromanipulation of embryos. Mouse, cattle and horse embryos used for learning the techniques involved in embryology. 3 lectures, 2 laboratories. Prerequisite: VS/ASCI 229 and ASCI 351.

**ASCI 410 Applied Animal Behavior Science (4)**

Principles of behavior applied to animals in managed environments. Observation and measurement of behavior, including sampling and recording methods. Learning, including training and operant conditioning. Discussion of issues related to behavioral welfare. Etiology and management of maladaptive behavior. 3 lectures, 1 laboratory. Prerequisite: ASCI 320, or CHEM 313 or CHEM 371, and ASCI 221, or ASCI 222, or ASCI 223, or ASCI 224, or ASCI 225, or ASCI 227.

**ASCI 412 Advanced Livestock Event Planning (3)**

Organization and planning for the Western Bonanza Junior Livestock Show. Establishment of committee assignments and show manager responsibilities. Corporate partnerships established and fund raising begun. Planning for activities and guest speakers and new student recruitment. Total credit limited to 6 units. 1 lecture, 2 activities. Prerequisite: ASCI 212, AGB 314 and consent of instructor.

**ASCI 413 Advanced Livestock Event Management (1)**

Student management of the Western Bonanza Junior Livestock Show. Leadership skills, team building, media relations, use of computer applications, livestock and fair industry contacts and mentoring to new students. Application of knowledge learned in ASCI 412. Total credit limited to 2 units. 1 activity. Prerequisite: ASCI 412 and consent of instructor.

**ASCI 415 HACCP for Meat and Poultry Operations (3)**

Using Hazard Analysis and Critical Control Point (HACCP) principles to develop regulatory inspection plans for meat and poultry operations; development and use of prerequisite programs; microbiological and process overviews. 3 lectures. Prerequisite: ASCI 211 or consent of instructor.

**ASCI 420 Animal Metabolism and Nutrition (3)**

Metabolism of proteins, carbohydrates, lipids, minerals, vitamins and water, and the relationship of nutrient utilization to animal production. 3 lectures. Prerequisite: ASCI 220; ASCI 320 or CHEM 313 or CHEM 371.

**ASCI 425 Meat Industry Study Tour (2)**

Study tour of commercial meat businesses. Livestock harvest and carcass fabrication, further meat processing, retail and food service operations. Personnel, processing procedures, regulatory standards, industry specifications and current issues. Travel for 4 days. 2 activities. Prerequisite: ASCI 211 or consent of instructor.

**ASCI 430 Animal Feed Processing (4)**

Management of feed manufacturing for poultry/swine, dairy/beef, and companion animals. General operation of a processing facility including process flow, raw materials receiving, particle reduction, mixing, pelleting, packaging and delivery. State and federal regulations. 3 lectures, 1 laboratory. Prerequisite: ASCI 112 or consent of instructor.

**ASCI 438 Systemic Animal Physiology (4)**

Homeostatic relationships of organ systems. Cardiovascular, respiratory, urogenital and neuro-endocrinological functions. 3 lectures, 1 laboratory. Prerequisite: VS/ASCI 229, CHEM 313 or CHEM 371, or ASCI 320. *Crosslisted as ASCI/VS 438.*

**ASCI 440 Immunology and Diseases of Animals (4)**

Introduction to immune system, including innate and acquired immunity of domesticated animals. Application of immunological analyses and examination of current disease issues in domesticated animals. 3 lectures, 1 laboratory. Prerequisite: VS/ASCI 229. Recommended: ASCI 320, CHEM 371 or equivalent. *Crosslisted as ASCI/VS 440.*

**ASCI 450 Computer Applications in Animal Science: Spreadsheet Analysis (4)**

Development of spreadsheets relating to livestock production. Integration of database and analytical techniques. Cost-benefit analyses of livestock production systems. 2 lectures, 2 activities. Prerequisite: CSC 110.

**ASCI 455 Advanced Equine Reproductive Technologies (4)**

Assisted reproductive technologies in horses; use of gametes from normal and sub-fertile horses; manipulation of sub-fertile horses, donor and recipient mares; manipulation of endocrine system; embryo utilization; cryobiology of gametes and embryos; assessment of high-risk mare, fetus, and neonate. 3 lectures, 1 laboratory. Prerequisite: ASCI 333; ASCI 351; ASCI 405 and ASCI 406 recommended.

**ASCI 461 Senior Project Planning (1) (CR/NC)**

Evaluation of project options and expectations. Selection of a project and an appropriate advisor. Primary objective: completion of a senior project proposal and outline signed by the senior project advisor, detailing the scope of the project, resources required, and timeline for completion. Credit/No Credit grading only. 1 seminar. Prerequisite: Junior standing.

**ASCI 462 Senior Project (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 60 hours. Prerequisite: ASCI 461.

**ASCI 463 Undergraduate Seminar (2) See ASCI 363**

~~Major developments in the chosen field of the student. Discussion of new developments, policies, practices, and procedures. Each individual is responsible for the development and presentation of a topic in the chosen field. 2 seminars. Prerequisite: Senior standing and ASCI 462. *Change effective Winter 2011.*~~

**ASCI 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**ASCI 471 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

**ASCI 476 Issues in Animal Agriculture (3)**

Exploration of social, political and environmental forces which will affect livestock production in the future. Roles played by advocacy groups and the media in influencing consumer demands and management practices. 3 seminars. Prerequisite: Upper division standing.

**ASCI 477 Senior Project – Research Experience in Animal Science (3)**

Independent research experience in a specific area of animal science conducted under faculty supervision. Satisfies senior project requirement. Minimum 90 hours required. Prerequisite: Senior standing, ASCI 363 and consent of instructor; one course in statistics recommended. *New course, effective Winter 2011.*

**ASCI 478 Senior Project – Advanced Internship Experience in Animal Science (3)**

Independent internship experience conducted under faculty supervision focusing on a discipline area of animal science. Completion of a project as a component of the internship. Satisfies senior project requirement. Minimum 90 hours required. Prerequisite: ASCI 363 and senior standing. *New course, effective Winter 2011.*

**ASCI 480 Advanced Integration of Livestock and Meat Production (4)**

Integration of domestic livestock systems and meat production. Advanced concepts in science and technology of animal management, growth enhancement, harvest and processing related to product safety and quality. 3 lectures, 1 laboratory. Prerequisite: ASCI 211 and ASCI 221; or equivalent course.

**ASCI 490 Advanced Animal Production and Management Enterprise (1-5) (CR/NC)**

Advanced field experience in animal production systems. May include health, nutrition, reproduction, management, processing, budgeting, and/or marketing exercises as well as management decision-making opportunities. Total degree credit for ASCI 290/ASCI 490 limited to 6 units. Credit/No Credit grading only. 1-5 lectures. Prerequisite: Consent of instructor. *Crosslisted as ASCI/PM 490.*

**ASCI 500 Individual Study in Animal Science (1–6)**

Advanced independent study planned and completed under the direction of a member of the Animal Science faculty. Total credit limited to 6 units. Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

**ASCI 503 Advanced Molecular Techniques in Animal Science (4)**

Advanced molecular laboratory techniques in animal science. Topics include analyses of cellular and metabolic regulation, gene expression, gene activation and regulation, gene construct design, transgenesis, knockout animal models. 2 lectures, 2 laboratories. Prerequisite: ASCI 403 or equivalent course.

**ASCI 520 Comparative Animal Nutrition (4)**

Advanced problem-based presentation of animal nutrition case studies. Emphasis on nutrients, clinical nutrition disorders and species not commonly considered in production animal nutrition. Analytical and problem-solving skills will be utilized to develop solutions to complex animal nutrition management issues. 3 lectures, 1 activity. Prerequisite: ASCI 320, or CHEM 313 or CHEM 371, and one of the following: ASCI 346, or ASCI 350, or ASCI 355, or DSCI 301, or consent of instructor.

**ASCI 530 Advanced Molecular Nutrition (3)**

In-depth analysis of molecular signaling mechanisms and events related to nutrient metabolism using examples from the current literature in animal science and nutrition. 3 lectures. Prerequisite: ASCI 320 or ASCI 420 or CHEM 372 or graduate standing and consent of instructor.

**ASCI 540 Advanced Immunology and Diseases of Animals (4)**

In-depth analysis of the immune system, including molecular basis for immunity of domesticated animals. Application of immunological assays, and application of scientific method to examine immunity and disease in domesticated animals. Not open to students with credit in VS 440. 3 lectures, 1 laboratory. Prerequisite: VS/ASCI 229; ASCI 320 or CHEM 371 or equivalent; STAT 218 or equivalent; or consent of instructor. Corequisite: VS/ASCI 541. *Crosslisted as ASCI/VS 540.*

**ASCI 541 Advanced Animal Immunology Laboratory (1)**

Laboratory complement to VS 540. Independent research projects, including hypothesis development, experimental design, data collection and analyses, and written and oral presentations. 1 laboratory. Corequisite: VS/ASCI 540. *Crosslisted as ASCI/VS 541.*

**ASCI 555 Advanced Equine Reproductive Technologies (4)**

Assisted reproductive technologies in horses; use of gametes from normal and sub-fertile horses; manipulation of sub-fertile horses, donor and recipient mares; manipulation of endocrine system; embryo utilization; cryobiology of gametes and embryos; assessment of high-risk mare, fetus, and neonate. 3 lectures, 1 laboratory. Prerequisite: ASCI 333; ASCI 351; ASCI 405 and ASCI 406 recommended. Not open to students with credit in ASCI 455.

**ASCI 570 Selected Topics in Animal Science (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1 to 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**ASCI 571 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title

selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Graduate standing or consent of instructor.

**ASCI 581 Graduate Seminar in Animal Science (1-4) (CR/NC)**

Current findings and research problems in the field and their application to the industry. Credit/No Credit grading only. Total credit limited to 12 units.-1-4 seminars. Prerequisite: Graduate standing and consent of instructor.

**ASCI 593 Stem Cell Research Internship (5)**

Supervised graduate research in stem cell science and engineering. Provides students with an off-campus industrial or university research internship. Total credit limited to 10 units. Prerequisite: Graduate standing in the Specialization in Stem Cell Research for the MS in Biological Sciences or for the MS in Biomedical Engineering, or the Animal Science Specialization in the MS in Agriculture, and BMED 510, BMED 545, BMED 515, and BIO 534. *Crosslisted as ASCI/BIO/BMED 593. New course, effective Winter 2011.*

**ASCI 594 Applications in Stem Cell Research (2)**

Transfer of skills and knowledge gained through ASCI/BIO/BMED 593, in an applied setting at Cal Poly. Demonstration of technical, problem solving, and presentation skills, and familiarity with current research. Part of the culminating experience for the Specialization in Stem Cell Research for the MS in Biological Sciences or for the MS in Biomedical Engineering, or the Animal Science Specialization in the MS in Agriculture. 1 seminar and supervised work. Prerequisite: ASCI/BIO/BMED 593 *Crosslisted as ASCI/BIO/BMED 594. New course, effective Spring 2011.*

## 2009-11 Cal Poly Catalog

### Biological Sciences Department

#### BIO–BIOLOGY

##### **BIO 100 Orientation to Biological Sciences (1) (CR/NC)**

Introduction to Biological Sciences faculty, department and campus resources, research opportunities, possible careers, studying science, and current topics in biology. Credit/No Credit grading only. 1 lecture.

##### **BIO 111 General Biology (4)**

**GE B2 & B4**

Principles of cellular biology, heredity, ecology, biological diversity, and evolution, with emphasis on their relationships to human affairs. Not open to students who have completed BIO 115 or BIO 161. 3 lectures, 1 laboratory. Fulfills GE B2 & B4.

##### **BIO 112 Environmental Biology and Conservation (4)**

**GE B5**

A biologically centered exploration of our planet focusing on natural resource conservation and contemporary environmental issues. Interactions between components of the biosphere and impacts of human society on interrelationships within ecosystems. Trends in natural resource conservation and biodiversity preservation. 4 lectures. Fulfills GE B5.

##### **BIO 113 Animal Diversity and Ecology (4)**

**GE B2 & B4**

Animal diversity and ecology in aquatic and terrestrial communities including structural and functional adaptations of animals to their environment. Identification of common invertebrate and vertebrate animals. Field experience in local ecosystems. Part of a course series for Liberal Studies majors planning a career in elementary school teaching. Saturday field trips. 2 lectures, 2 laboratories. Fulfills GE B2 & B4.

##### **BIO 114 Plant Diversity and Ecology (4)**

**GE B2 & B4**

Plant diversity and ecology in aquatic and terrestrial plant communities including adaptations of plants to their environment. Identification of common, local native plants and plant communities, uses of native plants by Native Americans, and human impacts on native plant communities. Part of a course series for Liberal Studies majors planning a career in elementary school teaching. Saturday field trips. 2 lectures, 2 laboratories. Fulfills GE B2 & B4.

##### **BIO 115 Animal/Human Structure and Function (4)**

**GE B2 & B4**

Survey of the structure and function of animal cells, tissues, organs, and organ systems, with examples drawn from vertebrates and invertebrates; emphasis will be on vertebrates, especially the human. Part of a course series for Liberal Studies majors planning a career in elementary school teaching. Not open to students who have completed BIO 153 or BIO 162. 3 lectures, 1 laboratory. Recommended prerequisite: a course in chemistry. Fulfills GE B2 & B4.

##### **BIO 160 Diversity and the History of Life (4)**

Overview of the history, diversity and genetic relatedness of life on Earth; broad-scale evolutionary framework of the organization and expansion of life on Earth. 2 lectures, 2 laboratories.

##### **BIO 161 Introduction to Cell and Molecular Biology (4)**

**GE B2 & B4**

Fundamentals of cellular biology with an emphasis on the molecular perspective of life: metabolism, photosynthesis, cell structure and reproduction, meiosis, immunology, classical and molecular genetics, gene regulation. 3 lectures, 1 laboratory. Recommended prerequisite: BIO 160 and one college-level introductory chemistry course. Fulfills GE B2 & B4.

##### **BIO 162 Introduction to Organismal Form and Function (5)**

Fundamentals of the structure and physiology of cells, tissues, and organs of plants and animals: energy acquisition and food distribution, gas exchange and fluid transport, and sensing and responding to the environment. 3 lectures, 2 laboratories. Prerequisite: BIO 161 or consent of instructor. Recommended: CHEM 110 or CHEM 111 or CHEM 124 or CHEM 127. One college-level introductory chemistry course.

##### **BIO 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies or surveys of selected problems. Intended for lower division students in the Biological Sciences Department. Total credit limited to 4 units, with a maximum of 2 units per quarter. Credit does not apply to any concentration in the Biological Sciences Department. 1-2 laboratories. Prerequisite: Consent of department chair.

##### **BIO 213 Life Science for Engineers (2)**

**GE B2**

Fundamentals of life sciences: energetics, cell biology, molecular and classical genetics, microbiology, organismal biology, and ecology. For engineering students only. 2 lectures. Prerequisite: MATH 142 and CHEM 124. Corequisite: ENGR/BRAE 213. Fulfills GE B2.

##### **BIO 227 Wildlife Conservation Biology (4)**

**GE B2**

Historical development of wildlife biology and philosophies. Basic principles of ecology and evolution. Practices applied to wildlife. Current problems involving people-wildlife interactions with special reference to world biodiversity. 4 lectures. Fulfills GE B2.

##### **BIO 232 Nanotechnology, Human Biology, Ethics and Society (4)**

Focus on four nanotechnology examples as focal points for themes of nanoscale science and technology, human biology, society, ethics, and systems thinking: gold nanoshells for cancer treatment; molecular manufacturing; tissue engineering of a vital organ; and a microfluidic glucose sensor. The focal points provide natural contexts for learning biology at the cellular level, the molecular level, the organ level and the biological systems level, respectively. 4 lectures. Prerequisite: GE Areas B1, B2, B3.

##### **BIO 253 Orientation to the Health Professions (1) (CR/NC)**

Participation in hospital activities and mental health services. Intended for medically oriented students. Total credit limited to 6 units with a maximum of 1 unit per quarter. Credit/No Credit grading only. 1 activity. Prerequisite: Consent of instructor and one course in college biology.

##### **BIO 263 Introductory Ecology and Evolution (4)**

Basic concepts in ecology and evolution. Relationships among organisms in populations, communities and ecosystems, structures and dynamics of populations, communities and ecosystems, ecosystem inputs and energy flows, nutrient cycling, biogeography, population genetics, evolution, patterns of biodiversity and issues in conservation biology. 3 lectures, 1 laboratory. Prerequisite: BIO 161 or consent of instructor. Recommended: BIO 160 and BIO 162.

##### **BIO 270 Selected Topics (1-4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### **BIO 302 Human Genetics (4)**

**GE B5**

Basic principles of human inheritance, including the transmission of genetic traits, chromosomal abnormalities and their effects, gene structure and function, mutations and mutagenic agents, cancer genetics, population genetics, and principles of genetic counseling. 4 lectures. Prerequisite: One course from GE Area B1 (Recommended: STAT 217 or STAT 218), and one course from GE Area B2. Fulfills GE B5.

##### **BIO 303 Survey of Genetics (4)**

Principles of heredity and variation, including transmission, population and quantitative genetics; introduction to molecular mechanisms of inheritance. 4 lectures. Prerequisite: One quarter of college biology. Recommended: STAT 218 or equivalent.

##### **BIO 305 Biology of Cancer (4)**

**GE B5**

Introduction to the causes, characteristics and treatment of human cancer. Topics include effects of carcinogens and radiation; the genetics of cancer; molecular, cellular and physiological changes in common cancers; conventional chemotherapy and new treatments. Not open for major credit in Biological Sciences, Microbiology or Biochemistry. 4 lectures. Prerequisite: Completion of GE Area B2 One course for GE Area B2 in Biology. Fulfills GE B5.

##### **BIO 306 Applications of Biological Concepts (4)**

Applications of basic biological concepts with special reference to how these concepts can be presented and developed in elementary schools. Emphasis is on hands-on activities, problem solving and computer assisted instruction modules in biology. 3 lectures, 1 laboratory. Prerequisite: Two of the following: BIO 113, BIO 114, BIO 115.

##### **BIO 307 World Aquaculture: Applications, Methodologies and Trends (4)**

**GE Area F**

Life histories and habitats of important species of fishes, invertebrates and algae. Methodologies for the commercial propagation of specific forms. Global and regional coverage, including socioeconomic trends, controversies and applications in developed and less developed regions of the world. 3 lectures, 1 activity. Prerequisite: One GE Area B2 course in biology (BIO, ZOO, BOT or MCRO prefix). Junior standing, one course in biology (BIO, ZOO, BOT or MCRO prefix), and completion of GE Area B. Not open for major credit in



Biological Sciences-(or Ecology and Systematic Biology majors on prior catalogs). Fulfills GE Area F.

#### **BIO 325 General Ecology (4)**

Relationships between organisms and their physical, chemical, and biological environment in terrestrial and aquatic habitats. Laboratory emphasis on field studies. Occasional field experiences may require participation during non-scheduled times. 3 lectures, 1 laboratory. Prerequisite: BIO 160, BIO 162, and BIO 263, or consent of instructor.

#### **BIO 327 Wildlife Biology Methods (5)**

Methods for gathering information for management of wildlife. Use of the literature, inventory of plants and animal populations, use of maps, sexing and aging, trapping, handling, and marking techniques, physiological indices, and radio telemetry. 3 lectures, 2 laboratories. Prerequisite: BIO 325 or equivalent.

#### **BIO 328 Marine Biology (5)**

Introduction to the functional biology of marine plants and animals and the processes that underlie their distribution and abundance in open oceans, coastal regions, estuaries, and wetlands. 3 lectures, 2 laboratories. Several field trips. Prerequisite: BIO 160, BIO 162, BIO 263.

#### **BIO 330 Extended Field Biology Activity (1)**

Minimum of two days of field instruction in places with significant biological diversity, and an individual or group project. Focus on field notebooks, field identification, survey methods, experimental design, and significant habitat types for various groups of organisms. The Schedule of Classes will list the title of the associated field biology course. Total credit limited to 6 units, each associated with a different field biology course, with no more than 4 units applied as advisor approved electives. 1 activity. Prerequisite or concurrent: Enrollment in corresponding field biology course.

#### **BIO 351 Principles of Genetics (5)**

Principles of genetics and genetic analysis, including underlying molecular mechanisms. Subjects include gene structure and function, inheritance patterns, regulation of gene expression, mutation, recombination, recombinant DNA technology, and an introduction to population genetics. 5 lectures. Prerequisite: BIO 161 and CHEM 312 or CHEM 316. Recommended: BIO 263 and STAT 218.

#### **BIO 361 Principles of Physiology (4)**

Fundamental principles of general and organs systems physiology, including composition and concentration of cellular and other body fluids, categories of movement (e.g., diffusion, membrane transporters), energy (thermodynamics, metabolic), enzymes, and membrane potentials with application to whole organisms. Introduction to physiological measurement techniques. 2 lectures, 2 laboratories. Prerequisite: BIO 162, and CHEM 312 or CHEM 316.

#### **BIO 375 Molecular Biology Laboratory (3)**

Introduction to techniques used in molecular biology and biotechnology; DNA extraction, characterization, cloning, Southern blotting, reverse transcription, polymerase chain reaction, and sequencing analysis. 1 lecture, 2 laboratories. Prerequisite: BIO 161, and BIO 351 or CHEM 373. *Crosslisted as BIO/CHEM 375.*

#### **BIO 400 Special Problems for Advanced Undergraduates (1–2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. 1–2 laboratories. Prerequisite: Consent of department chair.

#### **BIO 401 Conservation Biology (4)**

Principles of conservation biology; practical solutions to current threats to biodiversity in terrestrial, freshwater, and marine environments. 3 lectures, 1 laboratory. Prerequisite: BIO 325 or equivalent.

#### **BIO 405 Developmental Biology (4–5)**

Events and mechanisms of embryonic development, including fertilization, morphogenesis, cell differentiation, and organogenesis, with emphasis on differential gene expression in model organisms. 3 lectures, **1 laboratory, 2 laboratories**. Prerequisite: **BIO 161**, BIO 162, and BIO 303 or BIO 351. *Change effective Spring 2011.*

#### **BIO 414 Evolution (4)**

Scientific evaluation of the theories, mechanisms, and patterns of biological evolution. 4 lectures. Prerequisite: BIO 263 or equivalent, and BIO 303 or BIO 351. Recommended: BIO 325 or equivalent.

#### **BIO 415 Biogeography (4)**

Plant and animal distribution patterns in relation to past and present physical and biotic factors; survey of major biomes with major emphasis on North and South America. 4 lectures. Prerequisite: BIO 263.

#### **BIO 419 Ecological Methodology (4)**

Introduction to quantitative methods used in ecology with an emphasis on the design and analysis of field studies. Population estimates, sampling design and analysis, and the determination of community structure. 3 seminars, 1 activity. Prerequisite: STAT 218 or equivalent. Recommended: BIO 263, BIO 325 or BOT 326, or consent of instructor.

#### **BIO 421 Wetlands (4)**

The formation, characteristics, and functions of wetlands. Genesis of hydric soils. Plant adaptations to saturated soils. Wetlands as wildlife habitat. Policies and social issues associated with wetlands. The procedures of wetland delineations. 3 lectures, 1 laboratory. Prerequisite: CHEM 128, BOT 313, SS 321. *Crosslisted as BIO/NR/SS 421.*

#### **BIO 424 Organizing and Teaching Science (4)**

Techniques, aims and objectives in the teaching of physical and life sciences at the secondary level. Selection and organization of teaching material, including strategies for English language learners (ELL) and special needs students. Evaluation of results. 4 lectures. Prerequisite: Consent of instructor. *Crosslisted as BIO/PSC 424.*

#### **BIO 426 Immunology (4)**

Principles of molecular and cellular immunology. Emphasis on molecular regulation of immune cell development, including generation of unique receptors, lymphocyte signal transduction and selection, programmed cell death and regulation of immune responses. Discussion and demonstration of roles of immunology in disease and as diagnostic tools. 3 lectures, 1 laboratory. Prerequisite: BIO 351 or consent of instructor. Recommended: Biochemistry course.

#### **BIO 427 Wildlife Management (4)**

Important habitats, such as riparian, wetlands, and habitat features important to wildlife, such as vegetation types and snags. Basic concepts of wildlife management. Emphasis on planning and designing habitats to meet the needs of wildlife. 3 lectures, 1 laboratory. Prerequisite: BIO 325 or equivalent.

#### **BIO 432 Vertebrate/Human Anatomy and Physiology I (5)**

Anatomy and physiology of the skeletal, muscular, nervous (central and peripheral) systems, and sense organs of vertebrates, with an emphasis on human systems. Not open to students with credit in ZOO 331. 3 lectures, 2 laboratories. Prerequisite: BIO 361 or consent of instructor.

#### **BIO 433 Vertebrate/Human Anatomy and Physiology II (5)**

Anatomy and physiology of the digestive, circulatory, urinary, endocrine, and reproductive systems, with an emphasis on human systems. Not open to students with credit in ZOO 332. 3 lectures, 2 laboratories. Prerequisite: BIO 361 or consent of instructor.

#### **BIO 434 Environmental Physiology (4)**

Comparative physiological mechanisms involved in the regulation of oxygen uptake, water and ion balance, and temperature regulation in animals. Emphasis is placed on physiological adaptations which maintain or restore homeostasis in animals which are subjected to environmental changes. 3 lectures, 1 laboratory. Prerequisite: BIO 162, CHEM 312 or CHEM 316. Recommended: BIO 325 and BIO 361.

#### **BIO 435 Plant Physiology (4)**

Consideration of the principal physiological and biochemical processes of plants with emphasis on water relations, mineral nutrition, photosynthesis, and the physiology of plant development. 3 lectures, 1 laboratory. Prerequisite: BOT 121 or BIO 162. Recommended: CHEM 312 or CHEM 316.

#### **BIO 438 Aquaculture (4)**

Propagation and rearing of fishes, invertebrates and algae from marine, freshwater, and estuarine habitats. Current methodologies and general life histories. Global perspective including aquacultural development in developed and developing countries. 3 lectures, 1 laboratory. Prerequisite: BIO 160, BIO 162, and BIO 263 or consent of instructor.

#### **BIO 439 Fisheries Science and Resource Management (4)**

Scientific investigation of marine and freshwater fisheries. Methodologies and quantitative strategies for study of finfish and invertebrates. Role of oceanographic or limnological processes on stock maintenance. Impact of human exploitation on maintenance of sustainable yields, including user-group conflict issues, and regional/global controversies. Lab/field protocols, basic fisheries statistical procedures, molecular methods, computer simulations. 3 lectures, 1 laboratory. Prerequisite: BIO 162. Recommended: ZOO 322.

**BIO 441 Bioinformatics Applications (4)**

Introduction to new problems in molecular biology and current computer applications for genetic database analyses. Use of software for: nucleic acid, genome and protein sequence analysis; genetic databases, database tools; industrial applications in bioinformatics; ethical and societal concerns. 3 lectures, 1 laboratory. Prerequisite: One course in college biology (BIO 111 or BIO 161 recommended). Recommended: BIO 303, BIO 351 or CHEM 373. *Crosslisted as BIO/CHEM 441.*

**BIO 443 Molecular Ecology and Systematics (4)**

Introduction to the science used to define and recognize the units of biological diversity, including a survey of the types of molecular data and computer programs used at the population and species level. 3 lectures, 1 laboratory. Prerequisite: BIO 160, BIO 162, BIO 263, BIO 351 and STAT 218 or equivalent.

**BIO 444 Population Ecology (3)**

Growth, fluctuations, balance, and natural mechanisms controlling terrestrial wildlife populations. 3 lectures. Prerequisite: BIO 325 or equivalent.

**BIO 450 Undergraduate Laboratory Assistantship (1–4) (CR/NC)**

Assisting the instructor in teaching and supervising undergraduate laboratories in the Biological Sciences Department. Total credit limited to 8 units, with a maximum of 4 units per quarter. Credit/No Credit grading only. Prerequisite: Consent of instructor and department chair.

**BIO 452 Cell Biology (4)**

Introduction to cell structure and function, energy conversions, protein sorting, signaling, cytoskeleton, cell adhesion, and the cell cycle. 3 lectures, 1 laboratory. Prerequisite: BIO 351 or CHEM 373, and CHEM 312 or CHEM 317. Recommended: Course in biochemistry.

**BIO 461 Senior Project – Research Proposal (2)**

Completion of a research proposal and literature review, including analysis of experimental results from published peer-reviewed articles in biology. Written and oral presentations. 2 activities. Prerequisite: Junior standing or consent of instructor.

**BIO 462 Senior Project – Research (2)**

Completion of a research project or equivalent in the biological sciences, selected and conducted in consultation with an instructor. Results are presented in written reports. 2 laboratories. Prerequisite: Junior standing and consent of instructor. BIO 400, BIO 461 or MCRO 461 are recommended.

**BIO 463 Honors Research (2)**

Completion of advanced research in the biological sciences, selected and conducted in consultation with an instructor. Results presented as a written report and/or oral presentation in a public forum. 2 laboratories. Prerequisite: BIO 462, consent of instructor, and department chair approval.

**BIO 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**BIO 471 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

**BIO 472 Current Topics in Biological Research (1–4)**

Applications of biological research topics. Discussions of how selected discoveries in biological research formed the basis for, and were developed into, practical applications, currently accepted theories, generally utilized techniques or decisions affecting society and political policies. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1–4 seminars. Prerequisite: Junior standing or consent of instructor.

**BIO 476 Gene Expression Laboratory (2)**

Heterologous gene expression of a recombinant protein in a microbial system: gene cloning, construction of expression plasmid, DNA sequence analysis, transformation of microbial host, selection and analysis of transformed host cells, expression and purification of recombinant protein. 2 laboratories. Prerequisite: BIO/CHEM 375; CHEM 313 or CHEM 371. *Crosslisted as BIO/CHEM 476.*

**BIO 485 Cooperative Education Experience (6) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation

by work supervisor required. Major credit limited to 4 units; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**BIO 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 4 units; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**BIO 500 Individual Study (1–4)**

Advanced study planned and completed with the approval of and under the direction of a member of the department faculty. A written scholarly presentation of the results of each BIO 500 project must be included in the graduate student's departmental file. Not open for credit to students in the Master of Science (MS) program. Total credit limited to 4 units. 1–4 laboratories. Prerequisite: Graduate standing in Biological Sciences and consent of instructor.

**BIO 501 Molecular and Cellular Biology (4)**

Principles of molecular and cellular biology including gene function and regulation, energetics, protein trafficking, cytoskeleton, signaling, adhesion, and the cell cycle. 3 lectures, 1 laboratory. Prerequisite: Graduate standing in Biological Sciences or consent of instructor.

**BIO 502 Biology of Organisms (4)**

Principles of and current topics in organismal biology, with an emphasis on physiology (including organ systems), behavior, and responses to the environment. 3 lectures, 1 laboratory. Prerequisite: BIO 501 and graduate standing in Biological Sciences, or consent of instructor.

**BIO 503 Population Biology (4)**

Considerations of theory and practice in population ecology, evolutionary biology, and biosystematics. 3 lectures, 1 laboratory. Prerequisite: Graduate standing in Biological Sciences or consent of instructor.

**BIO 511 Trends in Biology (1) (CR/NC)**

Recent trends in the field of biology for graduate students new to the Biological Sciences master's degree program. Overview of current faculty research to help students choose a thesis project and mentor. Credit/No Credit grading only. 1 activity. Prerequisite: Graduate standing in Biological Sciences or consent of instructor.

**BIO 515 History of Biology (3)**

Analysis of historical attempts to solve biological problems. 3 seminars. Prerequisite: Graduate standing in Biological Sciences or consent of instructor.

**BIO 524 Developmental Biology Seminar (2)**

Principles and selected topics in developmental biology. Issues of differentiation, morphogenesis, and pattern formation; specific topics chosen by participants. 2 seminars. Prerequisite: Graduate standing in Biological Sciences or consent of instructor. Recommended: BIO 501.

**BIO 531 Theory and Prediction in Ecology (3)**

Directed group study and lectures on selected topics in ecology. Emphasis on an in-depth study of a restricted topic. 3 seminars. Prerequisite: Graduate standing in Biological Sciences or consent of instructor.

**BIO 534 Principles of Stem Cell Biology (2)**

Principles of stem cell biology including characteristics, types, roles in development, therapeutic uses, historical perspectives and ethical issues. 2 seminars. Prerequisite: Graduate standing in Biological Sciences, Biomedical Engineering, or Agriculture, or consent of instructor. Recommended: BIO 452 or BIO 501. *New course, effective Winter 2011.*

**BIO 542 Multivariate Biometry (4)**

Studies in continuous multivariate statistics, including the multivariate linear model, principal components and factor analysis, discriminant analysis, clustering, and canonical correlation. Use of MINTAB and SAS throughout. 4 lectures. Prerequisite: Two courses in statistics or consent of instructor.

**BIO 561 Proposal Writing for Biology Research (3)**

Written and oral presentations of a proposal for research in biology including a literature review. 3 seminars. Prerequisite: Graduate standing in Biological Sciences or consent of instructor.

**BIO 570 Selected Topics in Biology (1–4)**

Directed group study of selected topics for graduate students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1 to 4 seminars. Prerequisite: Graduate standing in Biological Sciences or consent of instructor.

**BIO 571 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Graduate standing or consent of instructor.

**BIO 575 College Teaching Practicum (1-2) (CR/NC)**

Part-time teaching assignment in an undergraduate college classroom. Includes teaching and related activities under the supervision of a professor in Biological Science. Total credit limited to 4 units. Credit/No Credit grading only. 1-2 activities. Prerequisite: Graduate standing and evidence of satisfactory preparation in biology. Department chair and graduate coordinator's approval required.

**BIO 585 Cooperative Education Experience (6) (CR/NC)**

Advanced study, analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Graduate standing in Biological Sciences and consent of instructor.

**BIO 590 Seminar in Biology (1)**

Problems and topics in advanced biology selected according to the interest and needs of the students enrolled. Total credit limited to 6 units. 1 activity. Prerequisite: Graduate standing in Biological Sciences or consent of instructor.

**BIO 593 Stem Cell Research Internship (5)**

Supervised graduate research in stem cell science and engineering. Provides students with an off-campus industrial or university research internship. Total credit limited to 10 units. Prerequisite: Graduate standing in the Specialization in Stem Cell Research for the MS in Biological Sciences or for the MS in Biomedical Engineering, or the Animal Science Specialization in the MS in Agriculture, and BMED 510, BMED 545, BMED 515, and BIO 534. *Crosslisted as ASCI/BIO/BMED 593. New course, effective Winter 2011.*

**BIO 594 Applications in Stem Cell Research (2)**

Transfer of skills and knowledge gained through ASCI/BIO/BMED 593, in an applied setting at Cal Poly. Demonstration of technical, problem solving, and presentation skills, and familiarity with current research. Part of the culminating experience for the Specialization in Stem Cell Research for the MS in Biological Sciences or for the MS in Biomedical Engineering, or the Animal Science Specialization in the MS in Agriculture. 1 seminar and supervised work. Prerequisite: ASCI/BIO/BMED 593 *Crosslisted as ASCI/BIO/BMED 594. New course, effective Spring 2011.*

**BIO 595 Cooperative Education Experience (12) (CR/NC)**

Advanced study, analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Graduate standing in Biological Sciences and consent of instructor.

**BIO 598 Masters Project in Biology (2)**

Individual investigation or research project for Masters of Arts in Biology. Written report required. Course satisfies culminating experience for the MA degree in Biology. Total credit limited to 4 units. 2 laboratories. Prerequisite: Graduate standing in Biological Sciences or consent of instructor.

**BIO 599 Thesis (~~3~~ 1-3)**

Individual research under the general supervision of the faculty, leading to a graduate thesis of suitable quality. Total credit limited to 9 units. ~~3~~ 1-3 laboratories. Prerequisite: Graduate standing in Biological Sciences; consent of instructor, and consent of thesis committee. *Change effective Spring 2011.*



## 2009-11 Cal Poly Catalog

### Biomedical and General Engineering Department

#### BMED–BIOMEDICAL ENGINEERING

##### **BMED 111 Biomedical Engineering Calculations (3)**

General introduction to bioengineering application of basic engineering science applied to topics in biomechanics, bioinstrumentation, biomaterials, biotechnology, and related areas. Application of the concepts and methods of science, mathematics and engineering to problems in biomedical engineering. 3 lectures. Corequisite: MATH 142 or consent of instructor.

##### **BMED 212 Introduction to Biomedical Engineering Design (3)**

General introduction to bioengineering design, including examples of engineering analysis and design applied to representative topics in biomechanics, bioinstrumentation, biomaterials, biotechnology, and related areas. Review of technological needs, design methodology, testing procedures, statistical analysis, governmental regulation, evaluation of costs and benefits, quality of life, and ethical issues. 2 lectures, 1 laboratory. Prerequisite: MATH 143 or consent of instructor.

##### **BMED 270 Selected Topics (1–4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### **BMED 310 Biomedical Engineering Management and Analysis (4)**

Fundamentals of biomedical engineering analysis. Use and application of tools and analytical methods used by bioengineers. 3 lectures, 1 laboratory. Prerequisite: EE 201 and CSC 101 or CSC 234 or consent of instructor.

##### **BMED 400 Special Problems for Advanced Undergraduates (2-4)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 8 units. Prerequisite: ME 212, junior standing and consent of department chair.

##### **BMED 404 Applied Finite Element Analysis (4)**

Finite element based solutions to engineering problems with an emphasis on elastostatic problems in structural mechanics. The power and pitfalls associated with the finite element method highlighted through practical modeling assignments. Introduces the use of commercial finite element codes. 3 lectures, 1 laboratory. Prerequisite: ME 329 or CE 351 or **BMED 410**. *Crosslisted as BMED/CE/ME 404. New crosslisting; change effective Fall 2010.*

##### **BMED 410 Biomechanics (4)**

Introduction to physiological systems, with emphasis on structure and function of major tissues and organs. Application of mechanics to understand the behavior of these tissues and organs at gross and microscopic levels. Bioelastic solids. Rigid body biomechanics. Biofluids, basic mechanical properties of collagen and elastin, bone, cartilage, muscles, blood vessels, and other living tissues. Application of continuum mechanics to hard and soft tissues. Biomechanical engineering design for clinical applications. 3 lectures, 1 laboratory. Prerequisite: ME 212, CE 204, BMED 310 or consent of instructor.

##### **BMED 420 Principles of Biomaterials Design (4)**

Fundamentals of materials science as applied to bioengineering design. Natural and synthetic polymeric materials. Materials characterization and design. Wound repair, blood clotting, foreign body response, transplantation biology, biocompatibility of materials, tissue engineering. Artificial organs and medical devices. Government regulations. Patenting. Ethical issues. 3 lectures, 1 laboratory. Prerequisite: CE 204, BMED 310 or consent of instructor.

##### **BMED 425 Biomedical Engineering Transport (4)**

Mass transfer in solids, liquids, and gases with application to biological systems. Free and facilitated diffusion. Convective mass transfer. Diffusion-reaction phenomena. Active transport. Biological mass transfer coefficients. Nonequilibrium thermodynamic analysis of transport phenomena. The osmotic effect. Diffusion and exchange in biological systems. 4 lectures. Prerequisite: ME 302, BMED 310 or consent of instructor.

##### **BMED 430 Biomedical Modeling and Simulation (4)**

Finite element methods for anatomical modeling and boundary value problems in the biomechanics of tissues and biomedical devices. Nonlinear biodynamics, heat flow, cardiac impulse propagation, anatomic modeling, and biomechanics. 2 lectures, 2 laboratories. Prerequisite: BMED 420 or consent of instructor.

##### **BMED 440 Bioelectronics and Instrumentation (4)**

Analog and digital circuits in bioinstrumentation. Biomedical signals in continuous and discrete systems. Sampling and digital signal processing. Ultrasound, MRI, CT, Bioelectromagnetics. Electrokinetics. Biophysical phenomena, transducers, and electronics as related to the design of biomedical instrumentation. Potentiometric and amperometric signals and amplifiers. Biopotentials, membrane potentials, chemical sensors. Mechanical transducers for displacement, force and pressure. Temperature sensors. Flow sensors. Light-based instrumentation. Electrical safety. 3 lectures, 1 laboratory. Prerequisite: EE 201, BMED 310 or consent of instructor.

##### **BMED 445 Biopotential Instrumentation (4)**

Focus on the principles associated with instrumentation used to detect surface biopotentials. Emphasis on circuit level design and laboratory implementation of systems used to detect ECG, EMG and EEG signals. Development of practical experience with analog electronic instrumentation used in the design and testing process. A system level design project related to surface biopotential detection and recording. 2 lectures, 2 laboratories. Prerequisite: BMED 440.

##### **BMED 450 Contemporary Issues in Biomedical Engineering (4)**

Current and evolving topics in biomedical engineering, including medical and industrial applications. Exploration of contemporary issues in biomedical engineering, including technical and societal implications. The Schedule of Classes will list topic selected. Total credit limited to 16 units. 4 lectures. Prerequisite: Senior standing in Biomedical Engineering.

##### **BMED 455, 456 Biomedical Engineering Design I, II (4) (4)**

Engineering design methodology, design process, project planning, decision making, modeling, construction, and testing of an open-ended design project. Preparation of formal engineering reports. Statistical analysis. Governmental regulations. Bioethical issues. 2 lectures, 2 laboratories. **BMED 455** prerequisite: BMED 410 or consent of instructor. **BMED 456** prerequisite: BMED 455 or consent of instructor.

##### **BMED 460 Engineering Physiology (4)**

Physiology for biomedical engineering students, with an emphasis on control mechanisms and engineering principles. Engineering aspects of basic cell functions; biological control systems; muscle; neural; endocrine, and circulatory systems, digestive, respiratory, renal, and reproductive systems; regulation of metabolism, and defense mechanisms. 3 lectures, 1 laboratory. Prerequisite: ZOO 331 or equivalent, BMED 310 or consent of instructor.

##### **BMED 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

##### **BMED 471 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

##### **BMED 481 Senior Project Design Laboratory I (2)**

Selection and development of project by individuals or team which is typical of problems graduates must solve in their fields of employment or applied research. Project may involve, but is not limited to, physical modeling and testing of integrated design projects, costs, planning, scheduling and research. Formulation of outline, literature review, and project schedule. 2 laboratories. Prerequisite: MATH 244, IME 314, ME 302 or consent of instructor.

##### **BMED 482 Senior Project Design Laboratory II (2)**

Continuation of BMED 481. Completion of project by individuals or team which is typical of problems graduates must solve in their fields of employment or applied research. Project may involve, but is not limited to, physical modeling and testing of integrated design projects, costs, planning, scheduling and research. Formulation of outline, literature review, and project schedule. 2 laboratories. Prerequisite: BMED 481 or consent of instructor.

##### **BMED 500 Individual Study (2-4)**

Individual investigation, research, studies or surveys of selected problems. Advanced study planned and completed under the direction of faculty. Open to graduate students who have demonstrated the ability to do independent work. Total credit limited to 8 units. Prerequisite: Graduate standing and consent of department chair.

##### **BMED 510 Principles of Tissue Engineering (4)**

Exploration of areas including cell source and isolation, scaffold selection and modification, tissue cultivation and bioreactor design, and patient implantation.

Applications of tissue engineering for creating skin, cartilage, blood vessels, and other tissues. 3 lectures, 1 laboratory. Prerequisite: **BMED 460: An upper division course in physiology. Change effective Winter 2010.**

#### **BMED 512 Biomedical Engineering Horizons (4)**

Examination of the advances in nanotechnology, micro-electro-mechanical systems, materials and clinical technology. Relationship between modern medical achievements and advances in engineering and science, the biomedical engineering industry, and the use of technology in a human context. 4 lectures. Prerequisite: Graduate standing, MATH 143, CHEM 125, PHYS 131 or **PHYS 141**, BIO 161 or consent of instructor. *Change effective Spring 2011.*

#### **BMED 515 Introduction to Biomedical Imaging (4)**

Introduction to the fundamental principles and applications of biomedical imaging modalities in medicine. Topics include X-ray radiography, computed tomography, magnetic resonance imaging, ultrasound, nuclear medicine, and optical imaging. 2 lectures, 2 laboratories. Prerequisite: **PHYS 132**, MATH 244, **BMED 520**; graduate standing; or consent of instructor. *Change effective Spring 2011.*

#### **BMED 520 Introduction to Biomedical Engineering (4)**

Advanced treatment of the basic engineering sciences in the biomedical engineering context. For the student who has had little prior exposure to biomedical engineering, but has either a strong engineering or a strong science background. 4 lectures. Prerequisite: Graduate standing.

#### **BMED 525 Skeletal Tissue Mechanics (4)**

Overview of the mechanical properties of various tissues in the musculoskeletal system, the relationship of these properties to anatomic and histologic structures, and the changes in these properties caused by aging, disease, overuse, and disuse. Tissues covered include bone, cartilage and synovial fluid, ligament, and tendon. 4 lectures. Prerequisite: CE 204, BMED 460.

#### **BMED 530 Biomaterials (4)**

Structure-function relationships for materials in contact with biological systems. Interactions of materials implanted in the body. Histological and hematological considerations including foreign body responses, inflammation, carcinogenicity, thrombosis, hemolysis, immunogenic and toxic properties. Microbial interaction with material surfaces, degradation. 4 lectures. Prerequisite: BIO 213, ENGR 213, MATE 210 and graduate standing or consent of instructor. *Crosslisted as BMED/MATE 530.*

#### **BMED 535 Bioseparations (4)**

Advanced topics in physicochemical hydrodynamics, bioseparations and microfluidic bioseparations, which include the key aspects of electrokinetics, colloid science and suspension mechanics in bioseparations. Understanding key separation design parameters through theoretical and numerical models. 4 lectures. Prerequisite: BMED 425, ME 341 or consent of instructor.

#### **BMED 540 Microcirculation (4)**

Anatomy and physiology of microcirculation, including wall structure, flow regulation, nutrient exchange, inflammation, and angiogenesis. Additional focus on experimental approaches, the primary literature, microcirculatory pathophysiology, and the role of engineering approaches to assess and treat microvascular dysfunction. 3 lectures, 1 laboratory. Prerequisite: BMED 460 or BIO 433 or equivalent.

#### **BMED 545 Cell Transplantation and Biotherapeutics (4)**

Lecture topics include patho-physiology, disease models, rodent anatomy, and therapeutic strategies. Laboratory topics include rodent handling, survival surgery, therapy delivery, and measurements of organ function or repair. Focus on experimental design, data collection and analysis, and literature integration. 2 lectures, 2 laboratories. Prerequisite: **Statistics - STAT 312 or STAT 218; Physiology - BMED 460, BIO 361, or ASCI/VS 438 or equivalent. Change effective Winter 2011.**

#### **BMED 550 Current and Evolving Topics in Biomedical Engineering (4)**

Current topics in biomedical engineering, including medical and industrial applications. Exploration of detailed technical treatment of contemporary issues in biomedical engineering, and examination of technical and societal implications of these subjects. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 lectures. Prerequisite: Graduate standing in biomedical engineering or consent of department chair.

#### **BMED 555 Neural Systems Simulation and Modeling (4)**

The biophysical basis of the Hodgkin-Huxley active membrane model. A detailed description of the dynamics of voltage gated ion channels. The complete Hodgkin-Huxley active membrane model, with an emphasis on its use in simulating the electrical activity of nerve cells. Equivalent circuit/ circuit

simulator based approaches to modeling Hodgkin-Huxley neurons. 4 lectures. Prerequisite: MATH 244, BMED 440.

#### **BMED 563 Biomedical Engineering Graduate Seminar (2)**

Selected topics of interest to biomedical engineering and other graduate students. Open to graduate students and selected seniors. A forum to share information about research and research tools; an opportunity to discuss topics of interest with professionals in the field, academics, and other graduate students. The Schedule of Classes will list topic selected. Total credit limited to 4 units. 1 seminar, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

#### **BMED 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Graduate standing or consent of instructor.

#### **BMED 571 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Graduate standing or consent of instructor.

#### **BMED 591 Thesis Project Design Laboratory I (2)**

Selection and development of project by individuals or team which is typical of problems graduates must solve in their fields of employment or applied research. Project may involve, but is not limited to, physical modeling and testing of integrated design projects, costs, planning, scheduling and research. Formulation of outline, literature review, and project schedule. 2 laboratories. Prerequisite: Graduate standing.

#### **BMED 592 Thesis Project Design Laboratory II (2)**

Continuation of BMED 591. Completion of project by individuals or team which is typical of problems graduates must solve in their fields of employment or applied research. Project may involve, but is not limited to, physical modeling and testing of integrated design projects, costs, planning, scheduling and research. Formulation of outline, literature review, and project schedule. 2 laboratories. Prerequisite: BMED 591 or consent of instructor.

#### **BMED 593 Stem Cell Research Internship (5)**

Supervised graduate research in stem cell science and engineering. Provides students with an off-campus industrial or university research internship. Total credit limited to 10 units. Prerequisite: Graduate standing in the Specialization in Stem Cell Research for the MS in Biological Sciences or for the MS in Biomedical Engineering, or the Animal Science Specialization in the MS in Agriculture, and BMED 510, BMED 545, BMED 515, and BIO 534. *Crosslisted as ASCI/BIO/BMED 593. New course, effective Winter 2011.*

#### **BMED 594 Applications in Stem Cell Research (2)**

Transfer of skills and knowledge gained through ASCI/BIO/BMED 593, in an applied setting at Cal Poly. Demonstration of technical, problem solving, and presentation skills, and familiarity with current research. Part of the culminating experience for the Specialization in Stem Cell Research for the MS in Biological Sciences or for the MS in Biomedical Engineering, or the Animal Science Specialization in the MS in Agriculture. 1 seminar and supervised work. Prerequisite: ASCI/BIO/BMED 593 *Crosslisted as ASCI/BIO/BMED 594. New course, effective Spring 2011.*

#### **BMED 599 Design Project (Thesis) (1-9)**

Selection by individual or group, with faculty guidance and approval, of topic for independent research or investigation resulting in a thesis or project to be used to satisfy the degree requirement. An appropriate experimental or analytical thesis or project may be accepted. Total credit limited to 9 units. Prerequisite: Graduate standing.

**2009-11 Cal Poly Catalog****History Department****New Program, effective Spring 2010****ASIAN STUDIES MINOR**

Provides interdisciplinary understanding of Asia – particularly its rich and varied histories, arts, languages, philosophies, religions and social patterns. Details and application forms are available from the History Department.

<b>Required Courses</b>	<i>Units</i>
HIST 310/HIST 316/HIST 319 (D5).....	4
PHIL 320 Asian Philosophy (C4) <i>or</i> RELS 301 Religions of Asia (C4) .....	4
MLL 103 Elementary Chinese III <i>or</i> JPNS 103 Elementary Japanese III <i>or</i> <b>CHIN 103 Beginning Mandarin Chinese III</b> .....	4
(9/25/12)	
<b>Electives</b> .....	16
(minimum 8 units upper-division)	

*Lower Division:*

ANT 201 (D3);  
**CHIN 201 (C5), 202 (C5)**  
ES 244 (D3);  
GEOG 150 (D3);  
HIST 221 (D3), HIST 222 (D3), HIST 223 (D3);  
**JPNS 201 (C5)**  
LA 211 (C3);  
MLL ~~421~~ 201, MLL ~~422~~ 202;  
POLS 225  
(8/30/13)

*Upper Division:*

ARCH 320 (C4);  
ART 317,  
ART 318 Asian Art Topics (C4)  
~~(Topics: Buddhist Art, Early Chinese Art,  
Technology and Mythology);~~  
*Corrected (07/12/11);*  
ES 322 (D5);  
HIST 416, 417, 418, 419, 443; (7/21/11)  
HUM 310 Humanities in World Cultures (C4)  
(Topics: China, Japan, Thailand);  
POLS 328 Politics of Developing Areas  
(Topic: East Asia);  
RELS 306 (C4), RELS 307 (C4);  
SOC 350

## 2009-11 Cal Poly Catalog

### Chemistry & Biochemistry Department

#### BS BIOCHEMISTRY

#### Flowchart

- ☐ 60 units upper division  
☐ 2.0 GPA

- ☐ GWR  
☐ USCP

\* = Required in Major/Support; also satisfies GE

Course sequencing: See flowcharts at

[www.csmadvising.calpoly.edu](http://www.csmadvising.calpoly.edu)

Note: No major, support or concentration courses may be taken as credit/no credit.

#### MAJOR COURSES

CHEM 127 General Chemistry (B3 & B4)* .....	4
CHEM 128 General Chemistry .....	4
CHEM 129 General Chemistry .....	4
CHEM 316 Organic Chemistry I .....	5
CHEM 317 Organic Chemistry II .....	5
CHEM 318 Organic Chemistry III .....	3
CHEM 319 Advanced Organic Chemistry Lab .....	2
<sup>1</sup> CHEM 331 Quantitative Analysis .....	5
CHEM 351 Physical Chemistry I .....	3
CHEM 352 Physical Chemistry II .....	3
CHEM 353 Physical Chemistry III .....	3
CHEM 354 Physical Chemistry Laboratory .....	2
CHEM 371 Biochemical Principles .....	5
CHEM 372 Metabolism .....	4
CHEM 373 Molecular Biology .....	3
Select one course from:	
<sup>2</sup> CHEM 375 Molecular Biology Laboratory, or	
CHEM 474 Protein Techniques Laboratory .....	2
Select one course from:	
CHEM 375, 439 <sup>3</sup> , 474 <sup>2</sup> ; BIO 361 <sup>3</sup> , 476.....	2
CHEM 459 Undergraduate Seminar (2) or SCM	
491 <sup>4</sup> Student Teacher Seminar (1)(1) .....	2
CHEM 461 Senior Project Report.....	1
<sup>5</sup> Select 12 units of advanced approved	
biochemistry electives or Polymers and	
Coatings Concentration to complete major.	
At least two courses must be from List A,	12-18
including one lecture. ....	<del>12-23</del>
List A	
CHEM 252, 341, 349, 357, 375, 377, 400 <sup>6</sup> , 401 <sup>7</sup> ,	
405, <del>414</del> , 419, 420, 439, <del>441</del> , 444, 445, 446,	
447, 448, 449, <del>450</del> , <del>451</del> , 458, 463, 465, 470,	
474, 477, 478, 481, 484, 485 <sup>6</sup> , 495 <sup>6</sup> , 528;	
BIO/PSC 424;	
SCM <del>302</del> , <del>325</del> , 451;	
( <del>5/17/12</del> )( <del>2/21/15</del> )	
List B	
BIO 361, 405, 432, 452;	
MCRO 402, 423, 424; ZOO <del>331</del> , <del>332</del> , 422	
( <del>11/17/14</del> )	<del>74-85</del> 80

#### SUPPORT COURSES

BIO 161 Intro to Cell & Molecular Biology (B2)*	4
MATH 141, 142, 143 Calculus I, II, III (B1)* .....	4,4,4

PHYS 121, 122, 123 College Physics or	
PHYS 141, 132, 133 General Physics .....	4,4,4
MCRO 224 <sup>2</sup> Gen Microbio I or BIO 452 Cell Bio	4-5
	<b>32-33</b>

#### GENERAL EDUCATION (GE)

72 units required, 16 of which are specified in Major/Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

#### Area A Communication (12 units)

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

#### Area B Science and Mathematics (no add'l units req'd)

B1 Mathematics/Statistics * 8 units in Support .....	0
B2 Life Science * 4 units in Support .....	0
B3 Physical Science * 4 units in Major .....	0
B4 One lab taken with either a B2 or B3 course	

#### Area C Arts and Humanities (20 units)

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

#### Area D/E Society and the Individual (20 units)

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

#### Area F Technology Elective (upper division)

(4 units) .....	4
	<b>56</b>

**FREE ELECTIVES**..... **11-18** ~~6-23~~ **18**

*Corrected (1/24/11)*

**180**

#### Concentration

(Students may select the following concentration)

#### Polymers and Coatings Concentration

CHEM 444 Polymers and Coatings I .....	3
CHEM 445 Polymers and Coatings II .....	3
CHEM 446 Surface Chemistry of Materials .....	3
CHEM 447 Polymers and Coatings Lab I .....	2
CHEM 448 Polymers and Coatings Lab II .....	2
CHEM 449 Internship in Polymers and Coatings ....	2
MATE 210 Materials Engineering .....	3
	<b>18</b>

<sup>1</sup> Students should take CHEM 331 as soon as possible after completing CHEM 129.

<sup>2</sup> Required for Molecular Biology concentration.

<sup>3</sup> Excess units count as approved advanced Biochemistry electives.

<sup>4</sup> SCM 491 only for students pursuing Single-Subject Teaching Credential.

<sup>5</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>6</sup> No more than 2 units may apply to approved advanced biochemistry electives.

<sup>7</sup> No more than 4 units may apply to approved advanced biochemistry electives.



**2009-11 Cal Poly Catalog****Biological Sciences Department****Flowcharts****BS BIOLOGICAL SCIENCES**

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                              ☐ USCP

\* = Required in Major/Support; also satisfies GE

Course sequencing: See flowcharts at [csmadvising.calpoly.edu](http://csmadvising.calpoly.edu)

Note: No major, support or concentration courses may be taken as credit/no credit.

**MAJOR COURSES**

BIO 160 Diversity & the History of Life .....	4
BIO 161 Intro to Cell & Molecular Bio (B2&B4)* .....	4
BIO 162 Intro to Organismal Form & Function .....	4/5
BIO 263 Introductory Ecology and Evolution.....	4
BIO 351 Principles of Genetics.....	5
BIO 414 Evolution .....	4
BIO 461 Senior Project – Research Proposal <i>or</i>	
BIO 462 Senior Project – Research.....	2
<sup>1</sup> <i>Biological Diversity:</i> .....	4
BIO 328, 415; BOT 313, 323, 433, 437; MCRO	
224, 402; ZOO 321, 322, 323, 329, 335, 336,	
341, 425	
<i>Ecology:</i> BIO 325, 327, 328, 445, 446; BOT 326;	
MCRO 436 (9/30/10)(9/26/13).....	4
<sup>2</sup> <i>Physiology:</i> BIO 361, 434, 435 .....	4
Concentration .....	38-39
(9/24/12) (3/17/14)	78-77-79

**SUPPORT COURSES**

CHEM 127 General Chemistry (B3&B4)* .....	4
CHEM 128, 129 General Chemistry .....	4, 4
<sup>3</sup> CHEM 312 Survey of Organic Chemistry <i>or</i>	
CHEM 216 Introduction to Organic Chemistry	
<i>I or</i> CHEM 316 Organic Chemistry I .....	5
MATH 161, 162 Calculus/Life Sciences I, II (B1)* .....	4, 4
PHYS 121, 122, 123 College Physics I, II, III ...	4, 4, 4
STAT 218 Appl Statistics-Life Sciences (B1)*.....	4
(7/13/12)	41

**GENERAL EDUCATION (GE)**

72 units required, 16 of which are specified in Major/Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing.....	4

**Area B Science and Mathematics (no add'l units req'd)**

B1 Mathematics/Statistics * 8 units in Support.....	0
B2 Life Science * 4 units in Major .....	0
B3 Physical Science * 4 units in Support .....	0

B4 One lab taken with either a B2 or B3 course in Major

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division)(4 units)**

	56
<b>FREE ELECTIVES</b> .....	4-6 5
(9/24/12)	180

**4 Concentrations (select one)****Anatomy and Physiology Concentration**

BIO 432 Vertebrate/Human Anatomy & Phys I	5
BIO 433 Vertebrate/Human Anatomy & Phys II	5
BIO 452 Cell Biology .....	4
CHEM 371 Biochemical Principles <i>or</i> CHEM 313	
Survey of Biochemistry and Biotechnology .....	5
<sup>5</sup> Approved electives.....	20
Select 20 units from the following; at least 12	
units must be from BIO, CHEM, MCRO, ZOO	
courses:	
ASCI 351, 406;	
BIO/CHEM 375;	
BIO 400, 405, 426, 434, 435, 462, 463;	
CHEM 217, 218, 219, 317, 318, 319, 372; (6/26/14)	
FSN 310, 429;	
KINE 406, 445, 446;	
MCRO 225, 320, 342, 402, 423, 424;	
PHIL 339;	
PSY 340;	
SCM 302, 451;	
ZOO 422, 425, 428	
(7/9/12)(3/13/13)(6/24/14)	39

<sup>1</sup> Students in the Molecular and Cellular Biology concentration should take MCRO 224 to fulfill this requirement.

<sup>2</sup> Students in the Anatomy and Physiology concentration and in the Biology Teaching concentration should take BIO 361 to fulfill this requirement.

<sup>3</sup> Students in the Molecular and Cellular Biology concentration should take CHEM 216 *or* CHEM 316 to fulfill this requirement. (7/9/12)

<sup>4</sup> Guidelines are available for approved electives in most concentrations. See your faculty advisor for assistance.

<sup>5</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

**<sup>1</sup> Biology Teaching Concentration**

BIO 432 Vertebrate/Human Anatomy/Phys I.....	5
BIO 433 Vertebrate/Human Anatomy/Phys II.....	5
BIO 452 Cell Biology.....	4
BIO/PSC 424 Organizing/Teaching Science.....	4
MCRO 320 Emerging Infectious Diseases.....	3
SCM 300 Early Field Experience, Science/Math ...	4
SCM 451 Ethics in the Sciences (3) <i>or</i>	3-4

PHIL 339 Biomedical Ethics (4), PHIL 340

Environmental Ethics (4) *or*

SCM 325 Genetic Engineering Technology (4) ..

**<sup>2</sup> Approved electives..... 10-11**

Select 11 units from the following:

BIO 328, 330, 361, 375, 400, 401, 415, 427  
434, 435, 445, 446, 462, 463, 472;  
BOT 311, 313, 323, 326, 335, 433, 437;  
NR 311, 421;  
MCRO 225, 421, 424, 433; SS 121, 421, 422  
ZOO 321, 322, 323, 329, 335, 336, 341, 437  
(10/3/12) (4/24/14)

39

**Ecology Concentration**

*Ecology of the Individual (select 1 course)..... 4-5*

BIO 434, BIO 435, MCRO 424, ZOO 437 *or*  
BIO 442 (Corrected 1/13/10)(10/29/13)

*Population Ecology (select 1 course)..... 3-4*

BIO 401, BIO 439, BIO 444

*Community Ecology (select 1 course)..... 4-5*

BIO 325, BIO 328, BOT 326, BOT 433,  
MCRO 436

*Global Ecology (select 1 course)..... 4*

BIO 415, GEOG 250, GEOG 333, UNIV 350

*Methodology (select 3 courses)..... 10-12*

BIO/CHEM 375, BIO 419, BIO 443, LA/NR  
318, STAT 313, STAT 419

**<sup>2</sup> Approved electives..... 14-9**

Select courses from the above five lists in this  
concentration, and/or from the following:

BIO 330, 361, 400, 427, 463, 472;  
BOT 311, 313, 323, 437;  
CSC 448;  
MCRO 224, 402;  
NR 307, 311, 418, 421; SCM 302 (3/13/13)  
SS 121, 321, 322, 421, 422;  
ZOO 321, 322, 323, 329, 335, 336, 341, 425  
(4/24/14)

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**Field and Wildlife Biology Concentration**

BOT 313 Taxonomy of Vascular Plants..... 4

BOT 433 Field Botany..... 4

ZOO 321 Mammalogy..... 4

ZOO 323 Ornithology..... 4

ZOO 341 Herpetology..... 4

Emphasis Area (select one)..... 19

*Field Biology Emphasis*

ZOO 335 General Entomology (4)

ZOO 437 Animal Behavior (4) *or* BIO 442 (4)  
(10/29/13)

BIO 439/ZOO 322 (4)

**<sup>2</sup> Approved electives (7) Select 7 units from:**

BIO 325, 327, 328, 330, 400, 401, 415, 419, 427,  
439, 434, 443, 444, 445, 446, 462, 463;

BOT 326, 437;

GEOG/LA/NR 317;

LA/NR 318;

NR 141, 142, 203, 307, 404, 416;

MCRO 402; SS 121, 321, 322; SCM 302 (3/13/13)

STAT 313, 324, 330, 416, 419, 421;

ZOO 322, 329, 335, 336, 425,

ZOO 437 *or* BIO 442 (10/29/13)

**<sup>3</sup> Wildlife Biology Emphasis**

BIO 327 Wildlife Biology Methods (5)

BIO 427 Wildlife Management (4)

BIO 444 Population Ecology (3) *or*

BIO 401 Conservation Biology (4)

**<sup>2</sup> Approved electives (6-7) Select 6-7 units**

from the approved electives list above for the  
Field Biology Emphasis

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**General Biology Concentration**

*Molecular/Cellular Biology*

BIO 405, 426, 452; BIO/CHEM 375, 441, 476;

BOT/HCS 450; MCRO 402; ZOO 428 (7/22/13)..... 2-4

CHEM 313 Survey of Biochem and Biotech *or*

CHEM 371 Biochemical Principles (12/21/09)... 5

*Anatomy/Physiology..... 4*

BIO 361, 432, 433, 434, 435; BOT 335;

MCRO 424, ZOO 422

*Botany..... 4*

BOT 313, 323, 326, 335, 433, 437

*Microbiology..... 3-5*

BIO 426; MCRO 224, 225, 320, 342, 402,

421, 433, 436; ZOO 428

*Zoology..... 4*

BIO 328; ZOO 321, 322, 323, 329, 335, 336, 341, 425

**<sup>2</sup> Approved electives..... 15-13**

Select from: (7/22/13) 13-17

BIO 200, 325, 327, 328, 330, 400, 401, 405,  
415, 419, 426, 427, 428, 432, 433, 434, 435,  
438, 439, 440, 442, 443, 444, 445, 446, 450,  
462, 463, 470, 471, 472; (6/24/14)

BOT 311, 313, 323, 326, 335, 433, 437;

CHEM 217 *or* 317; (9/21/12)

MCRO 224, 225, 320, 342, 402, 421, 424, 433, 436;

SCM 302, 451; (3/12/14)

ZOO 321, 322, 323, 329, 335, 336, 341, 422, 425, 428

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<sup>1</sup> To meet credentialing requirements, it is recommended that students take KINE 250 *or* KINE 255 to fulfill GE D4, and SCM 330 to fulfill GE Area F. (6/23/09)

<sup>2</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>3</sup> Students seeking Wildlife Biologist Certification should see faculty advisor for assistance.



**Marine Biology and Fisheries Concentration**

BIO 328 Marine Biology.....	5
BIO/CHEM 375 Molecular Biology Laboratory.....	3
BOT 437 Phycology.....	4
STAT 313 Applied Experimental Design and Regression Models.....	4
ZOO 322 Ichthyology.....	4
ZOO 336 Invertebrate Zoology .....	4
<sup>1</sup> Approved electives.....	15
<i>Select at least 8 units from:</i>	
BIO 325, 327, 400, 401, 405, 419, 434, 435, 438, 439, 440, 443, 444, 445, 446, 452, 462, 463;	
MCRO 436;	
ZOO 321, 323, 324, 425	
ZOO 437 or BIO 442 (10/29/13)	
<i>Select no more than 8 units from:</i>	
CHEM 217, 317, 313 or 371; 341, 474;	
PSC 201, SCM 302	
(7/9/12)(3/13/13)(6/24/14)	39

**Molecular and Cellular Biology Concentration**

BIO/CHEM 375 Molecular Biology Laboratory.....	3
BIO 452 Cell Biology.....	4
CHEM 217 Organic Chemistry for Life Sciences II (4) or CHEM 317 Organic Chemistry II (5) .....	4-5
CHEM 371 Biochemistry.....	5
CHEM 372 Metabolism .....	4
CHEM 474 Protein Techniques Laboratory or BIO/CHEM 476 Gene Expression Laboratory	2
Choose 8 units from the following.....	8
BIO 405, BIO 426, BIO/CHEM 441, BIO/CHEM 476 or CHEM 474, BOT 450, MCRO 402, MCRO 433, SCM 201	
<sup>1</sup> Approved electives.....	8
<i>Select 8 units from:</i>	
List A	
BIO 400, 405, 426, 432, 433, 435, 462, 463;	
BIO/CHEM 441;	
BIO/CHEM 476 or CHEM 474;	
BOT 323, 450;	
MCRO 320, 402, 423, 424, 433;	
ZOO 422, 425, 428	
List B (Only one course from this list without special petition)	
ASCI 403, 406;	
CHEM 218, 318, 331, 377, 472, 477, 478, 528;	
SCM 201, 302, 451	
(7/9/12) (3/13/13) (6/20/14)	38-39

**Systematics and Biodiversity Concentration**

BIO 443 Molecular Ecology & Systematics .....	4
BIO/CHEM 375 Molecular Biology Laboratory .....	3
BIO 415 Biogeography .....	4
BIO/CHEM 441 Bioinformatics Applications .....	4
STAT 313 Applied Experimental Design and Regression Models .....	4
STAT 419 Applied Multivariate Statistics .....	4
<sup>1</sup> Approved biological diversity electives.....	16
<i>Select 16 units from:</i>	
BIO 325, 327, 328, 400, 401, 419, 427, 429, 463, 472;	
BIO/NR 317;	
BOT 311, 313, 323, 326, 433, 437;	
CSC 448;	
NR 307;	
STAT 324, 330, 416, 421;	
ZOO 321, 322, 323, 335, 336, 341, 425	

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<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

**2009-11 Cal Poly Catalog****Biological Sciences Department****BIOLOGY MINOR**

The purpose of the minor is to help students from other disciplines acquire increased factual and conceptual knowledge in biology, an increased understanding of scientific methods and techniques used to study biology, and an increased ability to analyze biological topics in the news or in various jobs. Biological issues are important throughout modern life and particularly relevant in many careers, including those in health-related businesses, agriculture, several engineering disciplines, city planning, teaching K-12 students, journalism, political science, psychology, and statistics. Students in more closely related majors such as biochemistry or kinesiology may also be interested in strengthening their biology background. In addition, an enhanced biology background helps students become better educated citizens regarding a variety of controversial issues (e.g., genetically-modified organisms in agriculture, human cloning, genetic discrimination, the pressures of population growth). Students may choose courses in environmental biology or in human biology and biotechnology, or may choose to take courses in several areas.

**Required Courses.***Units*

Choose 1 of the following combinations of courses 12-13

BIO 160 Diversity and the History of Life (4) *or*MCRO 221 Microbiology (4) (B2&B4) *or*

MCRO 224 General Microbiology I (5)

(B2&amp;B4) (3/23/10)

BIO 161 Introduction to Cell and Molecular Biology (4) (B2&amp;B4)

BIO 162 Intro to Organismal Form and Function (4/5) *or* BIO 263 Intro Ecology and Evolution (4) (9/24/12)

OR

BIO 113 Animal Diversity and Ecology (4) (B2&amp;B4)

BIO 114 Plant Diversity and Ecology (4) (B2&B4) *or* BOT 121 General Botany (4) (B2&B4)BIO 115 Animal/Human Structure and Function (4) *or* BIO 111 General Biology (4) (B2&B4) *or* MCRO 221 Microbiology (4) (B2&B4)

The first combination (BIO 160 *or* MCRO 221 *or* MCRO 224, BIO 161, BIO 162 *or* BIO 263) is recommended and provides the prerequisites for many courses offered in the department. Other introductory courses may be substituted with approval by the Biology Minor Coordinator.

**Advisor Approved Electives** ..... 15-16

*Students must obtain prior approval from the Biology Minor Coordinator.*

Choose a minimum of 15-16 units from 300-400 level courses in BIO, BOT, MCRO or ZOO to create a cohesive set of courses that reflect a particular focus in biology, for a total of at least 28 units. Suggested combinations of courses in particular areas of biology are available in the department.

## 2009-11 Cal Poly Catalog

Biomedical and General Engineering  
DepartmentFlowchart**BS BIOMEDICAL ENGINEERING**

☐ 60 units upper division      ☐ GWR

☐ 2.0 GPA      ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

ENGR 110 Engineering Science I.....	3
BMED 111 Biomedical Engrg Calculations <i>or</i> ENGR 111 Engineering Science II (12/11/12).....	3
BMED 212 Intro to Biomedical Engrg Design.....	3
BMED 310 Biomed. Engrg Measuremt/Analysis.....	4
BMED 410 Biomechanics.....	4
BMED 420 Biomaterials.....	4
BMED 425 Biomedical Engineering Transport.....	4
BMED 430 Biomedical Modeling.....	4
BMED 440 Bioelectronics and Instrumentation.....	4
BMED 450 Special Topics in Biomedical Engrg.....	4
BMED 455 Biomedical Engineering Design I.....	4
BMED 456 Biomedical Engineering Design II.....	4
BMED 460 Engineering Physiology.....	4
Advisor approved technical electives (300/400).....	14
BMED 355, 404 434, 435, 445, 450, 510, 515, 525, 530, 531, 535, 540, 545, 550, 555; CHEM 444, 446, 447; CSC 448; EE 361; ENGR 451; IME 327, 356, 427, 430, 435, 577; MATE 440, 445; ME 305, 326, 343, 401 (12/31/14)	
<sup>3</sup> BMED 481 (2), 482 (2) <i>or</i> ENGR 462 (4) Senior Project <i>or</i> BMED 481 (1), 482 (1), 483 (2).....	4
(2/21/12)	<b>67</b>

**SUPPORT COURSES**

BIO 161 Intro to Cell & Molecular Bio (B2/B4)*	4
CHEM 124 Gen Chem for Engrg I (B3/B4)* <i>and</i> CHEM 125 Gen Chem for Engrg II (Add'l Area B)* <i>or</i> CHEM 127, 128 Gen Chem I, II.....	4,4
ENGL 149 Technical Writing for Engineers (A3)*	4
MATH 141, 142 Calculus I, II (B1)*.....	4,4
MATH 143 Calculus III (Add'l Area B)*.....	4
MATH 241 Calculus IV.....	4
MATH 244 Linear Analysis I.....	4
PHYS 141 General Physics IA.....	4
PHYS 132 General Physics II.....	4
PHYS 133 General Physics III.....	4
<sup>+</sup> Approved math and science electives	<b>16</b>
MATH 344 <i>or</i> STAT 312 <i>or</i> PHYS 417 (B6)*.....	4
ZOO 331 <i>or</i> ZOO 332 <i>or</i> BIO 432 <i>or</i> BIO 433.....	5
Select from the following:.....	7
BIO 302, 303, 351, 405, 426, 432, 433, 441, 447, 452, 475;	

BUS 310; CHEM 216, 217, 218, 219, 312, 313,  
316, 317, 318, 371, 377, 444, 445, 446, 473;  
CE 207; CSC 448; EE 251, 321, 361;  
KINE 406; MATH 344;  
MCRO 221 *or* 224, MCRO 225, 320, 402;  
ME 251; PHYS 417; STAT 312;  
ZOO 331, 332, 426, 428 (12/31/14)

CE 204 Mechanics of Materials I.....	3
<sup>2</sup> CSC 101 Fundamentals of Computer Science <i>or</i> CSC 234 C and Unix <i>or</i> CSC 231 (12/13/13).....	3
EE 201 Electric Circuit Theory.....	3
IME 314 Engineering Economics.....	3
MATE 210 Materials Engineering.....	3
ME 211 Engineering Statics.....	3
ME 212 Engineering Dynamics.....	3
ME 302 Thermodynamics I.....	3
ME 341 Fluid Mechanics I.....	3
	<b>91</b>

**GENERAL EDUCATION (GE)**

72 units required, 32 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 8 units required at the 300 level.

**Area A Communication (8 units)**

A1 Expository Writing.....	4
A2 Oral Communication.....	4
A3 Reasoning, Argumentation, and Writing * 4 units in Support.....	0

**Area B Science and Mathematics (no add'l units req'd)**

B1 Mathematics/Statistics * 8 units in Support.....	0
B2 Life Science *4 units in Support.....	0
B3 Physical Science* 4 units in Support.....	0
B4 One lab taken with either a B2 or B3 course	
B5 (requirement for Liberal Arts students only)	
B6 Upper-division Area B * 4 units in Support.....	0
Additional Area B units * 8 units in Support.....	0

**Area C Arts and Humanities (16 units)**

C1 Literature.....	4
C2 Philosophy.....	4
C3 Fine/Performing Arts.....	4
C4 Upper-division elective.....	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404).....	4
D2 Political Economy.....	4
D3 Comparative Social Institutions.....	4
D4 Self Development (CSU Area E).....	4
	<b>40</b>

<b>FREE ELECTIVES</b> .....	<b>0</b>
	<b>198</b>

<sup>+</sup> For a total of 16 units: Select one course from:

—ZOO 331, ZOO 332, BIO 432, BIO 433.

Select one course from GE-B6\*:

—MATH 344, STAT 312, PHYS 417.

Typical remaining course selections include, but are not limited to:

—BIO 302 *or* 303 *or* 351, BIO 405, BIO 447, BIO 452; CHEM 312,  
CHEM 313, CHEM 444, CHEM 473, MCRO 221 *or* 224, MCRO  
225, MCRO 320, MCRO 402, ZOO 426, (12/31/14)

<sup>2</sup> If CSC 231 is taken for 2 units then 1 additional unit of Approved  
Support Electives is required. (12/13/13)

<sup>3</sup> May substitute an additional 4 units of approved technical electives,  
if using BMED 456 to fulfill senior project requirement. (7/31/14)

**2009-11 Cal Poly Catalog**  
**BioResource and Agricultural**  
**Engineering Dept**

**BS BIORESOURCE AND AGRICULTURAL  
ENGINEERING**

☐ 60 units upper division      ☐ GWR  
 ☐ 2.0 GPA                      ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major or support courses may be taken as  
 credit/no credit.

**MAJOR COURSES**

BRAE 128 Careers in Bioresource & Ag Engr. ....	2
BRAE 129 Laboratory Skills and Safety .....	1
BRAE 133 Engineering Design Graphics .....	2
BRAE 151 CAD for Agricultural Engineering .....	1
BRAE 216 Fundamentals of Electricity .....	4
BRAE 232 Agricultural Structures Planning .....	4
BRAE 234 Intro Mechanical Systems-Agric .....	4
BRAE 236 Principles of Irrigation .....	4
BRAE 239 Engineering Surveying .....	4
BRAE 312 Hydraulics .....	4
BRAE 320 Principles of Bioresource Engineering .....	4
BRAE 328 Measurements/Computer Interfacing	4
BRAE 331 Irrigation Theory .....	3
BRAE 403 Agricultural Systems Engineering .....	4
BRAE 414 Irrigation Engineering .....	4
BRAE 421, 422 Equipment Engineering .....	3,4
BRAE 433 Agricultural Structures Design .....	4
BRAE 460 Senior Project Organization .....	1
BRAE 461, 462 Senior Project I, II .....	2,2
<sup>1</sup> Approved electives .....	10
Select 10 units from the following, with a minimum of 6 units upper division: BRAE 152, 302, 335, 337, 345, 348, 405, 427, 430, 435, 447, 448, 532, 533; (4/19/12) any upper division CE course; CHEM 312; any upper division ENVE course; FSN 204; IME 141, 142, 143, 144, 319; MATE 210, 215; MCRO 221, 421; any upper division ME course	
	<b>75</b>

**SUPPORT COURSES**

BIO 213 and ENGR/BRAE 213 or MCRO 221 Microbiology (B2)* .....	4
CE 201 Mechanics of Materials (6) or CE 204 and CE 207 Mechanics of Materials I, II (3)(3) .....	6
CHEM 124 General Chemistry for the Engineering Disciplines (B3/B4)* .....	4
CHEM 125 General Chemistry for the Engineering Disciplines (Add'l Area B)* .....	4
CSC 231/CSC 232/CSC 234 .....	2/3

ECON 201 Survey of Economics (D2)* .....	4
EE 321 Electronics & EE 361 Electronics Lab or PHYS 206 Instrument/Experimental Physics and PHYS 256 Electrical Measurements Lab	3,1
ENGL 149 Technical Writing for Engineers (A3)*	4
MATH 141, 142 Calculus I, II (B1)* .....	4,4
MATH 143 Calculus III (Add'l Area B)* .....	4
MATH 241 Calculus IV .....	4
MATH 244 Linear Analysis I .....	4
ME 211 Engineering Statics .....	3
ME 212 Engineering Dynamics .....	3
ME 302 Thermodynamics .....	3
PHYS 141 General Physics IA .....	4
PHYS 132, 133 General Physics .....	4,4
SS 121 Introductory Soil Science .....	4
STAT 312 Statistical Methods-Engr. (B6)* .....	4

**81-82**

**GENERAL EDUCATION (GE)**

72 units required, 36 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 8 units required at the 300 level.

**Area A Communication (8 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing * 4 in Support .....	0

**Area B Science and Mathematics (no additional units  
are required)**

B1 Mathematics/Statistics * 8 units in Support .....	0
B2 Life Science * 4 units in Support .....	0
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	
B5 (requirement for Liberal Arts students only)	
B6 Upper-division Area B * 4 units in Support .....	0
Additional Area B units* 8 units in Support .....	0

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

**Area D/E Society and the Individual (12 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy * 4 units in Support .....	0
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4

**36**

**FREE ELECTIVES .....**

**0**

**192**

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved  
 electives; bear in mind your selections may impact pursuit of post-  
 baccalaureate studies and/or goals.

**2009-11 Cal Poly Catalog****College of Science and Mathematics****BIOTECHNOLOGY MINOR**

The Biotechnology Minor consists of a core of required courses and restricted elective courses. Advising for students in the Biotechnology Minor takes place in the student's major department, including selection of restricted electives and preparation of an agreement form listing specific courses to satisfy the requirements for the minor. The Biotechnology Minor Form is available from the Dean's Office or the Advising Center in the College of Science and Mathematics. Final approval of the minor is by the Program Coordinator in the College of Science and Mathematics.

The minor is open to any major except Biochemistry, Microbiology, and Biological Sciences with the Molecular and Cellular Biology concentration.

*Biological Sciences* students preparing for the minor should take CHEM 316, 317, and 371 to fulfill the organic chemistry and biochemistry requirements in their major.

Students interested in more information should contact either John Goers in the Chemistry and Biochemistry Department or Ken Hillers in the Biological Sciences Department.

<b>Core courses (15-21)</b>	<i>Units</i>
BIO 161, BOT 121, MCRO 221 <i>or</i> MCRO 224 .....	4-5
BIO 303, BIO 351, <i>or</i> CHEM 373 .....	3-5
CHEM 313 <i>or</i> CHEM 371 .....	5
<i>Laboratory elective:</i> ASCI 403, BIO/CHEM 375, BOT 450 <i>or</i> CHEM 474 .....	2-5
SCM 201 Orientation to Biotechnology .....	1-2
<b>Restricted electives</b> .....	<del>7-13</del>
<i>Animal Biotechnology:</i>	<del>6-13</del>
ASCI 403, 406, 503; DSCI 330; VS 340	
<i>Bioinformatics:</i>	
BIO/CHEM 441, CSC/CPE 448	
<i>Cell and Molecular Biology/Microbial Biotechnology:</i>	
BIO/CHEM 375, BIO 426, 452, 476; CHEM 472, 474, 528; MCRO 225, 320, 402, 433	
<i>Engineering-related Biotechnology:</i>	
BRAE 448; ENVE 443; ENGR 581, 582, 583	
<i>Ethics:</i>	
PHIL 339; SCM 451	
<i>Pharmaceutical Biotechnology:</i>	
CHEM 377, 477	
<i>Plant Biotechnology:</i>	
BOT 323, 324, 450; CHEM 472	
(8/22/14)	28



## 2009-11 Cal Poly Catalog

### BioResource and Agricultural Engineering Dept

## BRAE-BIORESOURCE and AGRICULTURAL ENGINEERING

### **BRAE 121 Agricultural Mechanics (2)**

Identification and use of tools and materials; shop safety; tool sharpening and care; concrete mixes and materials; simple electric wiring; metal work; pipe fitting; basic woodworking; estimating quantities and costs. Students are required to meet safety regulations in laboratory work. 1 lecture, 1 laboratory.

### **BRAE 124 Small Engines (2)**

Operating principles of the small internal combustion engine. Maintenance and trouble-shooting applications of small power units to all types of engine applications. Repair procedures related to economic justifications. 1 lecture, 1 activity.

### **BRAE 128 Careers in Bioresource and Agricultural Engineering (2)**

Introduction to careers associated with BioResource and Agricultural Engineering, and Agricultural Systems Management. Professional engineering registration process. Engineering problem solution and report format. Design procedures. Engineering fundamentals. Laboratory includes visits to facilities relating to career opportunities. 1 lecture, 1 laboratory.

### **BRAE 129 Laboratory Skills and Safety (1)**

Introduction to fabrication and construction materials used in the field of Agricultural Engineering. Fabrication skills in the development of wood, metal, concrete projects, and creative design. Strength tests of wood, fasteners, concrete, and student design projects. 1 laboratory. Prerequisite: BRAE and ASM majors only.

### **BRAE 133 Engineering Design Graphics (2)**

Visual communication in engineering design and problem solving. Principles of freehand sketching, engineering graphics, and computer-aided-drafting. Perspective and orthographic sketching, orthographic drawing with instruments and computer, applied descriptive geometry. 2 laboratories.

### **BRAE 141 Agricultural Machinery Safety (3)**

Evaluation of safe tractor and equipment operation. Supervised field operation emphasizing the safe and efficient performance of modern farm and utility-industrial equipment. 2 lectures, 1 laboratory.

### **BRAE 142 Agricultural Power and Machinery Management (4)**

Evaluation of agricultural machinery and tractor power performance. Equipment studied includes primary and secondary tillage tools, grain drills, row crop planters, sprayers, grain and forage harvesters, and specialty crop harvesters. Emphasis on management, selection, cost analysis using computers and efficient operation of agricultural machinery. 3 lectures, 1 laboratory. Prerequisite: MATH 116 or equivalent.

### **BRAE 143 Power and Machinery (4)**

Performance of tractors and machinery. Evaluation of tillage, planting, and harvesting operations. Analysis and development of optimum mechanical systems. Use of microcomputers for evaluation, analysis, and report presentation. 3 lectures, 1 laboratory. Prerequisite: BRAE 128, MATH 119 or equivalent.

### **BRAE 151 CAD for Agricultural Engineering (1)**

Computer aided drafting on a desktop personal computer using Autocad software. Drawing setup. 2-D projections including automatic dimensioning and hatching. Isometric construction, drawing layers, library symbols. Use of 3-D drawing software. 1 laboratory. Prerequisite: BRAE 133 or equivalent.

### **BRAE 152 3-D Solids Modeling (1)**

Introduction to 3-dimensional solids modeling using state-of-the-art software. Model generation and modification of associative properties, assembly modeling, extrusions and revolutions. 1 laboratory. Prerequisite: BRAE 133, BRAE 151 or equivalent courses.

### **BRAE 200 Special Problems for Undergraduates (1-4)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

### **BRAE 201 Enterprise Project (1-4) (CR/NC)**

Introductory experience in a bioresource/agricultural engineering or agricultural systems management project. Project participation is subject to approval by the department head and the Cal Poly Corporation. Credit/No Credit grading only. Prerequisite: BRAE 129 or consent of instructor.

### **BRAE 203 Agricultural Systems Analysis (3)**

Agricultural Systems Analysis investigates the interrelationships between sub-components in an overall system. Problem solving algorithms, network analysis, project planning techniques, and optimization. 2 lectures, 1 laboratory. Prerequisite: MATH 118 or equivalent.

### **BRAE 213 Bioengineering Fundamentals (2)**

### **GE B2**

Treatment of the engineering applications of biology. Genetic engineering and the industrial application of microbiology. Systems physiology with engineering applications. Structure and function relationships in biological systems. The impact of life on its environment. 2 lectures. For engineering students only. Prerequisite: MATH 142, CHEM 124. Corequisite: BIO 213. *Crosslisted as BRAE/ENGR 213.* Fulfills GE B2.

### **BRAE 216 Fundamentals of Electricity (4)**

Application of electricity in BioResource and Agricultural Engineering, including basic electric circuits. Will include wiring materials, code regulations, electrical measurements, R-L-C circuit fundamentals, system planning, motors, basic electronics, and an introduction to computer usage. 3 lectures, 1 laboratory. Prerequisite: BRAE 128, BRAE 129, MATH 142, PHYS 131.

### **BRAE 231 Agricultural Building Construction (3)**

Development of practical skills in carpentry and light construction. Selection of materials. Agricultural buildings repaired, constructed, or modified during laboratory periods. 1 lecture, 2 laboratories. Prerequisite: BRAE 129 or consent of instructor.

### **BRAE 232 Agricultural Structures Planning (4)**

Planning of facilities required in production systems. Materials and processes used in construction of agricultural structures. Environmental factors affecting crop storage structures and animal housing. Design of structural environments to meet the needs of commodities, animals, and plants. 3 lectures, 1 laboratory. Prerequisite: BRAE 151, PHYS 132.

### **BRAE 234 Introduction to Mechanical Systems in Agriculture (4)**

Introduction to elements used in the mechanical transmission of power and force in agricultural systems. Power transmission using v-belts, roller chain, gear and shaft drives, hydraulic actuators. Linear and nonlinear actuation devices including linkages, cams, and hydraulic/pneumatic cylinders. 3 lectures, 1 laboratory. Prerequisite: BRAE 128, BRAE 129, PHYS 131.

### **BRAE 236 Principles of Irrigation (4)**

Land grading design, operation, management, and evaluation of irrigation methods. 3 lectures, 1 laboratory. Prerequisite: MATH 141, BRAE 239, SS 121, a computer programming course.

### **BRAE 237 Introduction to Engineering Surveying (2)**

An introduction to basic field note keeping as well as the use of steel tapes, automatic levels, total stations and survey tools. Training in the procedures for differential and profile leveling; angle measurement and traversing. Hands-on experience with the use of GPS for surveying. An understanding in computations to determine direction, elevations, and earthwork volumes. Practice in map reading and building layout. 1 lecture, 1 laboratory. Prerequisite: MATH 119 or equivalent.

### **BRAE 239 Engineering Surveying (4)**

Development of proper field note taking and procedures for measuring using automatic levels, total stations and GPS systems. Understanding in the procedures and computations for differential leveling, profiles, traversing, triangulation and topographic surveys. Computations in traverse adjustment, contour mapping, earthwork volumes, curve alignments and building layout. Understanding in map reading, the use of datums, photogrammetry, CAD design and boundary law. 2 lectures, 2 laboratories. Prerequisite: MATH 119 or equivalent.

### **BRAE 240 Agricultural Engineering Laboratory (1)**

Individual projects. Total credit limited to 4 units. 1 laboratory. Prerequisite: Consent of instructor.

### **BRAE 247 Forest Surveying (2)**

Use and care of tapes, staff compass, abney levels, total stations, and GPS receivers. Keeping field notes, measurements by tape. Closed and open traverse by compass and total stations. Turning angles and determining directions of lines. Map reading and public land description. GPS measurements. Weekend



field trips required. 1 lecture, 1 laboratory. Prerequisite: NR 215. *Crosslisted as BRAE/NR 247.*

#### **BRAE 270 Selected Topics (1–4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

#### **BRAE 301 Hydraulic and Mechanical Power Systems (4)**

Selection, application and use of hydraulic components and mechanical power transmission equipment. Use of standardized circuit design procedures. 3 lectures, 1 laboratory. Prerequisite: PHYS 121 or PHYS 141. *Change effective Spring 2011.*

#### **BRAE 302 Servo Hydraulics (4)**

Application of microcomputers and programmable logic controllers to hydraulic, pneumatic and mechanical systems. Theory, instrumentation and sensors used in process and control systems used in agricultural equipment. 3 lectures, 1 laboratory. Prerequisite: BRAE 216 or BRAE 324 and BRAE 234 or BRAE 301.

#### **BRAE 312 Hydraulics (4)**

Static and dynamic characteristics of liquids, flow in open and closed channels, uniform and nonuniform flow, flow measurement, pumps. 3 lectures, 1 laboratory. Prerequisite: PHYS 132, ME 211.

#### **BRAE 320 Principles of Bioresource Engineering (4)**

Theory and applications of bioprocess technology in biological and agricultural systems. Engineering properties of biological materials and organisms. Basic unit operations, fluid mechanics and heat/mass transfer as applied to bioprocess technology. Special requirements of agricultural and biological processes. 3 lectures, 1 laboratory. Prerequisite: BRAE 128, BRAE 232, BRAE 236, CHEM 125, PHYS 132, BIO 213 and BRAE 213 or ENGR 213, or MCRO 221.

#### **BRAE 321 Agricultural Safety (3)**

Principles of agricultural safety. Accident causation and prevention, hazard identification and abatement, laws and regulations. Machinery, electrical, chemical, livestock, shop and fire safety. Safety program development. 2 lectures, 1 activity. Prerequisite: Junior standing.

#### **BRAE 324 Principles of Agricultural Electrification (4)**

Applications of DC/AC electricity in agriculture. National Electric Code regulations. The wiring of agricultural structures and electrical distribution. Series, parallel and series-parallel circuits, R-L-C circuits, electric motors, electronics. 3 lectures, 1 laboratory. Prerequisite: MATH 119 or MATH 120, PHYS 121.

#### **BRAE 325 Agricultural Energy Systems (3)**

Use of energy systems in modern agriculture with a focus on the economic and moral dilemmas facing our technological society. 2 lectures, 1 laboratory. Prerequisite: PHYS 121, BRAE 142.

#### **BRAE 326 Energy Systems for Agriculture (3)**

Theory and application of energy sources and systems. Covering such sources as heat systems, biomass, direct energy conversion, and power application to the soil. 2 lectures, 1 laboratory. Prerequisite: BRAE 143, ME 211, ME 302. ME 302 may be taken concurrently.

#### **BRAE 328 Measurements and Computer Interfacing (4)**

Transducers and engineering measurements in agricultural engineering. Covering transducer characteristics, signal processors and controllers, instrumentation techniques, and the use of the computer in the measurement and control of typical engineering problems. 3 lectures, 1 laboratory. Prerequisite: EE 321, EE 361, a computer programming course.

#### **BRAE 331 Irrigation Theory (3)**

Plant-water-soil relations using evapo-transpiration, plant stress, soil moisture deficiency, frequency and depth of irrigation, salinity, infiltration, drainage and climate control. 3 lectures. Prerequisite: BRAE 236, or BRAE 340.

#### **BRAE 335 Internal Combustion Engines (4)**

Principles of operation of internal combustion engines. Theory of operation and diagnosis evaluation and repair of small engines, gasoline and diesel engines and economics of operation, use and repair. Power analysis and application. 3 lectures, 1 laboratory. Prerequisite: Junior standing.

#### **BRAE 337 Landscape Irrigation (4)**

Design of sprinkler and drip irrigation systems including: site characteristics, soil variables affecting water storage and infiltration rate, plant selection and hydrozones, hydraulics, nozzle spacing, selection of system components, back flow prevention, plumbing codes and cost estimating. Irrigation system evaluation and audit irrigation scheduling, and water budget. 3 lectures, 1 laboratory. Prerequisite: MATH 118 or consent of instructor.

#### **BRAE 339 Internship in BioResource and Agricultural Engineering (1–12) (CR/NC)**

Students will spend up to 12 weeks with an approved agricultural firm engaged in production or related business. Time will be spent applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Consent of internship instructor.

#### **BRAE 340 Irrigation Water Management (4)**

**GE Area F**

Soil-plant-water relationships; evapotranspiration; irrigation schedules; salinity and drainage; irrigation efficiency. Water measurement; soil moisture measurement; irrigation systems and practical constraints affecting scheduling. California water supply and budget; water rights; local, state and federal water institutions; California water issues. 3 lectures, 1 laboratory. Prerequisite: Junior standing, completion of GE Area A1, A3, and Area B, including Math 118 or better. Fulfills GE Area F.

#### **BRAE 342 Agricultural Materials (4)**

Physical properties of agricultural materials and their measurement. Strength of materials, material flow and transport, material deformation, shape and size classification, moisture relationships and biological interactions. Interactions between agricultural materials, the environment and equipment used to handle them. 3 lectures, 1 laboratory. Prerequisite: PHYS 121, CHEM 110 or CHEM 111, SS 121.

#### **BRAE 343 Mechanical Systems Analysis (4)**

Use of statics and dynamics to make original calculations, plans, sketches, graphics, drawings, schemes and layouts for the fabrication and construction of machines. 3 lectures, 1 laboratory. Prerequisite: MATH 119, BRAE 203, BRAE 301 or concurrent. Junior standing.

#### **BRAE 344 Fabrication Systems (4)**

Fabrication systems including cutting, sawing, shearing, bending, welding, grinding, cleaning, painting and proper safety procedures. Experimental projects to include team design and construction, presentation, organization, and evaluation. 2 lectures, 2 laboratories. Prerequisite: BRAE 343.

#### **BRAE 345 Aerial Photogrammetry and Remote Sensing (3)**

Object recognition, three-dimensional equipment, and interpretation of aerial photographs. Print alignment, stereoscopic viewing, scales, elevation determination, and application. Orthophotos and their relationship to Geographic Information Systems (GIS). Application of aerial photos to regional studies. 2 lectures, 1 laboratory. Prerequisite: MATH 119.

#### **BRAE 348 Energy for a Sustainable Society (4)**

**GE Area F**

Study of how the transition can be made from fossil fuels to renewable energy sources including hydro, biomass, solar, wind, and energy conservation. Environmental, economic, and political consequences of a renewable energy-based sustainable society. 3 lectures, 1 activity. Prerequisite: Junior standing and completion of GE Area B. Fulfills GE Area F.

#### **BRAE 400 Special Problems for Advanced Undergraduates (1–4)**

Individual investigation, research, studies, or surveys of selected problems in agriculture. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

#### **BRAE 401 Enterprise Project Management (1-4) (CR/NC)**

Advanced experience in a bioresource/agricultural engineering or agricultural systems management project. Project leadership and management are stressed. Project participation is subject to approval by the department head and the Cal Poly Corporation Credit/No Credit grading only. Prerequisite: BRAE 201 or consent of instructor.

#### **BRAE 403 Agricultural Systems Engineering (4)**

Engineering and economic principles combined with mathematical optimization techniques to evaluate parameters in agricultural production and processing systems. Project planning techniques, linear and nonlinear modeling, response surface methodology. Professional responsibilities in Agricultural Engineering including ethics, patents, copyrights, liability. 3 lectures, 1 laboratory. Prerequisite: ECON 201/211, MATH 242 or MATH 244.

#### **BRAE 405 Chemigation (1)**

Fertilizer and chemical injection through irrigation systems. Hardware, fertilizer compounds, and distribution uniformity. Matching chemicals and equipment to specific irrigation methods. Safety. 1 laboratory. Prerequisite: BRAE 236 or BRAE 340.

**BRAE 414 Irrigation Engineering (4)**

Design of on-farm irrigation systems; micro, surface, and sprinkler irrigation systems; canals and pumps; economic and strategies of pipe design; pipeline protection. 3 lectures, 1 laboratory. Prerequisite: BRAE 331 or BRAE 340; BRAE 312 or course in hydraulics with a grade of C or better.

**BRAE 415 Hydrology (4)**

Collection, organization and use of precipitation and runoff data, flood frequency, stream gauging and use of hydrograph, principles of groundwater and flood routing, sizing and economics of soil and water conservation structures. 3 lectures, 1 laboratory. Prerequisite: Junior standing, MATH 141, and SS 121 or consent of instructor.

**BRAE 418, 419 Agricultural Systems Management I, II (4) (4)**

Project management of agricultural systems. Emphasis placed on a team approach to problem solution. Case studies and student projects used to explore the following topics: project leadership, project organization, communication, needs assessment, feasibility studies, cost analysis, decision making, solution implementation, and evaluation. BRAE 418: 3 lectures, 1 laboratory. BRAE 419: 2 lectures, 2 laboratories. Prerequisite: BRAE 203, AGB 301, AGB 310 and ENGL 148. For BRAE 419: BRAE 418.

**BRAE 421 Equipment Engineering (3)**

Design and construction of specialized agricultural components and equipment. 2 lectures, 1 laboratory. Prerequisite: BRAE 328, CE 205, ME 212.

**BRAE 422 Equipment Engineering (4)**

Design and construction of specialized agricultural components and equipment. 2 lectures, 2 laboratories. Prerequisite: BRAE 421.

**BRAE 425 Computer Controls for Agriculture (3)**

Computer activated controls as applied to agricultural machinery, agricultural structures, processing and irrigation industries. Encompassing control logic to evaluate stability behavior of systems of computer interfacing, data input and control output. 2 lectures, 1 laboratory. Prerequisite: BRAE 324, CSC 110 or CSC 119 or CSC 232.

**BRAE 427 Agricultural Process Engineering (3)**

Agricultural engineering principles applied to air, water, air-water mixtures, drying, heating, refrigeration, fluid flow, size reduction, fan laws and materials handling. 2 lectures, 1 laboratory. Prerequisite: BRAE 312, BRAE 430, ME 302.

**BRAE 430 Finite Element Analysis (3)**

Introduction to the theory of finite element analysis and its application to drainage, pipe flow, fruit and vegetable damage predictions, structural strength, heat transfer, and other agricultural engineering applications. 2 lectures, 1 laboratory. Prerequisite: CE 204, MATH 242 or MATH 244, ME 302.

**BRAE 432 Agricultural Buildings (4)**

Selection of buildings, storage units, and related equipment for production agriculture. Economics and functionality of various designs and construction materials. Environmental factors affecting crop storage and animal housing. 3 lectures, 1 laboratory. Prerequisite: PHYS 121, BRAE 342, BRAE 343.

**BRAE 433 Agricultural Structures Design (4)**

Structural analysis and design of agricultural service and processing buildings. Emphasis on use of wood, metals, and reinforced concrete in light construction. 3 lectures, 1 laboratory. Prerequisite: BRAE 232, CE 205.

**BRAE 435 Drainage (4)**

Relevant principles of hydrology and porous media flow. Flow nets, wells and ground water, design of simple surface and sub-surface drains. 3 lectures, 1 laboratory. Prerequisite: Junior standing, BRAE 312, BRAE 331, or BRAE 340 or SS 432 and consent of instructor.

**BRAE 437 Conservation Engineering (3)**

Engineering solutions of soil and water conservation problems. Applications of engineering fundamentals of hydraulics, hydrology, and soils used in the design and construction of soil and water conservation structures. 2 lectures, 1 laboratory. Prerequisite: BRAE 312, BRAE 415, SS 121, or consent of instructor.

**BRAE 438 Drip/Micro Irrigation (4)**

Drip/micro irrigation hardware and management. Emphasizes agricultural drip/micro irrigation with some landscape application. Filtration, emitters, chemical injection, agronomic constraints, and scheduling. Field trip(s) included. 3 lectures, 1 laboratory. Prerequisite: BRAE 236 or BRAE 340.

**BRAE 439 Vineyard Water Management (4)**

Management of rain and irrigation water in vineyards. Irrigation scheduling, managing water stress, climate control with irrigation methods commonly used.

Management for wine, table grapes, and raisins. 3 lectures, 1 laboratory.

Prerequisite: BRAE 340 or BRAE 236.

**BRAE 440 Agricultural Irrigation Systems (4)**

On-farm irrigation system evaluation and management. Drip, micro-spray, furrow, border strip, sprinkler systems. Irrigation efficiency and uniformity. Pumping costs. For non-BRAE majors only. 3 lectures, 1 laboratory. Prerequisite: BRAE 340 or consent of instructor.

**BRAE 446 CAD Software for Land Modeling (2)**

Techniques for preparing data for geographic information systems using TERRAMODEL. Digital data from surveying, orthophotography, and government data sources will be entered, displayed, edited and translated for use in other software packages. Transformation of coordinate systems. Earthwork and hydrologic examples. 1 lecture, 1 laboratory. Prerequisite: BRAE 239.

**BRAE 447 Advanced Surveying with GIS Applications (4)**

Collecting field data; processing the data; generating graphical representation of the data; design based on the data and laying out the design in the field; and available record resources for use in GIS systems and their accuracy. 2 lectures, 2 laboratories. Prerequisite: BRAE 239.

**BRAE 448 Bioconversion (4)**

Biological, thermal and physical techniques for converting biomass into useful energy forms for agriculture and industry. Laboratory exercises include experiments with anaerobic digestion of animal wastes into methane, ethanol fermentation of grains and composting of agricultural residues. Technical and economic feasibility of biofuels. 3 lectures, 1 laboratory. Prerequisite: MATH 118 (or MATH 116 and MATH 117) or equivalent, or consent of instructor.

**BRAE 452 Legal Aspects/Data Accuracy for GIS (3)**

Research of boundary descriptions, record maps, and existing survey data. Value and implications of the data. Local and state requirements and restrictions on use of data. Procedures for incorporation of data into Arc/Info. 2 lectures, 1 laboratory. Prerequisite: BRAE 237 or BRAE 239.

**BRAE 460 Senior Project Organization (1)**

Selection and organization of senior project. Involves time management, research techniques, budgeting and project presentation. Documentation of multidisciplinary team experience. 1 lecture. Prerequisite: For BRAE majors: ENGL 149; for ASM majors: ENGL 148; for BRAE and ASM majors: junior standing and 240 verified hours of advisor approved paid and/or volunteer experience subsequent to entering Cal Poly.

**BRAE 461, 462 Senior Project I, II (2) (2)**

Solution of an engineering or systems management problem in agriculture. May involve research methodology, problem statement, analysis, synthesis, project design, construction, and evaluation. Project requires 150 hours with a minimum of faculty supervision. Prerequisite: BRAE 460.

**BRAE 463 Undergraduate Seminar (1)**

Group discussion of current agricultural engineering topics presented by individual members of the class and visitors. Placement opportunities and requirements. 1 seminar.

**BRAE 464 Professional Practice (3)**

Contracts, specifications, and legal aspects of agricultural engineering. Safety and human factors. Engineering ethics and professional registration. 3 lectures. Prerequisite: Senior standing.

**BRAE 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

**BRAE 471 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Consent of instructor.

**BRAE 481 Advanced Agricultural Mechanics (2)**

Advanced shop skills. Carpentry, electricity, plumbing, surveying, power mechanics, tractor equipment operation and maintenance. 1 lecture, 1 laboratory. Prerequisite: Agricultural teacher candidates starting/returning from student teaching, senior or graduate standing or consent of instructor.

**BRAE 485 Cooperative Education Experience in BioResource and Agricultural Engineering (6) (CR/NC)**

Part-time work experience with an approved BioResource and Agricultural Engineering firm engaged in production or related business, industry or governmental agency. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 4 units; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**BRAE 495 Cooperative Education Experience in BioResource and Agricultural Engineering (12) (CR/NC)**

Full time work experience with an approved BioResource and Agricultural Engineering firm engaged in production or related business, industry or governmental agency. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 4 units; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**BRAE 500 Individual Study (1-3)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Total credit limited to 6 units, repeatable in same term. Prerequisite: Consent of instructor.

**BRAE 521 Systems Analysis of Agricultural Systems (4)**

Principles and methods of creative problem solving and systems analysis as applied to the design of agricultural systems. Problem solving using the engineering design process to analyze the need, establish boundaries, and generate creative alternative solutions. Examples worked through in feasibility analysis, transportation and network problems, linear programming, project planning, human factors and ergonomics, and system analysis with an emphasis on optimum system operation. 3 lectures, 1 laboratory. Prerequisite: Consent of instructor.

**BRAE 522 Instrumentation Control/Microprocessors (4)**

Engineering input/output instrumentation for sensing and controlling functions through data acquisition, analysis and response to agricultural processing. 3 lectures, 1 laboratory. Prerequisite: BASIC language programming or consent of instructor.

**BRAE 529 Small Farm Mechanization (3)**

Principles of farm machinery used for tillage, seeding, weeding, harvesting and transport of agricultural crops. Small-scale equipment, suitable for subsistence farming in developing countries. Small tractors, hand tools, animal power, and fuel from renewable sources. 2 lectures, 1 laboratory. Prerequisite: BRAE 143 or equivalent, graduate standing, or consent of instructor.

**BRAE 532 Water Wells and Pumps (4)**

Water well drilling, design, and development. Pump characteristics and system head. Series and parallel operation. Design of pump intakes. Variable speed electric drives and engines. Pump testing. 3 lectures, 1 laboratory. Prerequisite: BRAE 340 or equivalent, or BRAE 312 or equivalent.

**BRAE 533 Irrigation Project Design (4)**

Engineering solutions and social aspects of improved water delivery to farms and canal automation. Flow measurement. Water user associations. Unsteady canal and pipeline controls. PID controls and modeling. 3 lectures, 1 laboratory. Prerequisite: BRAE 340, hydraulics/fluid mechanics.

**BRAE 570 Selected Topics in BioResource and Agricultural Engineering (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1 to 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**BRAE 571 Selected Advanced Laboratory in BioResource and Agricultural Engineering (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Consent of instructor.

**BRAE 581 Graduate Seminar in BioResource and Agricultural Engineering (3)**

Group study of current problems of the bioresource and agricultural engineering industry; current experimental and research findings as applied to field of bioresource and agricultural engineering. The Schedule of Classes will list topic

selected. Total credit limited to 9 units. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**BRAE 599 Thesis in BioResource and Agricultural Engineering (1-9)**

Systematic research of a significant problem in bioresource and agricultural engineering. Thesis will include problem identification, significance, methods, data analysis, and conclusion. Students must enroll every quarter in which facilities are used or advisement is received. Degree credit limited to 6 units. Prerequisite: Graduate standing and consent of instructor.

## 2009-11 Cal Poly Catalog

### Orfalea College of Business

#### BUS–BUSINESS

##### **BUS 100 Student Orientation and College Success (2) (CR/NC)**

Designing a successful four-year plan for graduation. Orientation of all OCOB majors to student's academic program including development of four-year graduate plan and orientation to the OCOB mission and values. Exploration of skills needed for success: time management, adjustment to college life, study skills, career planning and concentration selection, diversity in school, business and beyond, and academic politics. Credit/No Credit grading only. 1 lecture, 1 activity.

##### **BUS 200 Special Problems for Undergraduates (1–4)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Consent of area coordinator.

##### **BUS 207 Legal Responsibilities of Business (4)**

Examination of the American legal system and important legal principles for business operations, such as those involved with contracts, torts, agency, business organizations, and employment. Emphasis on how legal principles help define socially responsible conduct. Case studies. 4 lectures.

##### **BUS 212 Financial Accounting for Nonbusiness Majors (4)**

Introduction to financial accounting theory and practice with an emphasis on financial statement preparation and analysis. Not open to Business majors. 4 lectures.

##### **BUS 214 Financial Accounting (4)**

Principles of financial accounting for Business majors. The course prepares students to understand and interpret financial statement information. Financial reporting standards are explored to give students an understanding of how financial events are reflected in financial statements. 4 lectures.

##### **BUS 215 Managerial Accounting (4)**

Applications of accounting for making business decisions. Content includes planning and control issues including cost behavior, budget preparation, performance reporting; addresses social responsibility and employee motivational and behavioral considerations. Preparation of spreadsheet applications useful for decision-making. 4 lectures. Prerequisite: Demonstrated competency in electronic spreadsheet, word processing, and presentation applications. BUS 212 or BUS 214 or equivalent.

##### **BUS 270 Selected Topics (1–4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### **BUS 290 Business Programming (4)**

Fundamentals of computer programming related to business applications. Application development using graphical user interface controls, variables, data types, and input/output with text files. 4 lectures.

##### **BUS 302 International and Cross Cultural Management (4)**

Dimensions of culture and its variations within and across nations. Impact of culture on managing in a global context. Development of managerial competencies requisite to working in and supervising multicultural groups in international corporations. Frameworks for analyzing cultural and contextual influences on organizational behavior, culture shock and readjustment, expatriation and repatriation, cultural change and innovation, intercultural conflict, and ethical dilemmas. Case studies, behavioral simulations, self-assessments and fieldwork. 4 lectures. Prerequisite: GE Area A, C1, C2, D1-D4, ECON 222, and BUS 207, or consent of instructor.

##### **BUS 303 Introduction to International Business (4)**

Special terms, concepts, and institutions associated with the environment in which international companies operate. Students will be enabled to understand, analyze and offer solutions to global business problems. 4 lectures. Prerequisite: A grade of C- or better in ECON 222.

##### **BUS 308 Business Law II (4)**

Legal aspects of management decisions, including problems arising in sales, commercial paper, personal property and bailments, secured transactions, bankruptcy, and securities regulation, with emphasis on the uniform commercial code. Case studies. 4 lectures. Prerequisite: BUS 207 or equivalent.

##### **BUS 310 Introduction to Entrepreneurship (2-4)**

Role and impact of entrepreneurship; characteristics and traits of entrepreneurs; social, economic, cultural and policy conditions conducive to entrepreneurship;

entrepreneurial thinking; opportunity identification and assessment; the management team; organizational and legal issues; business models; acquiring social and financial capital; managing startup to growth; entrepreneurial behavior in existing organizations; realizing and harvesting value. Total credit limited to 4 units. 2-4 lectures. Prerequisite: GE Area A.

##### **BUS 311 Managing Technology in the International Legal Environment (4) GE D5**

Analysis of U.S. and international laws regarding technological innovations from economic, social and political perspectives. Copyrights, patents, trademarks, trade secrets, contracts, products liability and privacy. The Internet, computer programs and biotechnology. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A, D1 and D2. Fulfills GE Area D5 except for Business Administration majors.

##### **BUS 319 Accounting Information Systems (4)**

Comprehensive coverage of manual and computerized accounting processes and internal controls. 3 lectures, 1 activity. Prerequisite: BUS 214.

##### **BUS 320 Federal Income Taxation for Individuals (4)**

Federal income taxation and planning for individuals. Federal role of taxation in the business decision-making process. Issues related to individual income tax preparation and introduction to basic property transactions. 4 lectures. Prerequisite: BUS 319 or consent of instructor.

##### **BUS 321, 322 Intermediate Accounting I, II (4) (4)**

Comprehensive coverage of financial reporting issues. BUS 321 covers financial statements, assets other than investments and intangibles, and liabilities. BUS 322 covers investments, intangibles, equities, revenue recognition and the Cash Flows Statement. 4 lectures. Prerequisite: BUS 321: BUS 214; BUS 319; BUS 322: BUS 321 with minimum grade of C-; Business majors must have formally declared their concentration to enroll in BUS 322.

##### **BUS 342 Fundamentals of Corporate Finance (4)**

Theory and applications of financing business operations. Financial management of current and fixed assets from internal and external sources. Analysis, planning, control, and problem solving. Some discussion of corporate social responsibility in the context of corporate objective functions. The use of technology in the form of financial calculators and/or spreadsheets. 4 lectures. Prerequisite: A grade of C- or better in all of the following: ECON 222, MATH 221, STAT 252, BUS 215.

##### **BUS 343 Quantitative Methods in Finance (4)**

Basic mathematical foundations for advanced courses in finance: mathematical finance -- dealing with elementary materials (time value of money, single multiple period portfolio choice, and application of arbitrage), and risk management -- dealing with value-at-risk, stressing current industry practices. 4 lectures. Prerequisite: STAT 252.

##### **BUS 346 Principles of Marketing (4)**

Introduction of the marketing process: identifying target markets; developing and launching products or services; and managing pricing, promotion, and distribution strategies. Focus on leveraging technologies that result in innovation and impact marketing practice. Recognition that markets are global. Ethics and social responsibility in marketing decision-making. 4 lectures. Prerequisite: A grade of C- or better in the following: for Business Administration and Economics majors, ECON 222 and BUS 207; for Industrial Technology majors, ECON 201; for Recreation Administration majors, either RPTA 210 or RPTA 260; and for all other majors, either ECON 201 or ECON 222.

##### **BUS 350 The Global Environment (4) GE Area F**

Interdisciplinary investigation of how human activities impact the Earth's environment on a global scale. Examination of population, resource use, climate change, and biodiversity from scientific/technical and social/economic/historical/political perspectives. Use of remote sensing maps. Sustainable solutions. 3 lectures, 1 activity. Prerequisite: Junior standing and completion of GE Areas A and B. *Crosslisted as AG/BUS/EDES/ENGR/HUM/SCM/UNIV 350.* Fulfills GE Area F.

##### **BUS 382 Organizations, People, and Technology (4)**

Organizations as sociotechnical systems. Examination of macro dimensions of organizations including environment, mission, goals, structure, people, technology, and internal management systems and processes. Case analysis, experiential class activities. Application to technology-oriented business settings. 4 lectures. Prerequisite: GE Area A, C1, C2, D1-D4; Business majors must have formally declared their concentration to enroll.

**BUS 384 Human Resources Management (4)**

Introduction to functional areas of the discipline including staffing, compensation, employee development and labor relations. Additional workplace issues addressed include performance and human capital management, employer legal and social responsibility for employee wellbeing, managing a diverse/global workforce, and using human resource information systems. 4 lectures. Prerequisite: GE Area A, C1, C2, D1-D4, ECON 221 and BUS 207.

**BUS 386 Employee Training and Development (4)**

Needs assessment, including organization, person, and task or competency analysis. Design, delivery and evaluation of employee training and human resource development in knowledge-based organizational settings. Performance management and feedback systems; development of learning organizations; human resource information systems (HRIS) applications in career management and training administration. 4 lectures. Prerequisite: BUS 384.

**BUS 387 Organizational Behavior (4)**

Application of behavioral, social and organizational science concepts to management. Exploration of the interactions between individuals and the organizations in which they work and live. Individual, interpersonal, team, intergroup and organizational levels of analysis included in topics such as expectations, perception, communications, creativity, leadership style, cultural and ethical behavior, group dynamics, team effectiveness and work design. 4 lectures. Prerequisite: GE Area A, C1, C2, D1-D4, ECON 221 and BUS 207. Recommended: STAT 252.

**BUS 390 Data Structures for Business Systems (4)**

The use of algorithmic processes related to business practices. Analysis techniques for managing data structures such as lists, stacks, queues and trees. Algorithms to perform common programming tasks such as sorting, searching and hashing. Emphasis on the use of data structures from object class libraries in projects and exercises. 4 lectures. Prerequisite: CPE/CSC 101 or CSC 237 (with a grade of C– or better), or BUS 290 (with a grade of C– or better), or consent of instructor.

**BUS 391 Information Systems (4)**

Computer applications in business and industry. Information systems and integrated systems concepts, computer hardware and software, strategic uses of information systems, databases, data warehousing, decision support systems and artificial intelligence, network basics, electronic commerce, systems development, ethical use of information, employing technology in a socially responsible manner, and emerging trends and technologies in information systems. 4 lectures. Prerequisite: BUS 214. Prerequisite for Industrial Technology majors: BUS 212.

**BUS 393 Database Systems in Business (4)**

Design, development, testing, and implementation of databases for business applications. Data modeling with entity relationship diagrams (ERD) and class diagrams (UML). Data normalization, data integrity, the effect of business rules on data normalization. Advanced queries using structured query language (SQL). Database application development culminating in a database project. 4 lectures. Prerequisite: BUS 390 or CSC 103 and BUS 391; Business majors must have formally declared their concentration to enroll.

**BUS 394 System Analysis and Design (4)**

Systems analysis and design. Project team creation and performance monitoring. Systems development life cycle and project management, process modeling using data flow diagrams, data modeling with E/R diagrams, CASE tools, object modeling with UML, and prototype development. 4 lectures. Prerequisite or concurrent: BUS 393 (grade of C– or better).

**BUS 395 Systems Design and Implementation (4)**

Systems design and implementation, with focus on project management and incorporating software quality into the software development process, including software testing. 4 lectures. Prerequisite: ~~BUS 393 and BUS 394~~ (both with a minimum grade of C– or better). *Change effective Fall 2010.*

**BUS 400 Special Problems for Advanced Undergraduates (1–4)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Senior standing or consent of instructor.

**BUS 401 Seminar in General Management and Strategy (4)**

Application of interdisciplinary skills to business and corporate strategy formulation and implementation. Analysis of interdependence between external environments and internal systems. Focus on responsibilities, tasks, and skills of general managers, including socially responsible behavior and governance. Case studies, group problem solving. Capstone course of Business core curriculum. 4

seminars. Prerequisite: ~~A grade of C– or better in all 300-level Business core courses~~; BUS 342, BUS 346, ~~IT 371~~, BUS 387, BUS 391, and senior standing, and completion of one of the following: IT 326, IT 330, IT 341, or IT 371. *Change effective Spring 2011.*

**BUS 402 International Business Management (4)**

Managerial concepts and techniques for analysis and decision making within international businesses. Environmental and organizational factors influencing multinational operations. Assessing international market opportunities and entry modes. Complexities of multinational management strategy, structure and systems, especially during initial stages of internationalization. Case studies and simulations. 4 lectures. Prerequisite: BUS 342, BUS 346, BUS 387 or consent of instructor.

**BUS 403 Advanced Seminar in International Management (4)**

Integration of management concepts within complex multinational organizations. Interdisciplinary approach to identifying and assessing multinational and global competitive environments and strategies; structuring and managing interdependent multinational operations; addressing conflicts between domestic and international policies and practices in multinational enterprises. Case studies, simulations, group analysis and problem solving. 4 seminars. Prerequisite: BUS 302 and BUS 402 or consent of instructor.

**BUS 404 Governmental and Social Influences on Business (4)**

Analysis from legal, economic, political, and ethical perspectives, of the changing domestic and international environments of the business enterprise. Topics include administrative law, agencies and regulatory policy, antitrust law, public policy analysis, business-government relations, and corporate responsibility. Case studies. 4 lectures. Prerequisite: BUS 207 and ECON 222.

**BUS 405 Joint Ventures and Alliances (4)**

Examination of joint ventures and alliances between organizations, using cross-cultural, interdisciplinary perspective. Alliance motives, types and traits. Processes for partner selection, negotiation, structure, operation, and performance assessment of international and cross-cultural alliances. Lectures, case studies, and simulation. 4 lectures. Prerequisite: BUS 342, BUS 346, and BUS 387.

**BUS 406 Managing Mergers, Acquisitions and Divestitures (4)**

Issues associated with analyzing, negotiating, and managing mergers, acquisitions and divestitures (MADS) using cross-cultural, interdisciplinary perspective. Rationale for decision to pursue MADS and processes for identifying targets; valuing and negotiating MADS; staffing and human resource management issues; strategic control and integration; and cross-cultural conflict and divided loyalties in domestic and international MADS. Lectures, case studies and simulation. 4 lectures. Prerequisite: BUS 342, BUS 346, and BUS 387.

**BUS 407 Managing People in Global Markets (4)**

Impact of cultural and strategic differences on management of people in multinational organizations. Critical human resource issues in domestic and international operations. 4 lectures. Prerequisite: BUS 387.

**BUS 409 Law of Real Property (4)**

Legal problems of acquisition, ownership and transfer of real property. Contracts, agency, estates, and co-ownership, mortgages and deeds, covenants, conditions, and restrictions, easements, landlord-tenant, and zoning. 4 lectures. Prerequisite: Senior standing.

**BUS 410 The Legal Environment of International Business (4)**

U.S., foreign, and international law affecting international business transactions. U.S. and foreign cultural, ethical, and political norms and legal institutions, and their effect on law and business. 4 lectures. Prerequisite: BUS 207 and ECON 222.

**BUS 412 Advanced Managerial Accounting (4)**

Product costing systems including hybrid costing systems, management control systems, cost allocation, activity based costing, cost information for decision making, new manufacturing environments, and strategic control systems. International dimension integrated in the course content. 4 lectures. Prerequisite: BUS 215.

**BUS 416 Volunteer Income Tax Assistance – Senior Project (4)**

Training and practice in the preparation of state and federal individual income tax returns. Coverage of the deductions and credits applicable to individuals. Students provide free tax assistance and income tax preparation to community residents under the supervision of qualified professionals. 2 lectures, 2 activities. Prerequisite: BUS 320 or equivalent, senior standing.



**BUS 417 Taxation of Corporations and Partnerships (4)**

Comparative study of the taxation of C corporations and flow-through tax entities, including S corporations, partnerships and limited liability companies. 4 lectures. Prerequisite: BUS 320 or equivalent.

**BUS 418 Listening to the Customer (4)**

A project-oriented introduction to exploratory, secondary, and qualitative methods. Access and use of secondary sources of information that support marketing decision making and lead to a carefully crafted research plan. Emphasis on qualitative marketing research techniques, with the goal of setting the stage for additional data collection. 4 lectures. Prerequisite: BUS 346.

**BUS 419 Strategic Marketing Measurement (4)**

Gathering, analyzing, and reporting information critical for marketing decision making. Focus on primary data collection and analytical techniques including experimental design, descriptive statistics, chi-square analysis, ANOVA, and regression. Other methods may include data mining, GIS, and customer relations management (CRM). 4 lectures. Prerequisite: BUS 418, STAT 252; Business majors must have formally declared their concentration to enroll.

**BUS 420 Advanced Financial Reporting (4)**

Comprehensive coverage of selected advanced financial accounting and reporting topics. Topics include revenue recognition, software development costs, employee stock option plans, pensions and posts retirement benefit plans, accounting for income taxes, leases, specialized inventory issues and advanced consolidation issues. 4 lectures. Prerequisite: BUS 322.

**BUS 422 Government and Not-For-Profit Entities (4)**

Accounting and reporting by state and local governments and not-for-profit entities. State and local governmental topics include: fund structures, budgetary accounting, the modified accrual basis of accounting, reporting entity issues. Not-for-profit topics include: financial and reporting concepts and practices, contributions, restricted resources, endowments. 4 lectures. Prerequisite: BUS 321.

**BUS 424 Professional Accounting (4)**

Development of the accounting profession. Past, present and future. Emphasis on contemporary issues confronting the professional accountant and his/her social and ethical responsibilities and opportunities. 4 lectures. Prerequisite: Consent of instructor.

**BUS 425 Auditing (4)**

Survey of the auditing environment including institutional, ethical, and legal liability dimensions. Introduction to audit planning, assessing materiality and audit risk, collecting and evaluating audit evidence, considering the internal control structure, substantive testing, and reporting. 4 lectures. Prerequisite: BUS 322.

**BUS 427 International Accounting (4)**

Consideration of conceptual, managerial, professional and institutional issues of international accounting. 4 lectures. Prerequisite: BUS 321 or equivalent.

**BUS 428 Accounting Policy (4)**

Role of management in establishing and directing accounting policy. Coverage includes impact of management decisions on external reporting and taxes and the impact of financial reporting requirements on management decisions. 4 seminars. Prerequisite: BUS 322.

**BUS 429 Accounting Process Analysis (4)**

Coverage of revenue, purchasing, human resources and payroll, integrated production, and general ledger and business reporting processes in enterprise systems. A risk management approach to evaluate key business and accounting processes. E-business concepts. 3 lectures, 1 activity. Prerequisite: BUS 215 and BUS 321 with a minimum grade of C-.

**BUS 430 Internship/Cooperative Education (2-12) (CR/NC)**

Work experience in business, industry, government and other areas of student career interest. Periodic written progress reports, final report, and evaluation by work supervisor required. Credit/No Credit grading. Major credit limited to 4 units; total credit limited to 12 units. Prerequisite: Approval of area chair, junior standing, and a CPSLO cumulative GPA of at least 2.5 without being on academic probation.

**BUS 431 Security Analysis and Portfolio Management (4)**

In-depth analysis of equity market and its instruments. Detailed study of leading stock valuation models. Impact of changes in the firm's fundamentals and in macroeconomic factors on stock prices. Brief introduction to equity and index derivatives. 4 lectures. Prerequisite: BUS 342; Business majors must have formally declared their concentration to enroll.

**BUS 432 Insurance Planning and Risk Management (4)**

Introduction to insurance planning and risk management and its role in financial planning. Key concepts include determining risk exposure and selecting insurance products. Legal aspects of property and liability policy, life, health, and social insurance. 4 lectures. Prerequisite: BUS 342.

**BUS 433 International Finance (4)**

Financial management of international business. International capital and money markets, international financial institutions, special problems in evaluating direct foreign investment, and financial techniques used in international business operations. 4 lectures. Prerequisite: BUS 342.

**BUS 434 Real Estate Finance (4)**

Analyses of real estate financing techniques and funding sources for development projects. Effects of federal, state, and local taxes on real estate investments. In-depth investigation and computer analyses of real estate investment projects. 4 lectures. Prerequisite: BUS 342.

**BUS 435 Real Estate Investment (4)**

Intensive investigation and computer analysis of real estate investment opportunities. Problems in real estate and property management. 4 lectures. Prerequisite: BUS 342.

**BUS 436 Entrepreneurial Finance (4)**

Process of financing new and fast-growing firms. Readings on the venture capital process, from seed capital through the initial public offering. Valuation of firms seeking venture capital, and those planning their initial public offering. Valuing convertible securities. Real options valuation. 4 seminars. Prerequisite: BUS 342.

**BUS 437 Retirement and Estate Planning (4)**

Retirement planning and employee benefits; Social Security and Medicare; types of retirement plans; qualified plan characteristics; distribution options; and group insurance benefits. Trusts, power of attorney, and probate. 4 lectures. Prerequisite: BUS 342.

**BUS 438 Advanced Corporate Finance (4)**

Corporate finance with an emphasis on managing the corporation to create shareholder value. Detailed treatment of topics such as capital budgeting, capital structure, economic value-added, corporate distribution policy, financial distress, and mergers and acquisitions. 4 lectures. Prerequisite: BUS 431 and BUS 439.

**BUS 439 Fixed Income Securities and Markets (4)**

Development of analytical skills for properly valuing fixed income securities. Bond pricing, yields, and volatility; interest rate term structure and yield curve; securities, market structure, and analytical techniques; bond portfolio strategies and an introduction to interest rate derivatives. 4 lectures. Prerequisite: BUS 342; Business majors must have formally declared their concentration to enroll.

**BUS 440 Commercial Bank Management (4)**

Analysis of the management of a commercial bank as a profit-making entity. Emphasis put on cases in bank management, especially those which deal with the management of a bank's asset and liability structure. 4 lectures. Prerequisite: BUS 342 and ECON 337.

**BUS 441 Computer Applications in Finance (4)**

A combination lecture/computer lab course focusing on computer acquisition of financial data and the subsequent application of financial theory and analysis to this data so as to facilitate financial decision making. 3 lectures, 1 activity. Prerequisite: BUS 342.

**BUS 442 Introduction to Futures and Options (4)**

An in-depth analysis of derivatives markets and instruments. Emphasis on the valuation of futures, options, swaps, and other derivative securities. 4 seminars. Prerequisite: BUS 431.

**BUS 443 Case Studies in Finance (4)**

Development of analytical and decision-making techniques in applying financial theory to business management problems. Emphasizes working capital management, financial analysis and forecasting, mergers and acquisitions, and other current topics in finance, including financial ethics. Cases are used to emphasize practical problems. 4 lectures. Prerequisite: BUS 431, BUS 438, and BUS 439.

**BUS 444 Financial Engineering and Risk Management (4)**

Advanced course synthesizing concepts from corporate finance, derivative securities, statistics, and computer science. Emphasis on both computer programming in a matrix programming language (Matlab) to solve practical risk management and valuation problems, and analytical training in the area of stochastic calculus, and its application to derivative security pricing. Practical



applications of derivatives for controlling risk in an international corporate environment. 4 lectures. Prerequisite: BUS 343, BUS 422 or BUS 433, CSC 234 or equivalent.

#### **BUS 445 Ethics and Behavioral Finance (4)**

Contemporary theoretical and empirical issues including agency theory, reputation building, game theory, and financial ethics. Discussion of the application of ethics theory to financial decisions. May include lectures, case analyses, student presentations, and guest speakers. 4 lectures. Prerequisite: BUS 342.

#### **BUS 446 International Marketing (4)**

Basic skills and tools needed to evaluate the cultural factors that impact the acceptance of products and services in markets around the world. Building of an understanding of global marketing strategy. 4 lectures. Prerequisite: BUS 346.

#### **BUS 451 Product Development and Launch (4)**

Building of project-based skills in developing new products and planning for their launch. Major phases of product development: opportunity identification, product design and positioning, pre-market testing and forecasting, and launch marketing. Introduction to data-gathering methods used to design well differentiated and successful products. 4 lectures. Prerequisite: BUS 419.

#### **BUS 452 Product Management (4)**

Development of project-based skills in managing products in the growth, maturity, and decline stages of their life cycles. Emphasis on the distribution, pricing, and communication strategies required to maintain distinctive product advantages. Product modification, product line strategies, and pruning. 4 lectures. Prerequisite: BUS 419.

#### **BUS 454 Developing and Presenting Marketing Projects (4)**

Client-based course providing an opportunity to apply marketing abilities. Teams draw upon research, analytical, and strategic marketing skills to develop an actionable plan that addresses a critical marketing challenge faced by an organization. Deliverables include research findings and written and verbal presentation to the organization and instructor. 4 lectures. Prerequisite: BUS 451 and BUS 452.

#### **BUS 455 Marketing Management (4)**

Integration of key marketing concepts using tools such as computer simulations, readings, and/or case studies. Development and implementation of strategic and tactical decisions for companies and brands. 4 lectures. Prerequisite: BUS 451 and BUS 452.

#### **BUS 456 Industrial Customer Interfacing (4)**

Focus on managing aspects of the customer interface for strategic advantage. Emphasis on building and maintaining customer data bases. Establishing and maintaining customer service centers. Providing technical support services. Conference and trade show planning and development. 4 lectures. Prerequisite: BUS 346 or consent of instructor.

#### **BUS 461, 462 Senior Project I, II (2) (2)**

Selection and analysis of a problem under faculty supervision. Problems typical of those which graduates must solve in their fields of employment. Formal report is required. Minimum 120 hours total time. Prerequisite: Senior standing.

#### **BUS 463 Senior Project: Applied Accounting and Auditing Research (4)**

Practice with multiple authoritative accounting and auditing databases, actual published financial reports, and business writing. Real world accounting and auditing issues, including revenue recognition and ethics issues. Federal and state regulation of securities transactions. Prerequisite: Senior standing, BUS 322 and Graduation Writing Requirement.

#### **BUS 464 Applied Senior Project Seminar (4)**

Selection and analysis of business problems and opportunities in directed individual or group-based projects. Problems typical to those which graduates could encounter in their fields of employment. Formal report required. 4 seminars. Prerequisite: Senior standing.

#### **BUS 465 Senior Project: Forensic Accounting Seminar (4)**

The concepts and principles of fraud. Application of fraud examination theory and detection procedures to an unstructured, real-life fraud case involving asset misappropriation and fraudulent financial statements. Summarization of findings and presentation in oral and written form. 2 lectures, 2 activities. Prerequisite: Senior standing.

#### **BUS 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title

selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

#### **BUS 471 Compensation (4)**

Design and management of compensation systems. Job analysis, job evaluation, wage and salary surveys, incentive systems, gainsharing, benefit administration, pay equity and legal regulation. Simulation and case study development of a wage structure, pay level and individual raise policies, administrative controls, salary and program budgets. 4 lectures. Prerequisite: BUS 384 and STAT 252, or equivalent.

#### **BUS 472 Labor Relations (4)**

Union organizing. Negotiation and administration of collective agreements. Simulation of bargaining, grievance, and arbitration processes. 4 lectures. Prerequisite: BUS 384 or equivalent.

#### **BUS 473 Employment Law (4)**

Federal and state labor policy as expressed in common law, relevant statutes, and executive orders. Effects upon employees, management, protected groups, and the public. Current rules analyzed in a contemporary and historical context. Understanding important workplace and employment problems. 4 lectures. Prerequisite: BUS 207, BUS 384 or equivalent.

#### **BUS 474 Independent Study in Accounting (4)**

Individual investigation, research, study or survey of selected topics in accounting, auditing or taxation. Total credit limited to 8 units, repeatable in the same term. The Schedule of Classes will list topic selected. Prerequisite: BUS 322.

#### **BUS 475 Staffing (4)**

Processes by which individuals and organizations become matched to form the employment relationship. Specific issues related to human resources planning, internal and external recruitment and selection. 4 lectures. Prerequisite: BUS 384 and STAT 252, or equivalent.

#### **BUS 477 Managing Change and Development (4)**

Analysis of development and trends in the field of organization change and development. Application of behavioral and organizational science knowledge and social technology to growth and change of organizations for the purpose of improving effectiveness and sustainability. 4 seminars. Prerequisite: BUS 387 or BUS 382 or consent of instructor.

#### **BUS 478 Organization Design Programs (4)**

Impact of changing business environment and strategy on design of organizations. Organization design programs, including design models, redesign processes, and guiding principles. Case studies, current redesign projects and field studies. 4 lectures. Prerequisite: BUS 382 or consent of instructor.

#### **BUS 479 Purchasing and Materials Management (4)**

Role and scope of the procurement function and concept of an integrated materials management process. Relations with functional departments. Purchasing structure and processes in business and service organizations. Global concept of international purchasing. Measuring purchasing performance. 4 lectures. Prerequisite: ECON 222 and IT 371.

#### **BUS 483 Seminar in Managerial Consultation (4)**

Management consulting in the private and public sectors. Analysis of substantive and process skills required to provide independent and objective advice to clients. Application of consulting knowledge and skills to real client problems and facilitation of change. 4 seminars. Prerequisite: BUS 382 and BUS 387.

#### **BUS 484 Corporate Training (4)**

Developing and managing curriculum for an industrial setting. Developing a philosophy, assessing resources, developing and sequencing objectives, developing and properly using materials in training, evaluating and reporting effectiveness. Managing people and resources within this process in an industrial setting. 4 lectures. Prerequisite: Senior standing.

#### **BUS 486 Human Resource Information Systems (4)**

Application of computers to the management of human resources. Human resource decision support systems and routine transaction processing. Ethical use of information systems in managing the human resource function. Basic system design decisions. Use of information systems to support traditional human resource functional areas. Exposure to enterprise-wide, integrated software. 4 lectures. Prerequisite: BUS 384 and BUS 391.

#### **BUS 488 Planning and Managing New Ventures (4)**

The purpose and process of business planning and the challenges of managing a start-up enterprise. Preparation of a complete business plan: management and organization; product or service; marketing; finance; operating and control systems; growth. 4 seminars. Prerequisite: BUS 215, BUS 310, BUS 342, and

BUS 346 and BUS 436; ~~BUS 310 recommended~~; Business majors must have formally declared their concentration to enroll. *Change effective Winter 2011.*

**BUS 489 Negotiation for Managers (4)**

Theory and practice of negotiation in the management of enterprise., including ethical issues in negotiation and the impact of culture on negotiation. 4 lectures. Prerequisite: BUS 387.

**BUS 491 Modeling and Analysis Using Computer Simulation (4)**

Modeling organizational systems and processes such as computer networks, transportation systems, manufacturing systems, retail systems, etc. Developing computer simulation models and animation of systems to provide decision support in selecting system design alternatives. Applying quantitative methods to model uncertainty and conduct statistical performance analysis. 4 lectures. Prerequisite: BUS 391, STAT 251 or equivalent.

**BUS 494 Enterprise Information Systems (4)**

Information systems in an integrated business environment. Collaborative learning with teams analyzing, designing, implementing and evaluating enterprise software. Determine and implement organizational policies and procedures to assure system performance. Coverage of business processes in the areas of accounting, procurement, human resource, production customer relationship and supply chain management. Ethical use of information systems in managing businesses. Role of information systems in conducting business in a socially responsible manner. 4 lectures. Prerequisite: BUS 391.

**BUS 495 Software Testing (4)**

Theory and practice of software testing, including state-of-the-art practices, design issues, staffing issues, test management issues, and other related areas. Software testing tools utilized for applications testing, and test management. 4 lectures. Prerequisite: BUS 391 and CPE/CSC 101 or CSC 237 (with a grade of C- or better), or consent of instructor.

**BUS 496 Electronic Commerce (4)**

Focus on the technology of electronic commerce, including programming, development environments and security, through a series of lectures, guest speakers, demonstrations, exercises and case studies. Networking, client/server computing, and web/database design concepts. Working e-commerce application required at end of course. 4 lectures. Prerequisite: BUS 391, CPE/CSC 101 or CSC 237 (with a grade of C- or better), BUS 390.

**BUS 498 Directed Topics in Information Systems (4)**

Specialized Information Systems (IS) topic selected from the IS areas of current interest. Intended for advanced IS concentration students who want to learn and acquire in-depth IS knowledge and skills. The Schedule of Classes will list topic selected. 4 lectures. Prerequisite: ~~IS concentration students only, and consent of instructor.~~ BUS 390 and BUS 393. *Change effective Fall 2010.*

**BUS 499 Data Communications and Networking (4)**

Combines the fundamental concepts of data communications and network-ing with practical applications in business. Provides a basic understanding of the technical and managerial aspects of business telecommunication. Introduction to data communications and applications and technical fundamentals, and to network products, technologies, applications, and services. 4 lectures. Prerequisite: BUS 391, or consent of instructor.

# Bachelor of Science Degree Programs

**BS Business Administration**

**BS Economics**

**BS Industrial Technology**

## BS BUSINESS ADMINISTRATION

The undergraduate business program provides students with the knowledge and the analytical skills essential for employment in all sectors of business, industry, governmental and non-profit organizations. Graduates of the business program will understand the fundamentals of how a successful enterprise operates, and will have sufficient depth in an area of study to begin a successful career by providing immediate value to an organization.

### Learning Objectives

The learning objectives for the business administration degree program are aligned with the Orfalea College of Business's mission and the business administration majors will:

1. demonstrate breadth of knowledge and skills in general business fundamentals.
2. demonstrate depth of knowledge, skills, and perspectives within their selected, specific business discipline.
3. recognize the ethical dimensions of business decisions and the wider responsibility of business organizations for societal level outcomes above and beyond firm level profit or loss.
4. be able to generate innovative solutions to business problems that are supported by appropriate data analysis and evaluation of alternatives.
5. understand diverse perspectives and generate solutions that incorporate them.
6. demonstrate effective writing and speaking skills, peer leadership and participation in teams.
7. engage in career-related interactions with business professionals and industry leaders.

The Orfalea College of Business engages in a comprehensive assessment plan to ensure student achievement of these objectives.

### Concentrations

Concentration are provided for students preparing for careers in accounting, financial management, management, information systems, marketing management, entrepreneurship, international business, and packaging and logistics.

The Quantitative Economics concentration and the Real Estate concentration, offered under the BS Economics, are also available to Business Administration majors.

The Business Administration degree program consists of five components: Major, Concentration, Support, General Education, and Electives.

## BS BUSINESS ADMINISTRATION

☐ 60 units upper division

☐ GWR

☐ 2.0 GPA

☐ USCP

\* = Required in Support; also satisfies GE

Note: No major, support or concentration courses may be taken as credit/no credit.

### MAJOR COURSES

BUS 207 Legal Responsibilities of Business.....	4
BUS 214 Financial Accounting .....	4
BUS 215 Managerial Accounting.....	4
BUS 342 Fundamentals of Corporate Finance.....	4
BUS 346 Principles of Marketing.....	4
BUS 387 Organizational Behavior .....	4
BUS 391 Information Systems .....	4
BUS 401 Seminar in General Mgmt and Strategy	4
BUS 404 Governmental and Social Influences.....	4
Production management. <i>Select one:</i> .....	4
IT 303, 326, 330, 341, 371 (5/23/13)	
International business. <i>Select one:</i> .....	4
BUS 301, 302, 303, 304, 402, 407, 410, 427, 433, 446; (4/20/11)(4/17/12)	
ECON 330.	
Senior Project. <i>Select:</i>	
BUS 461 and 462, or BUS 416, 463, 464, 465 ....	4
Concentration courses (see following pages).....	24-28

**72-76**

### SUPPORT COURSES

ECON 221 Microeconomics.....	4
ECON 222 Macroeconomics (D2)* .....	4
ECON elective (300-400 level) .....	4
MATH 221 Calculus for Business and Econ (B1)*	4
<sup>1</sup> STAT 251 Statistical Inference-Mgmt. I (B1)* .....	4
<sup>1</sup> STAT 252 Statistical Inference-Mgmt. II .....	5

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### GENERAL EDUCATION (GE)

72 units required, 12 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

### Area A Communication (12 units)

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing.....	4

<sup>1</sup>STAT 301 (4) and STAT 302 (4) may be used as a substitute for STAT 251 (4) and STAT 252 (5). All students must still complete two approved GE B1 courses. STAT 301 and 302 are not GE courses. Students should follow the advising footnote under the Support section of the ECON major (p. 145 of the 2011-13 Catalog): "Students pursuing the Quantitative Concentration should take MATH 141 and MATH 142 instead of MATH 221". (4/12/13)

<b>Area B Science and Mathematics (8 units)</b>	
B1 Mathematics/Statistics * 8 units in Support ....	0
B2 Life Science .....	4
B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	
<b>Area C Arts and Humanities (20 units)</b>	
C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4
<b>Area D/E Society and the Individual (16 units)</b>	
D1 The American Experience (40404) .....	4
D2 Political Economy * 4 units in Support .....	0
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4
<b>Area F Technology Elective (upper division)</b>	
(4 units) .....	4
	<b>60</b>
<b>FREE ELECTIVES .....</b>	<b>19-23</b>
	<b>180</b>

## Accounting

Business Bldg. (03), Room 403  
805 756-1543

### Area Chair, Douglas C. Cerf

Lee B. Burgunder	Charles R. (Tad) Miller
Chris Carr	Steven Mintz
Janice L. Carr	Rodney Mock
Li Dang	Arline Savage
Earl C. Keller	Andreas Simon
Kathryn A. S. Lancaster	

Accounting is known as the “language of business” and is fundamental to understanding the operations of organizations. It provides information for making sound and informed business decisions. The Accounting Area works closely with the accounting profession to help ensure curriculum relevancy and technical competency.

### ACCOUNTING CONCENTRATION

The Accounting Concentration prepares students for careers in public accounting (tax and audit), private industry, government, and not-for-profit organizations.

BUS 319 Accounting Information Systems.....	4
BUS 320 Federal Income Taxation for Individuals ....	4
BUS 321 Intermediate Accounting I .....	4
BUS 322 Intermediate Accounting II.....	4
BUS 420 Advanced Financial Reporting	
or BUS 425 Auditing .....	4
BUS 429 Accounting Process Analysis.....	4
Approved accounting elective .....	4
Select from BUS 412, 417, 420, 422, 424, 425	

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## Finance

Business Bldg. (03), Room 407  
805 756-1472

### Area Chair, Cyrus Ramezani

Bing Anderson	Sanjiv Jaggia
John Dobson	Kenneth D. Riener
Samir Dutt	Hervé Roche
Larry R. Gorman	Alan M. Weatherford

The Finance Area's mission is threefold: First, to provide all Business students with an understanding of the financial principles which are essential to their success in the business world. Second, to provide students concentrating in Finance a rigorous, coherent, real-world-based, and up-to-date curriculum which prepares them for rewarding careers in Finance. Third, the Finance Area provides coursework in support of other majors and concentrations both within and outside the Orfalea College of Business.

Many of the classes are taught in the **Financial Analysis Resource Center**, a special-purpose classroom with Bloomberg and Reuters data terminals, scrolling ticker tape and DataWall display of prices of selected stocks. Each workstation is equipped with software which permits students to work on real-world problems, individually and in teams.

### FINANCIAL MANAGEMENT CONCENTRATION

This concentration has four required courses, which provide Finance students with fundamentals of asset valuation, and applies these principles to securities as well as business assets. These principles are applied in courses focused on financial markets and institutions, and on corporate finance. Within the Finance curriculum, students can further specialize in one of three tracks, depending upon their career goals: the Financial Services track, including insurance, retirement, and estate planning; the Corporate Finance track; or the Financial Analyst track, working for investment banks, brokerage industry, or the asset management industry. The following are the required course that should be taken in sequence:

BUS 431 Security Analysis and Portfolio Mgmt .....	4
BUS 438 Advanced Corporate Finance .....	4
BUS 439 Fixed Income Securities and Markets .....	4
BUS 443 Case Studies in Finance	
or ECON 339 Econometrics (4/10/12).....	4
Approved electives .....	12
Select two courses from: BUS 432, 433, 434, 435, 436, 437, 440, 441, 442, 444, 445	
Select one course from: BUS 320, 321, 322 412, 417, 425, 427, 429; ECON 311, 313, 330, 337, 339, 340, 405, 406, 408, 420, 424	

## Management

Business Bldg. (03), Room 405  
805 756-2012

### Area Chair, Rosemary Wild

Dawn Chandler	Alison Mackay
Jean-Francois Coget	Tyson Mackay
Rebecca Ellis	Patricia A. McQuaid
Barry Floyd	William Pendergast
Colette Frayne	James Sena
J. Michael Geringer	A. B. (Rami) Shani
Kenneth A. Griggs	Michael W. Stebbins
Kevin Lertwachara	

The Management Area offers coursework in human resource management, information systems, international management, organization behavior, organization theory, management science, and small business management. The area's objectives include: 1) to provide students with knowledge, skills, and competencies critical to managerial success in small and complex organizations; 2) to prepare students for initial employment and subsequent management career advancement; 3) to help professionally oriented students use theory, concepts, analytical tools, and problem solving techniques; 4) to provide experiences that integrate functional business knowledge; and 5) to prepare students for integrating technology-based solutions in the business environment. The Management Area includes two concentrations: Management and Information Systems.

### MANAGEMENT CONCENTRATION

#### Concentration Co-Coordinator

Rebecca Ellis and A. B. (Rami) Shani

The Management Concentration has three required courses devoted to managing people, processes, and change. This is an interdisciplinary program that prepares students to manage knowledge workers in both small and large enterprises within a global marketplace. Selected electives support a human resources *or* program management emphasis *or* a selected course of study tailored to an individual's career or occupational goals.

BUS 382 Organizations, People and Technology .....	4
BUS 384 Human Resources Management .....	4
BUS 477 Managing Change and Development.....	4
Approved electives.....	16
Select four courses from the following:	
BUS 386, 405, 406, 407, 470, 471, 472, 473, 475, 478, 483, 488, 489, 494	

**INFORMATION SYSTEMS CONCENTRATION****Concentration Coordinator**

Barry Floyd

The Information Systems Concentration is an interdisciplinary program for students who want to analyze, design and implement information technology-based solutions for business and industry. With a focus on teamwork and turning theory into practice, the program ensures that students acquire a strong understanding of information systems and the functional areas of business while developing effective interpersonal skills. Students have opportunities to tailor the program to fit their particular interests, including earning a minor in Computer Science or a double concentration in Accounting or Finance. Graduates enjoy exciting career opportunities in business and industry as business analysts, consultants, network administrators, database designers, database administrators, web developers, project managers, and programmers, among many others.

<sup>1</sup> <del>BUS 290 or CSC/CPE 101 or CSC/CPE 237</del> .....	4
BUS 390 Business Data Structures .....	4
BUS 393 Database Systems in Business .....	4
BUS 394 Systems Analysis and Design .....	4
BUS 395 Systems Design and Implementation .....	4
Approved electives .....	8
Select two courses from the following:	
BUS 491, 494, 496, 498, 499	
(4/8/10)	24 <del>28</del>

<sup>1</sup> For students who already completed BUS 290, BUS 290 can substitute for BUS 390; then BUS 390 becomes an option as one of the two approved electives. For any additional information, contact the Concentration Coordinator.

*Marketing*

Business Bldg. (03), Room 403

805 756-1543

**Area Chair, Lynn E. Metcalf**

Norm A. Borin

Jeffrey Danes

Jeffrey Hess

Joan M. Lindsey-Mulliken

Stern Neill

Brian Tietje

The objective of the Marketing Area is twofold: 1) to prepare students for rewarding careers in marketing, and 2) to provide non-marketing students with a basic understanding of marketing and its role in business. At the heart of marketing is a customer-focus; the same is true of the Area and its faculty. The marketing faculty is student-oriented and is committed to helping students develop the skills necessary to successfully transition from the academic environment to the business world. The Area offers classes in the undergraduate and graduate degree programs offered through the College and works to develop courses to meet student and market place needs.

**MARKETING MANAGEMENT CONCENTRATION**

The Marketing Management Concentration provides students with a rigorous, analytical understanding of marketing decision-making. Students learn to generate, analyze, interpret, and present the information that organizations need to satisfy and retain customers; build brand equity and maximize return on investment; and develop innovative products and services.

The Marketing Management Concentration provides students with knowledge of a wide range of tools and techniques from fields as diverse as sociology, psychology, anthropology, information technology, engineering, and economics. Students learn to leverage information, technology, and knowledge to support innovation in virtually all areas of business, non-profit enterprises, and government.

As a discipline with broad applications, the Marketing Management Concentration offers flexible career paths and work styles. Graduates are in demand for positions in marketing intelligence, product development, product management, advertising, sales, and purchasing.

BUS 418 Listening to the Customer .....	4
BUS 419 Strategic Marketing Measurement .....	4
BUS 451 Product Development and Launch .....	4
BUS 452 Product Management .....	4
BUS 454 Developing/Presenting Marketing Projects	4
BUS 455 Marketing Strategy .....	4
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## *Interdisciplinary Studies*

Business Bldg. (03), Room 405  
805 756-2012

**Area Coordinator, Lou Tornatzky**

### **ENTREPRENEURSHIP CONCENTRATION**

This interdisciplinary concentration provides an environment in which students develop an entrepreneurial mindset and acquire the knowledge and decision skills necessary to envision, plan and implement new ventures in start-up and existing organizations, domestic and international settings, in either service, product or technology-based companies and in for-profit and non-profit contexts. It draws expertise and coursework from across the College and emphasizes interdisciplinary problem-based learning.

BUS 310 Introduction to Entrepreneurship .....	4
BUS 488 Planning and Managing New Ventures .....	4
Select three courses from: .....	12
BUS 311, 418, 436, 470, IT 326, 428, 470	
Approved electives. Select two courses from: .....	8
BUS 308, 384, 402, 405, 419, 451, 475, 477, 494, IT 402, 407	
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### **INTERNATIONAL BUSINESS CONCENTRATION**

**Concentration Coordinator, Colette Frayne**

This interdisciplinary concentration provides the student the opportunity to develop proficiency in the subject matter basic to an occupational goal in business of international/multinational operations. It provides cultural understanding, business knowledge and analytical skill central to international business contexts.

BUS 302 International and Cross Cultural Mgmt. ....	4
BUS 402 International Business Management .....	4
BUS 403 Adv. Seminar in International Mgmt. ....	4
BUS 407 Managing People in Global Markets .....	4
Approved electives selected from the following	12
courses: .....	
BUS 303, 311, 350, 405, 406, 410, 433, 446;	
ECON 304, 325, 330, 404, 405;	
AGB 318;	
GEOG 308	
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## *Individualized Course of Study*

Business Bldg. (03), Room 100  
805 756-2601

**Area Coordinator: Brian C. Tietje, Associate Dean and  
Director of Undergraduate Programs**

Students have the option of choosing one of the previously mentioned concentrations or 28 units of advisor approved electives selected according to individual talents and interests. This option allows students to blend courses from a variety of areas to achieve specific career objectives.

## *Industrial Technology*

Business Bldg. (03), Room 405  
805 756-2012

### **PACKAGING AND LOGISTICS CONCENTRATION** **Concentration Coordinator, Lou Tornatzky**

This concentration provides business majors entry into a rapidly expanding field that has been fueled by the globalization of manufacturing and customer-supplier relationships. This trend has been enabled by new approaches to value chain management and packaging technology. Packaging plays a key role in any logistics system as products are shipped between value chain partners. The interactions between packaging and the logistics system creates a rich environment for students to examine complex problems. Lessons are drawn from a range of established and emerging industries, food and auto parts as well as biomedical devices and electronic components.

IT 330 Fundamentals of Packaging .....	4
IT 403 Quality Systems Management .....	4
IT 410 Operations Planning and Control .....	4
IT 457 Radio Frequency Identification in Supply Chain Management .....	4
IT 475 Packaging Performance Testing .....	4
Approved electives selected from the following	8
courses: .....	
IT 341, 406, 408, 435, 470	

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## 2009-11 Cal Poly Catalog

### Psychology and Child Development

### Department

#### CD—CHILD DEVELOPMENT

##### CD 102 Orientation to the Child Development Major (2)

Introduction to the child development major, self-assessments, career opportunities, university and community resources, and the program at Cal Poly. 2 lectures. Prerequisite: CD majors only or consent of instructor.

##### CD 109 Parenting (2)

Philosophies and techniques explored out of which an individual can devise an effective parenting style. Basic skills for parent effectiveness. 2 lectures.

##### CD 131 Observing and Interacting with Children (4)

Observation methods and guidance techniques for adults working with children in family, community, and educational settings. 3 lectures, 1 activity.

##### CD 200 Special Problems for Undergraduates (1–4)

Supervised investigation, including a written report, of a topic chosen with prior approval of instructor. Total credit limited to 6 units, with a maximum of 4 units per quarter.

##### CD 207 The Learner's Development, Culture and Identity in Educational Settings (4)

Theoretical background of child and early adolescent development within diverse cultural settings and implications for the teaching-learning process. Observations of children in everyday settings. 3 lectures, 1 activity. **Participation in public schools requires mandated fingerprint clearance.** Prerequisite: PSY 201 or PSY 202. *Crosslisted as CD/EDUC 207. Change effective Fall 2010.*

##### CD 230 Preschool Laboratory (4)

Teaching experience with children in a preschool laboratory setting. Participant planning, execution and evaluation of age-appropriate activities. Observation is used as the basis for planning for the development of the whole child. 4 laboratories. Prerequisite: CD 131, PSY 256, or consent of instructor. *Formerly CD 308.*

##### CD 254 Family Psychology (4)

Introduction to research and theory on family relationships and behavior across the lifespan. Contextual influences, diversity of family forms, and topics such as love, mate selection, marital quality, parenting, gender, household work, divorce, and remarriage. 4 lectures. Prerequisite: PSY 201 or PSY 202. *Crosslisted as CD/PSY 254.*

##### CD 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### CD 304 Infant and Toddler Development (4)

Human development from conception through the second year of life. Examination of theory and research in multiple domains of development. Consideration of environments and activities which enhance the emerging capabilities of infants and toddlers. 4 lectures. Prerequisite: PSY 256. *Formerly CD 208.*

##### CD 305 Early and Middle Childhood Development (4)

In-depth study of theory and research on development in early and middle childhood, especially within physical, cognitive, social, and emotional domains. Consideration of case studies and current practices in light of theoretical perspectives and current research. 4 lectures. Prerequisite: PSY 256 or CD/EDUC 207.

##### CD 306 Adolescence (4)

Psychological analysis of the years from prepubescence to young adulthood. Current research on behavior and development during adolescence with emphasis on physical, affective, cognitive, sociocultural, historical, family, peer and school aspects of life during the post-child, pre-adult years. 4 lectures. Prerequisite: CD 207 or PSY 256, PSY 201 or PSY 202, junior standing. *Crosslisted as CD/PSY 306.*

##### CD 329 Research Methods in Child Development (4)

Introduction to research methods in child development. Critically evaluating research literature, generating research questions, and conducting observations and interviews with children and adolescents. 3 lectures, 1 activity. Prerequisite: PSY 256 or CD/EDUC 207, STAT 217.

##### CD 330 Supervised Internship (4) (CR/NC)

Faculty-supervised internship. Role of professional apprentice is experienced and analyzed by each student. Credit/No Credit grading only. Prerequisite: CD major, CD 230, PSY 323, KINE 280 or equivalent first aid certification, junior standing and consent of instructor.

##### CD 350 Developmental Issues in Education (4)

Current issues concerning how human beings develop and learn. Topics may include motivation, intelligence, peer relations, creativity, learning competence, moral development, and the implications these topics have for education. 4 lectures. Prerequisite: PSY 256 or CD/EDUC 207.

##### CD 390 Career Planning (2) (CR/NC)

Individual career and graduate school planning. Current employment issues for college graduates such as career profiles, trends and work environments. Credit/No Credit grading only. 2 seminars. Prerequisite: Junior standing or consent of instructor. *Crosslisted as CD/PSY 390.*

##### CD 400 Special Problems for Advanced Undergraduates (1–4)

Supervised investigation, including a written report, of a topic chosen with prior approval of instructor. Total credit limited to 6 units, with a maximum of 4 units per quarter. Prerequisite: Junior standing.

##### CD 401 Perspectives on Child and Adolescent Development (4)

Advanced study of theoretical perspectives and research on the development of children and adolescents and the implications for current practice and policy. 4 seminars. Prerequisite: CD 304, CD 305, CD 306, CD 329, CD 330, or consent of instructor.

##### CD 404 Administration of Children's Programs (4)

Organization and administration of programs for young children, preschool and child care centers. Staffing, finance, equipment, records, program evaluations, regulations, public policy and community relations. 4 lectures. Prerequisite: CD 305.

##### CD 413 Children, Adolescents and Technology (6)

Examination of research and theory on how children and adolescents use digital technologies and influences on cognitive, social, and identity development. Observations of children's use of various digital technologies, and design of activities that use technology tools to support learning goals. 4 lectures, 2 laboratories. Prerequisite: CD 305, CD 306, CD 329.

##### CD 424 Children's Learning in Families and Communities (4)

Examination of research on children's learning and development in diverse families and community settings. Effective organizational practices, and formal and informal instructional activities. Further study of sociocultural perspectives and cross-cultural research. 4 lectures. Prerequisite: Two of the following: CD 304, CD 305, CD 306 or consent of instructor.

##### CD 430 Advanced Internship (4) (CR/NC)

Faculty-supervised preprofessional experience in a career-related setting which complements the CD 330 internship. Such roles as master teacher, caseworker, therapeutic intern, administrative aide or program specialist are experienced and analyzed by each student. Credit/No credit grading only. Prerequisite: CD major, CD 330, and consent of instructor.

##### CD 431 Assessing Children's Development and Environments (4)

Current developmental and environmental assessments used in childcare and educational settings and in research. Practice using, creating, and evaluating child assessments. 3 lectures, 1 activity. Prerequisite: CD 304 and CD 305 or two of the following: PSY 419, PSY 420, PSY 421. *Crosslisted as CD/PSY 431.*

##### CD 432 Research Internship (4) (CR/NC)

Faculty-supervised research experience on various topics related to child and adolescent development. Student apprenticeship with a department faculty member to conduct aspects of a research project. Total credit limited to 8 units. Credit/No Credit grading only. Prerequisite: CD 329, CD 330, CD 431, or consent of instructor.

##### CD 461 Senior Project Seminar (2)

Senior project expectations and skills. Students work alone or in groups to identify appropriate topics, methods and content for the senior project; to be presented in a series of progress reports. Begin literature reviews for completion in CD 462. 2 seminars. Prerequisite: CD major, completion of GWR, CD 329, and consent of instructor.

##### CD 462 Senior Project (2)

Completion of a project under faculty supervision. Prerequisite: CD 461.

**CD 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

## 2009-11 Cal Poly Catalog

### Civil & Environmental Engineering Department

## CE–CIVIL ENGINEERING

### CE 111 Introduction to Civil Engineering (1) (CR/NC)

Broad overview of the field of civil engineering, including professional societies and their student chapters, professional licensing and registration, professional codes of ethics, the elements of engineering design, and the scope of analysis and design activities undertaken by private- and public-sector civil design professionals. Credit/No Credit grading only. 1 lecture.

### CE 112 Design Principles in Civil Engineering (2)

The civil and environmental engineering design process. Illustration and quantification of design alternatives. Practice in creating and evaluating typical designs drawn from different specialty areas of the field. 2 lectures. Prerequisite: MATH 141.

### CE 113 Computer Aided Drafting in Civil Engineering (2)

Computer-aided drawing (CAD) and related software to display and quantify engineering designs. Elements of engineering design drawings. Related topics in information technology. 2 laboratories. Prerequisite or concurrent: CE 112.

### CE 200 Special Problems for Undergraduates (1–2) (CR/NC)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Credit/No Credit grading only. Prerequisite: Consent of department chair.

### CE 201 Mechanics of Materials (6)

Stresses, strains, and deformations associated with torsion, axial, shear, moment, and pressure vessel loadings. Combined loadings and principle representations of the states of stress and strain at a point. Basic failure criteria. Introduction to stability including buckling of columns. Equivalent in content to CE 204 and CE 207. 6 lectures. Prerequisite: ME 211.

### CE 204 Mechanics of Materials I (3)

Stresses, strains, and deformations associated with axial, torsional, and flexural loading of bars, shafts, and beams. Analysis of elementary determinate and indeterminate mechanical and structural systems. 3 lectures. Prerequisite: ME 211.

### CE 206 Strength of Materials Laboratory (1)

Introduction to experimental stress analysis. Verification of analytical equations through strain gage measurements of axially, torsionally, and flexurally loaded specimens. 1 laboratory. Prerequisite or concurrent: CE 201 or equivalent (CE 205 from prior catalogs).

### CE 207 Mechanics of Materials II (3)

Combined stress states including torsion, axial, shear, moment, and pressure vessel loadings. Principle stress/strain states. Basic failure criteria. Analysis of beam forces, moments, deflections, and rotations. Introduction to stability concepts including column buckling. 3 lectures. Prerequisite: CE 204.

### CE 240 Additional Engineering Laboratory (1-2) (CR/NC)

Special assignments undertaken by students who need or wish to acquire abilities supplementary to their standard pattern of courses. Assignments must be primarily of shop or laboratory nature. Work done with minimum faculty supervision. Total credit limited to 6 units. Credit/No Credit grading only. 1-2 laboratories.

### CE 251 Numerical Methods in Engineering (4)

Concepts from numerical analysis and basic programming theory introduced in the context of engineering applications. Topics include the application of programming constructs, finite precision calculations, vectors, matrices, eigenvalues/vectors, linear systems, linear programming, basic nonlinear systems, differential equations, plotting, statistics, least squares, and approximations. 3 lectures, 1 laboratory. Prerequisite: CE 113 and MATH 244. Corequisite: CE 207.

### CE 259 Civil Engineering Materials (2)

Experimental determination of mechanical properties of concrete, asphalt, and soils as required for engineering applications. Experimental verification of assumptions made in mechanics of materials procedures. Use of strain measuring devices. Preparation of technical reports. 2 laboratories. Prerequisite: CE 204.

### CE 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### CE 321 Fundamentals of Transportation Engineering (3)

The characteristics and functions of highway, air, rail, transit and other modes of urban and intercity transportation. Fundamentals of transportation design, operations, and planning. Evaluation of costs, benefits, and environmental considerations. 3 lectures. Prerequisite: PHYS 131, CE 259. *Formerly CE 221.*

### CE 322 Fundamentals of Transportation Engineering Laboratory (2)

Application of principles of transportation planning, operations, and design. Emphasis on urban transportation planning and operations, and the design of urban and intercity highway and rail facilities. Experimental determination of the physical and mechanical properties of pavement materials through laboratory and field testing. Analysis of data and preparation of testing reports. 2 laboratories. Prerequisite or concurrent: CE 321. *Formerly CE 222.*

### CE 336 Water Resources Engineering (4)

Hydraulics of pile flow. Open channel flow, groundwater, and hydrology. 4 lectures. Prerequisite: ME 341 or ENVE 264.

### CE 337 Hydraulics Laboratory (1)

Application of basic fluid dynamic principles to various mechanical systems. Exposure to experimental problems and techniques with guided laboratory projects related to civil engineering discipline. 1 laboratory. Prerequisite: ME 341 or ENVE 264. Corequisite: CE 336.

### CE 351 Structural Analysis (4)

Analysis for member forces and deflections of determinate and indeterminate structures, including trusses, beams, and frames. General theorems, influence diagrams, and energy methods. 3 lectures, 1 laboratory. Prerequisite: CE 251 and either CE 201 or CE 207.

### CE 355 Reinforced Concrete Design (4)

Analytical and design principles of reinforced concrete in designing civil engineering systems. Origin of code requirements. Fundamentals of proportioning. Details of elements and structural systems. 3 lectures, 1 laboratory. Prerequisite: CE 259, CE 351.

### CE 356 Structural Steel Design (4)

Design and behavior of the elements of steel structures. Design and analysis of bolted, welded and eccentric connections. Proportioning of members and connections. Introduction to plastic design, end plate connection, composite construction, shear connections and design of composite beams. 3 lectures, 1 laboratory. Prerequisite: CE 351.

### CE 381 Geotechnical Engineering (4)

Engineering geology, elementary mass-volume relations, clay-water interaction, soil classification, soil compaction, geostatic stress distributions, 1-D and 2-D steady-state flow, shear strength under drained and undrained conditions. 4 lectures. Prerequisite: CE 207 and ME 341. Concurrent: CE 382 (CE majors only).

### CE 382 Geotechnical Engineering Laboratory (1)

Use of standard laboratory test methods to determine physical, mechanical, and hydraulic properties of soil. 1 laboratory. Corequisite: CE 381.

### CE 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

### CE 401 Advanced Mechanics of Materials (4)

Introduction to linear elasticity as a means for development of reduced order theories such as torsion, beams, columns, and plates from the general three-dimensional continuum. Energy methods as well as the application and limitation of these theories. 4 lectures. Prerequisite: CE 351 or ME 328.

### CE 404 Applied Finite Element Analysis (4)

Finite element based solutions to engineering problems with an emphasis on elastostatic problems in structural mechanics. The power and pitfalls associated with the finite element method highlighted through practical modeling assignments. Introduces the use of commercial finite element codes. 3 lectures, 1 laboratory. Prerequisite: ME 329 or CE 351 or **BMED 410**. *Crosslisted as BMED/CE/ME 404. Change effective Fall 2010.*

### CE 405 Concrete Materials (4)

Supplementary cementitious materials and chemical admixtures and their incorporation into concrete mix design. Design and testing of concrete for durability and other specialized properties. 3 lectures, 1 laboratory. Prerequisite: CE 259.

### CE 407 Structural Dynamics (4)

Effect of vibration and transient loads on structural elements. Dynamics load factors, support motion, damping and natural frequencies of multidimensional

structural systems. Modal analysis. 3 lectures, 1 laboratory. Prerequisite: CE 351, ME 212.

#### **CE 421 Traffic Engineering (4)**

Principles of traffic circulation on highway systems and other modes. Traffic control. Traffic data collection and analysis. Capacity analysis. Traffic modeling. New technologies. 3 lectures, 1 laboratory. Prerequisite: CE 321 or consent of instructor.

#### **CE 422 Highway Geometrics and Design (4)**

Alignment location and safe geometric design of highways. Earthwork and drainage related to highway. Theory and practice in design of alignments, highway cross-sections, intersections, interchanges, and freeways in urban and rural areas. Application of advanced computer software to highway geometrics. 2 lectures, 2 laboratories. Prerequisite: CE 321 or consent of instructor.

#### **CE 423 Intelligent Transportation Systems (4)**

Specification and operation of Intelligent Transportation Systems (ITS). Traffic surveillance and control systems including applications to freeways, urban streets, rural highways, and public transportation. Standards include the National Architecture for ITS. 3 lectures, 1 laboratory. Prerequisite: CE 321, graduate standing, or consent of instructor.

#### **CE 424 Public Transportation (4)**

Interdisciplinary aspects of public transportation problems, systems-team design approach to solutions. History and present state of public transportation; role of public transportation in urban environment; legislative, political, social, and economic aspects of public transportation systems. Methodology and procedures for transit planning. Review of transit studies. 3 lectures, 1 laboratory. Prerequisite: CE 321 or consent of instructor.

#### **CE 431 Coastal Hydraulics I (4)**

Waves and their characteristics, types of waves, water wave theories, orbital velocities, refraction of waves, wave diffraction, wave reflection, application of linear theory to wave forces on cylindrical structures, submerged pipelines and vertical flat barriers (sea walls), wave uprush, rubble mound breakwaters. 4 lectures. Prerequisite: ME 341 or ENVE 264.

#### **CE 432 Coastal Hydraulics II (4)**

Reformed breaker height determination, wave runup analysis using a reformed breaker height. Wave setback analysis. Pile height determination. Criteria for types of breaking waves. Revetment analysis, rip-rap revetment design, wave forces on pilings. 4 lectures. Prerequisite: CE 431.

#### **CE 433 Open Channel Hydraulics (4)**

Analysis and characteristics of flow in open channels; critical flows; uniform flow; gradually varied flow; channel design problems, channel transitions and controls. Rapidly varied flow; hydraulic jump and energy dissipaters. Unsteady flows, waves and wave propagation, flood routing. Applications of numerical methods in hydraulic engineering. 4 lectures. Prerequisite: CE 336.

#### **CE 434 Groundwater Hydraulics and Hydrology (4)**

Differential equations of groundwater flow, Darcy Law, solutions of the steady and unsteady flow, differential equations for confined and unconfined flows. Pumping test design. Groundwater models, leaky aquifers. Saltwater intrusion. 4 lectures. Prerequisite: CE 336.

#### **CE 440 Hydraulic Systems Engineering (4)**

Water and wastewater flows. Design of water distribution systems, transmission and storage reservoirs, wastewater collection systems, and storm water systems. Pumps and pump systems, flow measurements. Water sources for municipal supply. 3 lectures, 1 laboratory. Prerequisite: CE 336.

#### **CE 454 Structural Design (4)**

Design of reinforced concrete, steel and timber structures. Loading standards, code design methods, connection design. Comprehensive design projects. 2 lectures, 2 laboratories. Prerequisite: CE 351, CE 355, CE 356.

#### **CE 455 Design of Timber Structures (4)**

Analysis and design of timber structures with emphasis on construction methodology, and material behavior. Topics include: physical and mechanical properties of structural lumber and glulams; lateral load paths; diaphragms; connections; shear wall design; and combined load design. 3 lectures, 1 laboratory. Prerequisite: CE 355 or CE 356.

#### **CE 456 Seismic Principles for Civil and Environmental Engineers (4)**

Basic principles in seismic analysis and design of civil and environmental systems. Seismological aspects of earthquakes. Simple concepts in structural dynamics. Simplified code-based analysis and design. 4 lectures. Prerequisite: CE 207. Not open to students with credit in CE 557.

#### **CE 457 Bridge Engineering (4)**

Fundamentals of the structural analysis and design of highway bridges. Construction materials in bridges. Loads on highway bridges. Load path and distribution in bridge superstructure. Design of reinforced concrete, pre-stressed concrete, steel plate girder, and composite bridges. 3 lectures, 1 laboratory. Prerequisite: CE 351 and CE 355. Corequisite: CE 356.

#### **CE 458 Fiber Reinforced Polymer (FRP) Design (4)**

Properties and mechanical characteristics of Fiber Reinforced Polymer (FRP) composite materials; applications in civil engineering structures as primary or secondary reinforcement; and design techniques based on newly developed ACI 440 design guidelines and worldwide experience in FRP design. 3 lectures, 1 laboratory. Prerequisite: CE 351 and CE 355. Concurrent: CE 356.

#### **CE 459 FRP Strengthening of Reinforced Concrete Structures (4)**

Flexural and shear strengthening reinforced and prestressed concrete members using fiber reinforced polymer composite plates and laminates; seismic repair and rehabilitation of columns, slabs, beams and structures. Focus on design philosophy and design methodology, based on the current understanding of FRP-strengthening techniques. 3 lectures, 1 laboratory. Prerequisite: CE 355.

#### **CE 461, 462 Senior Project I, II (2) (2)**

Completion of a 120-hour integrated civil research, analysis, and/or design project that is representative of those encountered in professional practice. Prerequisite: Senior standing and consent of the supervising faculty member.

#### **CE 464 Professional Practice (3)**

Examination of the non-technical issues that are dealt with on a regular basis by the design professional, including professional ethics, marketing and business development, professional engagement, personnel and project management, risk management, professional liability insurance, and dispute resolution. 3 seminars. Prerequisite: Senior standing.

#### **CE 466 Senior Design I (3)**

Work on multi-disciplinary teams to complete an integrated civil design project. Focus of formal instruction on selected topics in geotechnical, structural, transportation, and water resources engineering design. Topics, related to interpersonal communication, teamwork, leadership, ethics, and professional practice, addressed to promote understanding of the non-technical issues and skills that must be mastered to become a successful design professional. 2 lectures, 1 laboratory. Prerequisite: CE 321, CE 322, CE 336, CE 337, CE 355, CE 356, CE 381, CE 382, senior standing, and consent of instructor.

#### **CE 467 Senior Design II (3)**

Continuation of CE 466. Continuation of work on multi-disciplinary teams to complete an integrated civil design project. Focus of formal instruction on technical and non-technical issues. Summarization of team project results in formal written reports and oral presentations. 2 lectures, 1 laboratory. Prerequisite: CE 466.

#### **CE 468, 469 Community Engineering Senior Design I, II (3) (3)**

Two-part series. Student teams work in cooperation with a local community organization to complete an integrated civil design project. Projects representative of those encountered in professional practice. Focus on professional as well as design issues. Volunteer service required. 2 lectures, 1 laboratory. Prerequisite: CE 321, CE 322, CE 336, CE 337, CE 355, CE 356, CE 381, CE 382, senior standing, and consent of instructor.

#### **CE 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

#### **CE 471 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

#### **CE 481 Analysis and Design of Shallow Foundations (4)**

Evaluation of shear strength for foundation design. Analysis of bearing capacity for generalized conditions. Design of reinforced concrete spread footings. Stress distributions beneath loaded areas. Immediate settlement, consolidation settlement, rate of consolidation, and creep. 4 lectures. Prerequisite: CE 381 and CE 382.

**CE 482 Conventional Subsurface Exploration (4)**

Subsurface exploration and sampling techniques. Laboratory analysis of material variability. Preparation of subsurface exploration reports. 2 lectures, 2 laboratories. Prerequisite: CE 481.

**CE 486 Introduction to Geological Engineering (4)**

Identification and characterization of consolidated geologic materials for the purpose of civil analysis and design. Interpretation of geologic maps, cross sections, and reports. Interpretation of aerial photographs. Engineering considerations important in dealing with transported soils. 4 lectures. Prerequisite: CE 381, CE 382, and GEOL 201.

**CE 487 Design of Foundations and Slopes in Rock (4)**

Evaluation of the engineering properties of rocks. Rock core description. Slope stability analyses in rock. Discontinuity analysis. Rockfall hazard assessment and mitigation. Design of shallow foundations on rock. 4 lectures. Prerequisite: CE 381, CE 382, and GEOL 201.

**CE 488 Engineering Risk Analysis (4)**

Introduction to the basic concepts of probability theory, statistics, and decision theory as they pertain to problems in civil and environmental engineering. Emphasis placed on the use of probabilistic modeling, Bayesian statistics, risk analysis, and decision theory. 4 lectures. Prerequisite: CE 381 and STAT 312.

**CE 493 Cooperative Education Experience (2) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 6 units. Prerequisite: Sophomore standing and consent of instructor.

**CE 494 Cooperative Education Experience (6) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 18 units. Prerequisite: Sophomore standing and consent of instructor.

**CE 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units. Prerequisite: Sophomore standing and consent of instructor.

**CE 500 Individual Study (1-3)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of department chair, graduate advisor and supervising faculty member.

**CE 501 Advanced Matrix Analysis of Structures I (4)**

Matrix terminology and operations. Matrix procedures for analysis of two-dimensional frameworks. Development of stiffness, flexibility and mixed methods. Development of algorithms and programs for use in the analysis of structural frameworks. Discussion of modeling issues and limitations. 3 lectures, 1 laboratory. Prerequisite: CE 351 or consent of instructor.

**CE 502 Advanced Matrix Analysis of Structures II (4)**

Matrix procedures for analysis of three-dimensional frameworks. Development of algorithms and programs for use in the analysis of structural frameworks. Additional topics to include: member releases, nonprismatic members, elastic supports, offset connections and oblique supports. 3 lectures, 1 laboratory. Prerequisite: CE 501 or consent of instructor.

**CE 504 Finite Element Analysis I (4)**

Linear finite element theory and analysis. Strong, weak and variational formulations. Physical and isoparametric spaces. Error estimates and numerical integration. Development of finite element algorithms. Use of commercial finite element codes to illustrate course concepts including modeling issues and limitations. 3 lectures, 1 laboratory. Prerequisite: CE/ME 404 and CE 511 or ME 501 or consent of instructor. *Crosslisted as CE/ME 504. Formerly ME 502.*

**CE 505 Finite Element Analysis II (4)**

Nonlinear and dynamic finite element theory and analysis. Variational formulations and their significance. Isoparametric formulation and numerical integration. Development of two and three-dimensional finite element

algorithms. The limitations of FEA. 3 lectures, 1 laboratory. Prerequisite: CE/ME 504. *Crosslisted as CE/ME 505.*

**CE 511 Continuum Mechanics and Linear Elasticity (4)**

Introduction to continuum mechanics. Kinematics, stress, and balance laws. Constitutive theory for isotropic and anisotropic solids and viscous fluids. Applications including design of beams and pressure vessels, stress concentrations, fiber-reinforced composites, and non-homogeneous biological materials. 4 lectures. Prerequisite: ME 401 or CE 401 or consent of instructor. *Crosslisted as CE 511/ME 501.*

**CE 513 Inelastic Stress Analysis (4)**

Perfectly plastic and work hardening materials; von Mises and Tresca yield, isotropic and kinematic hardening flow rules, boundary-value problems. Finite elasticity: kinematics, Cauchy- and Green-elasticity, invariance, constraints, Neo-Hookean and Mooney-Rivlin materials, experimental approaches, non-uniqueness, anisotropy, residual stress, thermoelasticity, boundary-value problems. 4 lectures. Prerequisite: ME 501 or CE 511. *Crosslisted as CE 513/ME 503.*

**CE 521 Airfield and Highway Pavement Designs (4)**

Theories, principles, and procedures in the structural design of highway and airfield pavements. Design of flexible and rigid pavements. Performance of flexible and rigid pavements in the field and the characterization of pavement materials. Practical and direct exposure to laboratory testing of pavement materials. 3 lectures, 1 laboratory. Prerequisite: CE 321, CE 259, CE 381, graduate standing or consent of instructor.

**CE 522 Advanced Transportation Design (4)**

Application of computers to advanced highway and transportation systems and geometrics. Use of computers for the solution of transportation facility design problems. 2 lectures, 2 laboratories. Prerequisite: CE 321, graduate standing, or consent of instructor.

**CE 523 Transportation Systems Planning (4)**

Planning of urban and regional multimodal transportation systems. Modeling of transportation networks and travel demand. Travel survey design. Urban data systems. Evaluation of alternatives based on economic, social, technological, and other factors. 2 lectures, 2 laboratories. Prerequisite: CE 321, graduate standing, or consent of instructor.

**CE 524 Pavement Performance and Management Systems (4)**

Introduction to pavement management; pavement distress data collection; deflection measurements and analysis; pavement performance modeling; pavement structure design; maintenance planning and rehabilitation strategies; prioritization and optimization; computer applications in pavement management. 2 lectures, 2 laboratories. Prerequisite: CE 321, CE 322, CE 259.

**CE 525 Airport Planning and Design (4)**

Historical background of aviation and airport development; financing; estimating demand; aircraft characteristics; airport capacity; airspace and air traffic control; site selection; airport configuration; geometric design of landing area; planning and development of terminal areas; lighting; pavement design and drainage. 3 lectures, 1 laboratory. Prerequisite: CE 321, graduate standing, or consent of instructor.

**CE 526 Transportation Safety (4)**

Introduction to nature and extent of transportation safety problem worldwide and in the United States. Several sub-areas of transportation safety: road safety, human factors, vehicle safety; crash data collection and management; safety planning; hot spot identification; methodologies for conducting transportation accident studies; statistical applications to accident data; predictive model building; "before-after" studies; countermeasure design. 3 lectures, 1 laboratory. Prerequisite: CE 321, CE 322, STAT 312.

**CE 527 Sustainable Mobility (4)**

Presentation and analysis of concepts and designs for sustainable mobility from a global-to-local, interdisciplinary perspective, including pedestrians, bicyclists, and public transportation. Addresses economy, environment, and equity (social issues) through lectures, panels, excursions and a planning/design project in San Luis Obispo County. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**CE 528 Transportation Analysis (4)**

Principles of engineering systems analysis and applications to transportation using examples from different modes. Identification of transportation benefits, costs, user and non-user impacts, transportation cost models, pricing, and optimization. 3 lectures, 1 laboratory. Prerequisite: CE 321, graduate standing, or consent of instructor.



**CE 529 Modeling and Simulation in Transportation (4)**

Theory and operation of transportation systems, the systems approach, simulation techniques. Use of available software packages. Simulation model development, calibration and use. 2 lectures, 2 laboratories. Prerequisite: CE 321, graduate standing, or consent of instructor.

**CE 533 Advanced Water Resources Engineering (4)**

Matrix and simulation methods in hydrology, statistical studies in hydrology and their applications to civil engineering problems. Generalized hydrologic characteristics. Hydrologic simulation, computer applications, urban and small watershed hydrology, macroscopic and microscopic approach. Storm water management models. Hydrologic design. 4 lectures. Prerequisite: CE 336 or graduate standing.

**CE 535 Water Resources Systems Planning and Analysis (4)**

Water resources planning, development, system analysis and optimization. Dynamic programming, multi-objective water resource systems. 4 lectures. Prerequisite: CE 336.

**CE 536 Computer Applications in Water Resources with Geographic Information Systems (GIS) (4)**

Modeling, design and analysis of water, wastewater, stormwater systems. Integration of water resource systems with Geographic Information Systems (GIS). 3 lectures, 1 laboratory. Prerequisite: CE 336 and CE 440.

**CE 537 Groundwater Contamination (4)**

Sources and types of groundwater contamination, contamination transport mechanisms. Sorption and other chemical reactions. Numerical modeling of contaminant transport. Nonaqueous phase liquids. Groundwater remediation and design. 4 lectures. Prerequisite: CE 113 ~~444~~; corequisite: CE 336 and ENVE 331. *Correction effective Summer 2009.*

**CE 538 Urban Water Systems (4)**

Integration of water delivery, wastewater collection, drainage systems, and associated treatment components in urbanizing areas. Relationships between surface and groundwater elements of water sources and disposal. Use of current design models to quantify the benefits of non-traditional options. 4 lectures. Prerequisite: CE 440.

**CE 539 Environmental Hydraulics (4)**

Application of fluid mechanics principles to environmental flows. Emphasis on advection, dispersion, stratification and mixing effects. Stratified flows, turbulent jets and plumes, wastewater and thermal diffusers, cooling ponds and channels, control of environmental problems. 4 lectures. Prerequisite: CE 336.

**CE 552 Analysis and Seismic Design of Reinforced Concrete (4)**

Emphasis placed on reinforced concrete behavior and seismic design. Topics include moment curvature analysis and plastic hinge modeling, strut and tie, design of structural walls, design of concrete moment frames and seismic detailing. 4 lectures. Prerequisite: CE 454; Recommended: concurrent: CE 557. *Formerly CE 452.*

**CE 555 Advanced Civil Engineering Materials Laboratory (2)**

Fundamental properties of new and advanced materials. Experimental techniques. Fracture characteristics and composite response of cement matrix composites. New materials and products to advanced applications such as automation. 2 laboratories. Prerequisite: CE 259 or graduate standing.

**CE 556 Advanced Fiber Reinforced Polymer (FRP) Strengthening of Reinforced Concrete Structures (4)**

Flexural and shear strengthening reinforced and pre-stressed concrete members using FRP composite laminates and plates; seismic repair and rehabilitation of columns, beams, slabs and whole structures. Design philosophies based on the current ACI 440 and the most up to date research in FRP composites. Durability, fire protection and blast mitigation of structures utilizing FRP laminates. 3 lectures, 1 laboratory. Prerequisite: CE 355. Not open to students with credit in CE 459.

**CE 557 Seismic Analysis and Design for Civil Engineers (4)**

Extension of the basic principles of structural dynamics to analysis of civil structures (buildings, bridges, tanks, etc.) to earthquake loading. Code based (Uniform Building Code and AASHTO) earthquake resistant design of civil structures. 3 lectures, 1 laboratory. Prerequisite: CE 407.

**CE 558 Advanced Fiber Reinforced Polymer (FRP) Design (4)**

Properties and mechanical characteristics of FRP composites and design methodologies based on the current understanding and usage of FRP composites. Applications of composite rebars in civil engineering structures as primary reinforcement. Design and analysis of reinforced concrete structures utilizing FRP rebars based on the ACI 440 design guidelines. 3 lectures, 1 laboratory. Prerequisite: CE 355. Not open to students with credit in CE 458.

**CE 559 Prestressed Concrete Design (4)**

Advanced analysis, design and behavior of prestressed and precast concrete elements and structures. Origin of code requirements. Detailed design of prestressed concrete components of civil engineering systems for buildings and highway construction. Creep and shrinkage of concrete and relaxation of steel applied to prestressing losses. 4 lectures. Prerequisite: CE 355 or graduate standing.

**CE 570 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 seminars. Prerequisite: Graduate standing or consent of instructor.

**CE 571 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Graduate standing or consent of instructor.

**CE 573 Public Works Administration (3)**

Management and engineering of infrastructure and related systems in public jurisdictions. Utility systems, streets and highways, illumination, distribution systems, etc. Personnel management, financing, public relations, and contract management. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**CE 574 Computer Applications in Civil Engineering (3)**

Overview of computer application, hardware and software alternatives, use of selected application programs. CAD, microcomputers, management and application of resources. 1 lecture, 2 laboratories. Prerequisite: Graduate standing or consent of instructor.

**CE 581 Advanced Geotechnical Engineering (4)**

Advanced topics in saturated flow, unsaturated flow, and consolidation. Stress-strain-deformation response of soils under both drained and undrained loading. Conventional and advanced laboratory strength testing. 3 lectures, 1 laboratory. Prerequisite: CE 481 or graduate standing.

**CE 582 Geotechnical In Situ Testing (4)**

Standard penetration, cone penetration, and flat-plate dilatometer testing. Equipment operation and maintenance. Interpretation of SPT/CPT/DMT sounding data. Stratigraphic analysis. CPT/DMT-based analysis and design of shallow and deep foundations. 2 lectures, 2 laboratories. Prerequisite: CE 481 or graduate standing.

**CE 583 Geotechnical Earthquake Engineering (4)**

Introduction to engineering seismology and ground motion evaluation. Dynamic behavior of soils. Seismic site response analysis. Soil liquefaction evaluation methods and mitigation techniques. Seismic stability of slopes and retaining walls. Computer-aided analysis. 4 lectures. Prerequisite: CE 481 and CE 407 or graduate standing.

**CE 584 Lateral Support Systems (4)**

Classical and modern earth pressure theories. Lateral earth pressure calculations for general subsurface conditions. Analysis and design of reinforced concrete cantilever walls, sheetpile walls, soldier-pile walls, tie-back walls, and mechanically-stabilized earth. Computer-aided analysis and design. 4 lectures. Prerequisite: CE 481 or graduate standing.

**CE 585 Slope Stability Analysis (4)**

Analysis of stability by planar, circular arc, piecewise-linear, and composite-surface techniques. Analysis of earth-fill dams and reservoirs for static, steady flow, sudden drawdown, and seismic loading conditions. Field instrumentation. Methods for slope remediation and stabilization. Computer-aided analysis. 4 lectures. Prerequisite: CE 481 or graduate standing.

**CE 586 Analysis and Design of Deep Foundations (4)**

Bearing capacity and settlement analysis of drilled shafts and driven piles. Analysis and design of single piles and pile groups for vertical, lateral, and combined loading. Construction procedures, field inspection, and load-testing. Computer-aided analysis and design. 4 lectures. Prerequisite: CE 481 or graduate standing.

**CE 587 Geoenvironmental Engineering (4)**

Principles for containment applications. Engineering properties of soils and geosynthetics and their interaction with contaminants and wastes; analysis of geosynthetics used in containment facilities; liners; covers; leachate and gas collection systems; contaminant transport; and monitoring systems. 4 lectures. Prerequisite: CE 381.

**CE 588 Ground Improvement (4)**

Ground improvement applications investigated for modification of geomechanical and hydraulic properties of soils. Engineering properties of soft ground and high water content materials; mechanical, chemical, and thermal stabilization investigated for foundation and environmental remediation applications. 4 lectures. Prerequisite: CE 381, CE 382, and CE 481.

**CE 589 Geosynthetics Engineering (4)**

Geosynthetics applications within civil engineering. Design content for geotechnical, geoenvironmental, and transportation applications. Manufacturing processes, material properties, interaction with soils, and service conditions. 4 lectures. Prerequisite: CE 381.

**CE 591 Graduate Seminar I(1)**

Current research activities and analysis/design philosophies in civil and environmental engineering practice. 1 seminar. Prerequisite: Graduate standing.

**CE 592 Graduate Seminar II (1)**

Current research activities and analysis/design philosophies in civil and environmental engineering practice. Development of oral and written presentation skills. 1 seminar. Prerequisite: CE 591 and graduate standing.

**CE 593 Cooperative Education Experience (2) (CR/NC)**

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**CE 594 Cooperative Education Experience (6) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**CE 595 Cooperative Education Experience (12) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**CE 599 Design Project (Thesis) (1-9)**

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis. Prerequisite: Graduate standing.

## General Requirements – Bachelor's Degree

### CHOICE OF CATALOG

Cal Poly issues a new catalog every one or two years, and the requirements for degree programs may change from one catalog to the next. Students have the right to choose the catalog they'll use, as described in Section 40401 of Title 5 of the *California Code of Regulations*.

An undergraduate student remaining in attendance in regular sessions at any California State University campus, at any California community college, or any combination of California community colleges and campuses of the California State University, may for purposes of meeting graduation requirements, elect to meet the requirements in effect at the campus from which the student will graduate either:

- (1) at the time the student began such attendance, or
- (2) at the time of entrance to the campus, or
- (3) at the time of graduation, or
- (4) as allowed by campus policy.

Campus authorities may authorize or require substitutions for discontinued courses. A campus may require a student changing his or her major or any minor field of study to complete the major or minor requirements in effect at the time of the change.

For purposes of this section, "attendance" means attendance in at least one semester or two quarters each university year. Absence due to an approved educational leave or for attendance at another accredited institution of higher learning shall not be considered an interruption in attendance, if the absence does not exceed two years. (Title 5 of the *California Code of Regulations*, Section 40401.)

### Choice of Catalog Older than 10 years for Returning Students

Returning students may request to complete their degrees on a catalog older than 10 years if the only remaining degree requirements at the time they left Cal Poly do not exceed 16 units. The decision to approve or disapprove a student's request is based on: (1) her/his willingness to commit to completing outstanding degree requirements within a specified timeframe, and (2) her/his ability to demonstrate, with written documentation, reasonable currency of knowledge and skills in her/his degree field to the satisfaction of the faculty in the applicable major, as certified by the department chair. Both the college dean and the Vice Provost for Academic Programs must give approval.

Students are not allowed to complete a degree that is no longer offered by the University.

## GENERAL GRADUATION REQUIREMENTS

There are nine general requirements, which all students must meet in order to earn the bachelor's degree from Cal Poly and participate in commencement. *Students must be formally admitted to the major in which they wish to graduate, and must matriculate, in order to earn a degree.* The more students understand their progress toward meeting these requirements and relate them to the many programs available, the better the chance of creating an exciting educational experience and avoiding errors which may delay graduation.

The specific requirements for each degree program are shown under the academic department offering the major and include a curriculum display with courses listed by Major, Support, General Education, and Electives. The department may have a flow chart, which shows the recommended sequence of courses leading to the degree.

Students are responsible for meeting all requirements. Advice is available from faculty advisors, college advising centers, and the Office of Academic Records. Students should plan their degree programs carefully and review them frequently with their advisors.

### MINIMUM REQUIREMENTS FOR GRADUATION

#### 1. Minimum Number of Units

Baccalaureate degree programs .....minimum 180 units

Individual baccalaureate degree programs may require more than 180 units. (Title 5, Sections 40500, 40501, 40505, 40507) A minimum of 60 units overall must be upper division.

Degree	Minimum # of major units at 300-400 level
Bachelor of Arts (BA)	18
Bachelor of Science (BS)	27
Bachelor of Fine Arts (BFA)	27
Bachelor of Architecture (BArch)	41
Bachelor of Landscape Architecture (BLA)	41

#### 2. Grade Point Average (GPA)

Students must earn at least a 2.0 GPA in all Higher Education units attempted (all college-level work), in Cal Poly cumulative units attempted, and in the major (the courses listed as major courses in the curriculum display). For a definition of GPA and quality points and hours, please refer to Grading.

#### 3. U. S. Cultural Pluralism (USCP) Requirement

Students must complete the USCP requirement as indicated on page 55.

#### 4. General Education (GE) Courses

Students must complete the GE requirements as indicated in the degree program and shown in the GE section of this catalog (see page 50).

**5. Graduation Writing Requirement (GWR)**

Students must demonstrate competency in writing skills as described below.

**6. Senior Project**

A senior project is a required for all Cal Poly students as described below.

**7. Academic Residence Requirements**

The minimum requirements for units taken in residence at Cal Poly are:

- \* 50 quarter units
- \* 30 units in residence of the last 40 units counted toward the degree
- \* 36 of the 50 units in residence must be upper division
- \* 18 of the 36 upper division units in residence must be in the major
- \* 12 units of General Education

Extension credit or credit by examination may not be used to fulfill the residence requirements. However, a maximum of 36 quarter units of extension credit may be counted toward the bachelor's degree.

**8. Evaluation for Graduation**

Students should request a graduation evaluation from the Office of Academic Records **four** quarters prior to their anticipated graduation date. The evaluation confirms remaining requirements for graduation and is a formal statement on the expected quarter of graduation. The actual date of graduation is the end of the quarter in which all requirements have been met.

Graduating students receive a complimentary diploma. Additional diplomas may be ordered through El Corral Bookstore. The diploma is not ordered until all degree requirements have been completed. The diploma is mailed approximately five to six weeks after the degree has been awarded.

If a student breaks enrollment prior to completion of degree requirements, he or she may be required to re-enroll and may be held to catalog requirements in effect at that time.

**9. Commencement**

For a student to participate in graduation ceremonies, the student must satisfy *at least one* of the following:

- \* shall have completed all degree requirements and not have participated in a graduation ceremony previously;
- \* shall currently be enrolled in classes that would complete all of that student's degree requirements;
- \* shall be registered for classes for the following term that would allow the student to complete all of his/her degree requirements.

Students completing all degree requirements in the Winter, Spring or Summer term are eligible to participate in the Spring Commencement. Students

completing all degree requirements in the Fall term are eligible for Fall commencement.

**GRADUATION WRITING REQUIREMENT (GWR)**

All students must demonstrate competency in writing skills as a requirement for graduation. Information on currently available ways to meet this graduation requirement may be obtained from the Writing Skills Program Office, Agriculture Building (10) Room 130 (756-2067), or on the Writing Skills webpage, [www.calpoly.edu/~wrtskills](http://www.calpoly.edu/~wrtskills).

The Board of Trustees of the California State University has mandated that all students earning undergraduate or graduate degrees in the CSU must be certified as proficient in writing at the upper-division level.

Students must earn proficiency after reaching 90 units. Students should review their program requirements to determine which option is appropriate. The GWR, if taken at another CSU campus (within seven years), may be approved if the student is pursuing a Cal Poly degree.

At Cal Poly, students may meet the Graduation Writing Requirement (GWR) through one of the following options:

1. Pass the Writing Proficiency Exam.
2. Pass an approved upper-division course with a grade of C or better (C- or below does not qualify) AND receive certification of proficiency in writing based on a 500-word in-class essay.

The following courses are approved for GWR credit:

\*Non-GE writing courses: ENGL 301, 302, 310, 317, or 326;

\*GE C4 literature courses: ENGL 330, 331, 332, 333, 334, 335, 339, 340, 341, 342, 343, 345, 346, 347, 349, 350, 351, 352, 354, 370, 371, 372, 380, 381, or 382.

**SENIOR PROJECT**

**Definition:** the senior project is a capstone experience required for all Cal Poly students receiving a baccalaureate degree. It integrates theory and application from across the student's undergraduate educational experiences. The senior project consists of one or more of the following:

- (1) a design or construction experience,
- (2) an experiment,
- (3) a self-guided study or research project,
- (4) a presentation,
- (5) a report based on internship, co-op, or service learning experience,
- (6) a public portfolio display or performance.

Where the senior project does not consist primarily of a written document, departments, may, where they deem appropriate, require some written documentation (length to be determined by the department) to accompany the senior project. The precise nature or form of a senior project is to be determined by the department or program of the student's

major. The senior project is normally related to the student's field of study, future employment, and/or scholastics goals, and is carried out under direct faculty supervision.

### Expected Outcomes

At the discretion of the major department, students are expected to have the ability to:

- Reduce a topic to specific points of analysis.
- Organize the points of analysis into a logical sequence.
- Apply acquired competencies to the successful completion of a project.
- Obtain, evaluate, synthesize, and apply project-related information.
- Develop and follow a project plan.
- Estimate hours of labor and/or cost of materials necessary to complete a project.
- Organize, illustrate, and write clear and concise project documentation.
- Accept supervision when needed.

### Requirements

1. The total number of senior project units must be 1 to 6 quarter units.
2. The senior project requirement is the same for all students in a given curriculum, but not for all students in the university, because of the nature of the various curricula.
3. Normally 30 hours of student work is required for each unit of credit granted.
4. Projects requiring an excessive amount of time are discouraged.
5. The number of students participating in a group senior project should not be so large as to unduly limit individual experience or responsibility and initiative.
6. The student is responsible for identifying costs and potential funding sources for his or her senior project prior to initiation of the project. Costly projects are discouraged.
7. It is the student's responsibility to become informed about the university's intellectual properties policy and human subject policy (where applicable).

### Library Copy

1. The academic department may send one copy of each senior project to the University Library where it is reproduced on microfiche or in an electronic format. A microfiche or electronic copy of the project becomes part of the Library's archival collection where it is available for public use.
2. After being copied on microfiche or electronically, the original project is returned to the academic department of its origin, as applicable. Non-print media (slides, audio/video tapes, CD's, floppy disks, etc.), however,

comprising all or part of a project is permanently retained in the Library collection.

3. All projects submitted to the Library include a completed Senior Project Requirement Form and a title page. The Form must be signed by the student's advisor or academic department head before it can be accepted for processing by the Library. The title page should follow a standardized format.
4. Each student whose senior project is submitted to the library is required to pay a library-processing fee for making her/his senior project available.

## OTHER INFORMATION

### Academic Minors

A minor is an integrated, coherent group of courses (24 to 30 quarter units), which gives the student knowledge in an area that lies outside of the major field of study. At least half of the units must be from upper-division courses (300- or 400-level) and at least half of the units must be taken at Cal Poly. Please see page 12 for the list of minors.

Not more than one-third of the courses in a minor can be graded Credit/No Credit (CR/NC), except for courses that have mandatory CR/NC grading. A minimum 2.0 GPA is required in all units counted for completion of the minor (foreign language minors must have a 2.75 GPA). A minor is not required for a degree. The minor is completed along with the requirements for the bachelor's degree. A major and a minor may not be taken in the same degree program.

Students who wish to complete a minor are to contact the department offering the academic minor as early as possible in the program and fill out the appropriate agreement form. The minor is declared when the student requests a graduation evaluation in the Evaluations Office. The completion of the minor is noted on the student's transcript, but is not shown on the diploma. In no case is a diploma awarded for the minor.

### Academic Honors

The **Dean's Honors List** is compiled at the end of each quarter to honor undergraduate students who have completed 12 or more letter-graded units during the quarter with a 3.5 grade point average or better for that term. The **President's Honors List** is compiled at the end of each university year to honor those undergraduate students who have demonstrated consistent achievement, as represented by being named to the Dean's Honors List for any three of the four quarters of the university year. The university year begins with summer quarter.

Candidates for bachelor's degrees with the following Cal Poly grade point averages are awarded honors at graduation. Only courses taken at Cal Poly calculate into the Cal Poly grade point averages. The GPA is officially calculated at the time the student has *completed* graduation requirements:

Summa cum laude – 3.85  
 Magna cum laude – 3.70  
 Cum laude – 3.50

### Blended BS+MS Programs

Blended programs provide an accelerated route to a graduate professional degree, with simultaneous award of both bachelor's and master's degrees. See individual programs and/or page 69 for additional information.

### Change of Major

*Updated 7/19/2010*

**This policy goes into effect beginning with students admitted for Fall 2010.** Students admitted before Fall 2010 may use either this policy or the previous change of major policy (see text with strikeout, below).

Applies to matriculated undergraduate students at Cal Poly wishing to change major. The “target” major is the major into which a student wishes to transfer.

### Policy Statement

Cal Poly students are required to declare a major at the time of application. Some students find that their interests and abilities lead them in a different direction. The University must offer a transparent and timely process for all students who seek to change majors.

### Process

#### I. General Guidelines

##### A. Minimum Time at Cal Poly

Students must complete at least one quarter at Cal Poly before requesting a change of major.

##### B. Basic Criteria that may be used in advising for determining Target Major Options

All academic departments should give careful consideration when determining target major options. The following criteria may be considered:

1. The majors for which the student was eligible at time of admission,
2. College academic record (e.g., GPA, coursework, etc.), and
3. Remaining coursework and the student's ability to complete degree requirements in the new major within the published unit maximums for that major.

##### C. One Chance to be Accepted

Students who enter into an individualized change of major agreement (ICMA) and do not complete the ICMA requirements will *not* be eligible to request that major again later in their career at Cal Poly.

##### D. Completion of Change of Major

The change of major will be approved once the student has successfully met all of the requirements of the ICMA.

##### E. Timeframe

The ICMA must be feasible to complete and be completed in no more than two quarters.

##### F. Publication of Change of Major Criteria

As applicable, departments' web sites should post the minimum criteria required of all students to change major into their program including timelines.

##### G. Impaction Constraints

Per the Office of the Chancellor's *The California State University Enrollment Management Policy and Practices*, other admissions requirements for all transfer students (internal and external) entering the target majors on impacted campuses must be the same (e.g., portfolios, auditions, etc.).

##### H. Academic Standing

A change of major agreement will be void if a student is academically disqualified prior to the completion of the agreement.

### II. Requesting a Change of Major

- Meet with current advisor to review major options and talk about career paths. Consider, also, consulting with Career Services, other advisors, and faculty and/or department heads/chairs in both current and target majors.
- Meet with the department head/chair or designee in the target major to determine the likelihood of success in the new major.
- Review the curriculum requirements for the target major.
- If the target major is not a good fit for the student, the student will be advised to look at other options.
- If the student receives a positive assessment based on consideration of the basic criteria outlined in Section I-B (above), and it is clear that he/she can complete degree requirements in the new major within the unit maximum (unit maximum is 24 units above program requirements), then an ICMA will be developed (see below).

### III. Individualized Change of Major Agreement (ICMA)

The change of major will be approved once the student has successfully met all of the requirements of the ICMA.

The ICMA will cover no more than two quarters. The ICMA may include the following components:

- Maximum of three specified courses or 12 units in the target major.
- Additional courses and/or units to allow the student to meet minimum progress standards and complete degree applicable units in both majors, whenever possible (e.g., GE courses or electives a student could use to meet degree requirements in both current and target majors).



- C. GPA requirements, as determined by the department (e.g., overall/term GPA, GPA in major-specified courses, GPA in past two quarters).
- D. If applicable, specific steps to be met to resume good academic standing status.

### General Information

As much as possible, entering students are encouraged to make careful and informed decisions about the initial application to their declared majors. All majors at Cal Poly are impacted and it will be difficult to change into some majors despite a student's best efforts. Nevertheless, sometimes students will find that their interests, abilities, or talents will take them in a different direction than they had identified when they originally applied to Cal Poly and they may seek to change to a different major. Depending on the degree of impact of the target major (i.e., the relationship between the number of applicants to the major and the number of places available), there might only be a few spaces available for change of majors, or no spaces at all. Students who are unable to change into their desired majors might also need to consider applying to another university in the major of their choice.

If a student makes the decision to change major, doing so early in the academic career will better allow a student to make degree progress in a timely manner and stay within the University's minimum progress to degree standards; major changes late in the academic career will be restricted by the University's minimum progress standards, including the unit maximum.

All students, whether lower division (those with fewer than 90 Cal Poly units) or upper division (those with more than 90 Cal Poly units or 90 transfer units), intending to change majors must demonstrate that they can complete the new major within the minimum progress standards and the unit maximum set forth by the University. This is likely to be a greater challenge for upper division students, who will have fewer remaining degree requirements. Further, students need to be aware that not all departments can accommodate upper division change of majors.

### Change of Major

~~An application for change of major is not considered until/ unless a student has completed at least one quarter at Cal Poly. Students who feel they have selected an inappropriate major for their interests and abilities, and who want to change their major, must consult with the department head in the target major (the major to which a student wishes to change). Students are strongly advised also to consult with at least one of the following: department head in the current major, faculty in the target major, advising center staff in current/target major, and Career Services staff.~~

~~Applicants for changing major are evaluated against published performance criteria. The criteria are established by each program and are designed to assess the student's~~

~~likelihood of achieving success in the major. Some majors have a limited number of available spaces and not all students who meet the performance criteria are accepted. At a minimum, a selection process takes place twice each year. Students should contact the target major department for specific information regarding change of major.~~

~~Admission to a new curriculum depends on the availability of space within the limitations imposed by budget, faculty, and facilities. Once approved, students receive a new evaluation of completed requirements for the new major from the Office of Academic Records.~~

~~Transfer from one curriculum to another does not in any way change a student's scholastic standing.~~

### Course Substitution

Although a curriculum is specified for each major, under certain conditions a student may be permitted some deviation from the established curriculum. See the major department for substitutions involving major or support courses.

All Cal Poly students are expected to complete the GE courses specified in their degree program. Cal Poly GE courses must be selected from the GE requirement list. Substitutions are not permitted except in extraordinary circumstances. Students requesting exceptions must follow petition procedures, outlined on the GE web site. This process may take several weeks.

### Double Majors or Degrees

If a student has completed the requirements for two or more majors leading to the same baccalaureate degree, those majors are acknowledged on the diploma. If a student has completed the requirements for two or more majors leading to different baccalaureate degrees, those degrees and the completed major or majors leading to each degree are acknowledged on each diploma. The student is consulted regarding the order in which the student prefers the degree(s) and major(s) to appear. If a student has completed concurrently the requirements for two or more degrees, at least one of which is a graduate degree, the campus may issue a single diploma acknowledging the degrees earned or a separate diploma for each degree earned.

A student may use one senior project to fulfill the requirements for two majors. However, the program in which the student seeks to replace the senior project must grant permission before the student begins the project. Permission must be obtained using a major/support substitution.

### Graduate Courses Taken by Undergraduates for Graduate Credit

Cal Poly undergraduates who have achieved senior standing may take courses in the 400 or 500 series for graduate credit while still undergraduates. If they subsequently enter a Cal Poly master's or credential program, they may petition to have such course credit applied toward their master's degree or credential program, if the units were not used for the baccalaureate degree.

**Student Classification/Standing**

Undergraduate students are assigned a classification level according to the number of quarter units earned:

**Lower Division**

Freshman .....fewer than 45 units

Sophomore.....45 to 89 units

**Upper Division**

Junior .....90 to 134 units

Senior.....135 or more units

## 2009-11 Cal Poly Catalog

### Chemistry & Biochemistry Department

## CHEM–CHEMISTRY

### **CHEM 101 Introduction to the Chemical Sciences (1) (CR/NC)**

Introduction to the chemistry and biochemistry disciplines. Orientation, advising, career opportunities and introduction to the faculty. Designed for first-year CHEM and BCHEM majors. Credit/No Credit grading only. 1 lecture. Prerequisite: CHEM/BCHEM major or consent of instructor.

### **CHEM 106 Introductory Chemistry (3)**

Introductory course in chemistry. Measurement, metric system, properties of matter, chemical symbols, atomic structure, chemical formulas, nomenclature, chemical equations, the mole concept, stoichiometry. Not open to students who have credit in a college chemistry course. 3 lectures.

### **CHEM 110 World of Chemistry (4) GE B3 & B4**

The fundamentals of chemical cause and effect–structure/function relationships. The basic principles of chemistry and their applications to solving human problems in organic materials science, biochemistry, toxicology, environmental science, agriculture, nutrition, and medicine. Not open to students majoring in Chemistry or Biochemistry. Not open to students with credit for CHEM 111, CHEM 124, or CHEM 127. 3 lectures, 1 laboratory. Prerequisite: Passing score on the ELM examination for MATH 116 eligibility, or an ELM exemption, or MATH 104. Fulfills GE B3 & B4.

### **CHEM 111 Survey of Chemistry (5) GE B3 & B4**

Introduction to atomic theory, chemical reactions, bonding, stoichiometry, nomenclature, and solutions. Intended for students who are preparing for CHEM 212/312. Not open to students with credit for CHEM 110, CHEM 124, or CHEM 127. 4 lectures, 1 laboratory. Prerequisite: High school chemistry or CHEM 106 or equivalent, and passing score on the ELM examination for MATH 116 eligibility, or an ELM exemption, or MATH 104. Fulfills GE B3 & B4.

### **CHEM 124 General Chemistry for the Engineering Disciplines I (4) GE B3 & B4**

General chemistry concepts presented using a materials science approach with engineering applications. Thermochemistry, bonding, solid-state structures, fundamentals of organic chemistry including polymers. Classwork is presented in an integrated lecture-laboratory format, with an emphasis on computer-based data acquisition, collaborative methods and multimedia-based presentation. Not open to students with credit for CHEM 110, CHEM 111 or CHEM 127. Equivalent to 3 lectures, 1 laboratory. Prerequisite: High school chemistry or CHEM 106 or equivalent, and passing score on the ELM examination for MATH 116 eligibility, or an ELM exemption, or credit in MATH 104. Fulfills GE B3 & B4.

### **CHEM 125 General Chemistry for the Engineering Disciplines II (4) GE B3 & B4**

A continuation of general chemistry designed for engineering students. Topics include solution chemistry, thermodynamics, kinetics, equilibrium, acids and bases, electrochemistry, and nuclear chemistry. Integration of laboratory with theoretical concepts. Use of computers for data acquisition and multimedia resources. Guided inquiry and collaborative methods emphasized. Not open to students with credit for CHEM 128. 3 lectures, 1 laboratory. Prerequisite: CHEM 124 or consent of course coordinator. Fulfills GE B3 & B4.

### **CHEM 127 General Chemistry I (4) GE B3 & B4**

Introduction to atomic theory, chemical reactions, bonding, stoichiometry, nomenclature, gas laws, colligative properties, colloids and solutions. Intended primarily for students whose majors are in the College of Science and Mathematics. Not open to students with credit for CHEM 111 or CHEM 124. 3 lectures, 1 laboratory. Prerequisite: High school chemistry or CHEM 106 or equivalent, and passing score on the ELM examination for MATH 116 eligibility or an ELM exemption or MATH 104. Fulfills GE B3 & B4.

**CHEM 128 General Chemistry II (4)**  
Continuation of CHEM 127. Oxidation-reduction reactions, electrochemistry, kinetics, equilibria, thermodynamics, acids and bases. Intended primarily for students whose majors are in the College of Science and Mathematics. Not open to students with credit for CHEM 125. 3 lectures, 1 laboratory. Prerequisite: CHEM 127.

**CHEM 129 General Chemistry III (4)**  
Acid and base equilibria, buffers, transition elements, solubility, complex ions, hybridization, nuclear chemistry. Laboratory study of the chemical properties

and semi-micro qualitative analysis of the representative group elements of the periodic table. 3 lectures, 1 laboratory. Prerequisite: CHEM 125 or CHEM 128.

### **CHEM 200 Special Problems for Undergraduates (1–2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: CHEM 111, CHEM 124, or CHEM 127 and consent of department chair.

### **CHEM 201 Undergraduate Research (1-3) (CR/NC)**

Laboratory research under faculty supervision. Credit/No Credit grading only. Total credit limited to 6 units. 1-3 laboratories. Prerequisite: Consent of instructor.

### **CHEM 212 Introduction to Organic Chemistry (5)**

Structure, isomerism, nomenclature, fundamental reactions of major functional groups and applications of organic chemicals in agriculture, medicine, industry, and the home. ~~Introduction to the fundamentals of organic chemistry nomenclature and selected reactions for the major functional groups. Promotes an understanding of how the structure and reactions of selected organic molecules relate to living systems and our environment.~~ CHEM 212 accepted in lieu of CHEM 312, but not for upper division credit. Not open to students with credit in CHEM 312, CHEM 216/316. 4 lectures, 1 laboratory. Prerequisite: CHEM 111, ~~CHEM 124 or CHEM 127~~ *CHEM 125 or CHEM 129. Change effective Winter 2011.*

### **CHEM 216 Introduction to Organic Chemistry I (5)**

Basic principles of the bonding, isomerism and stereochemistry in compounds of carbon. Essentials of organic nomenclature. Representative reactions and mechanisms for selected aliphatic and aromatic compounds. Introduction to the physical analysis and synthesis of organic compounds. CHEM 216 accepted in lieu of CHEM 316, but not for upper division credit. Not open to students with credit in CHEM 316. 4 lectures, 1 laboratory. Prerequisite: CHEM 111 or CHEM 125 or CHEM 128.

### **CHEM 217 Introduction to Organic Chemistry II (5)**

Properties and reactions of carbonyl compounds, alcohols, and organic halides with an overview of the mechanisms of the reactions. Introductory concepts and applications of infrared and NMR spectroscopy. CHEM 217 accepted in lieu of CHEM 317, but not for upper division credit. Not open to students with credit in CHEM 317. 3 lectures, 2 laboratories. Prerequisite: CHEM 216/316.

### **CHEM 218 Introduction to Organic Chemistry III (3)**

Properties and reactions of amines, heterocyclic and aromatic compounds with an overview of the mechanisms of the reactions. Introductory concepts and applications of ultraviolet spectroscopy and mass spectrometry. CHEM 218 accepted in lieu of CHEM 318, but not for upper division credit. Not open to students with credit in CHEM 318. 3 lectures. Prerequisite: CHEM 217/317.

### **CHEM 222 Introduction to Computational Chemistry (2)**

Introduction to chemical structure and behavior by computational chemistry techniques. Applications include scientific visualization, molecular modeling, geometry optimization, transition states and molecular dynamics. 1 lectures, 1 laboratory. Prerequisite: CHEM 129, CHEM 316 and MATH 142 or MATH 162.

### **CHEM 231 Introduction to Quantitative Analysis (5)**

Fundamental theory for common titrimetric and spectrophotometric methods in analytical chemistry. Essentials of chemical equilibria as it applies to titration curves. The laboratory focuses on precision and accuracy for common, practical methods in analytical chemistry. CHEM 231 accepted in lieu of CHEM 331, but not for upper division credit. Not open to student with credit in CHEM 331. 3 lectures, 2 laboratories. Prerequisite: CHEM 129.

### **CHEM 252 Laboratory Glassblowing (1)**

Techniques of glassblowing applied to the making of simple laboratory apparatus. 1 laboratory. Prerequisite: CHEM 111, CHEM 124 or CHEM 127.

### **CHEM 270 Selected Topics (1–4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### **CHEM 305 Physical Chemistry for Engineers (4) GE B6**

Fundamentals and applications of chemical thermodynamics of particular interest to engineers. Chemical and phase equilibria. 4 lectures. Prerequisite: PHYS 123 or PHYS 133, CHEM 125 or CHEM 129, MATH 143. Fulfills GE B6.

### **CHEM 312 Survey of Organic Chemistry (5)**

Structure, isomerism, nomenclature, fundamental reactions of major functional groups and applications of organic chemicals in agriculture, medicine, industry,

and the home. Not open to students with credit in CHEM 212 or CHEM 216/316. 4 lectures, 1 laboratory. Prerequisite: CHEM 111, **CHEM 124 or CHEM 127 or equivalent**. *Change effective Winter 2011.*

**CHEM 313 Survey of Biochemistry and Biotechnology (5)**

Chemistry of biomolecules including carbohydrates, proteins, fats, vitamins, enzymes and hormones. Basic molecular biology with applications to biotechnology and genetic engineering. Practical intermediary metabolism of prokaryotic and eukaryotic systems. 4 lectures, 1 laboratory. Prerequisite: CHEM 212/312 or equivalent.

**CHEM 316 Organic Chemistry I (5)**

Structure, bonding, nomenclature, isomerism, stereochemistry and physical properties of organic compounds. Introduction to spectroscopy. Reactions and mechanisms of alkanes, alkenes, alkynes, cycloalkanes and aromatic compounds. Laboratory techniques in organic preparations. 4 lectures, 1 laboratory. Prerequisite: CHEM 125 or CHEM 128.

**CHEM 317 Organic Chemistry II (5)**

Reactions and reaction mechanisms of organic halides, alcohols, phenols, epoxides, ethers, carboxylic acids and their derivatives, aldehydes, ketones; acidity and basicity; infrared and NMR spectroscopy. 3 lectures, 2 laboratories. Prerequisite: CHEM 216/316.

**CHEM 318 Organic Chemistry III (3)**

Chemistry of amines, aromatic compounds, heterocycles, macromolecules, some biomolecules, carbanions, rearrangement and ultraviolet and mass spectrometry. 3 lectures. Prerequisite: CHEM 217/317.

**CHEM 319 Advanced Organic Chemistry Laboratory (2)**

Practice in multiple step organic synthesis, column chromatography, vacuum distillation, enzymes as chemical reagents, inert atmosphere techniques, introduction to FT NMR spectroscopy and mass spectrometry, survey of organic chemical literature. 2 laboratories. Prerequisite: Concurrent or prior enrollment in CHEM 218/318.

**CHEM 331 Quantitative Analysis (5)**

Theory and application of chemical equilibrium to analytical problems. Survey of important analytical methods with stress placed on the theory and application associated with titrimetric and spectrophotometric analysis. 3 lectures, 2 laboratories. Prerequisite: CHEM 129.

**CHEM 341 Environmental Chemistry: Water Pollution (3)**

Chemical aspects of water and water pollution: alkalinity; acid deposition, particularly relating to lake and stream acidification and forest decline; drinking water treatment and THMs; wastewater treatment; detergents, builders, and eutrophication; pesticides; other toxic organic compounds such as PCBs and dioxin; hazardous wastes; toxic elements such as Pb, Hg, Sn, Cd, and Se. 3 lectures. Prerequisite: CHEM 129 and CHEM 212/312 or CHEM 216/316.

**CHEM 342 Environmental Chemistry: Air Pollution (3)**

Chemical aspects of the atmosphere and air pollution: greenhouse effect and global climate change; CFCs, the ozone layer, and the ozone hole; carbon monoxide, nitrogen oxides, and photochemical smog, particulate matter; radon, asbestos, indoor air pollution; sulfur oxides and acid deposition, particularly relating to atmospheric reactions and control options. 3 lectures. Prerequisite: CHEM 129 and CHEM 212/312 or CHEM 216/316.

**CHEM 349 Chemical and Biological Warfare (4)**

**GE Area F**

History, development, and use of chemical and biological warfare (CBW). Chemical and biological disarmament. Production and destruction of CBW agents. Uses of CBW. CBW terrorism. Ethics of CBW. 2 lectures, 2 seminars. Prerequisite: Junior standing, completion of GE Area B, including a chemistry course (CHEM), and a course in biology (BIO, MCRO or ZOO). Fulfills GE Area F.

**CHEM 350 Chemical Safety (1)**

Laboratory regulations, equipment hazard analysis, hazardous chemicals, classification of chemicals, toxic materials handling, reaction hazards, radiation, emergency procedures, safety management programs and legal concerns. Includes project. 1 lecture. Prerequisite: CHEM 212/312 or equivalent.

**CHEM 351 Physical Chemistry I (3)**

Basic physical chemistry for the study of chemical and biochemical systems. Kinetic-molecular theory, gas laws, principles of thermodynamics. Not open to students with credit in CHEM 305. 3 lectures. Prerequisite: CHEM 129, PHYS 122 or PHYS 132, MATH 143.

**CHEM 352 Physical Chemistry II (3)**

Application of physical chemistry to chemical and biochemical systems. Electrochemistry, kinetics, viscosity, surface and transport properties. 3 lectures. Prerequisite: CHEM 305 or CHEM 351.

**CHEM 353 Physical Chemistry III (3)**

Principles and applications of quantum chemistry. Chemical bonding and molecular structure. Spectroscopy and diffraction. 3 lectures. Prerequisite: CHEM 352.

**CHEM 354 Physical Chemistry Laboratory (2)**

Experimental studies of gases, solutions, thermochemistry, chemical and phase equilibria, electrochemistry, chemical and enzyme kinetics, computational methods and applications to chemistry and biochemistry. Applicable literature and databases. 2 laboratories. Prerequisite: CHEM 231/331. **and Corequisite:** CHEM 352. *Change effective Spring 2011.*

**CHEM 357 Physical Chemistry III Laboratory (1)**

Experimental and computational investigations of quantum chemistry, spectroscopy, symmetry and statistical chemistry. 1 laboratory. Corequisite: CHEM 353.

**CHEM 371 Biochemical Principles (5)**

Chemistry and function of major cellular constituents: proteins, lipids, carbohydrates, and membranes. 4 lectures, 1 laboratory. Prerequisite: CHEM 212/312 or CHEM 217/317, and BIO 161. Recommended: CHEM 231/331.

**CHEM 372 Metabolism (4)**

Intermediary metabolism of carbohydrates, lipids, amino acids and nucleotides, regulation and integration of metabolic pathways, bioenergetics, photosynthesis, electron transport, nitrogen fixation, biochemical function of vitamins and minerals. 4 lectures. Prerequisite: CHEM 371.

**CHEM 373 Molecular Biology (3)**

Structure of nucleic acids and chromosomes. Mechanisms and regulation of nucleic acid and protein synthesis. Molecular biology techniques and protein targeting. 3 lectures. Prerequisite: CHEM 371.

**CHEM 375 Molecular Biology Laboratory (3)**

Introduction to techniques used in molecular biology and biotechnology; DNA extraction, characterization, cloning, Southern blotting, reverse transcription, polymerase chain reaction, and sequencing analysis. 1 lecture, 2 laboratories. Prerequisite: BIO 161, and BIO 351 or CHEM 373. *Crosslisted as BIO/CHEM 375.*

**CHEM 377 Chemistry of Drugs and Poisons (3)**

Introduction to pharmacology and toxicology: history, sources, development and testing, physical and chemical properties, biochemical and physiological effects, mechanisms of action, and the therapeutic uses and toxicology of common drugs and poisons. 3 lectures. Prerequisite: CHEM 313 or CHEM 371 or consent of instructor.

**CHEM 385 Geochemistry (3)**

Application of chemical principles to terrestrial and extraterrestrial systems. Formation of the elements; chemical influences on the earth's formation; chemical evolution studies; age-dating techniques; reactions in sea water; petroleum and ore formation; distribution and movement of the elements. 3 lectures. Prerequisite: CHEM 216/316, CHEM 231/331.

**CHEM 400 Special Problems for Advanced Undergraduates (1-3)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 3 units per quarter. 1-3 laboratories. Prerequisite: Junior standing and consent of department chair.

**CHEM 401 Advanced Undergraduate Research (1-3) (CR/NC)**

Laboratory research under faculty supervision. Credit/No Credit grading only. Total credit limited to 6 units. 1-3 laboratories. Prerequisite: Consent of instructor. 4 units may be applied to approved chemistry electives. *Crosslisted as CHEM/SCM 401.*

**CHEM 405 Advanced Physical Chemistry (3)**

Selected advanced topics in physical chemistry, which may include statistical mechanics, computational chemistry, nonequilibrium thermodynamics, lasers in chemistry, solid-state and/or advanced spectroscopy. Total credit limited to 6 units. 3 lectures. Prerequisite: CHEM 353 or consent of instructor.

**CHEM 419 Bioorganic Chemistry (3)**

Methods of investigating reaction mechanisms, mechanisms of chemical catalysis, organic models of enzymes, chemistry of vitamins that serve as enzyme cofactors, chemistry of the phosphate group, synthesis of biomolecules. 3 lectures. Prerequisite: CHEM 218/318.

**CHEM 420 Advanced Organic Chemistry–Synthesis (3)**

Modern methods of organic synthesis. Carbon-carbon bond forming reactions, functional group transformations, protecting groups, strategies of total synthesis of natural products. 3 seminars. Prerequisite: CHEM 218/318.

**CHEM 439 Instrumental Analysis (5)**

Theory, practice and method selection of modern instrumental analytical techniques, including spectroscopic, electrochemical, chromatographic and thermal methods. Current industrial applications. Laboratory work emphasizes optimization of experimental parameters. 3 lectures, 2 laboratories. Prerequisite: CHEM 231/331, CHEM 354. Recommended: CHEM 353.

**CHEM 441 Bioinformatics Applications (4)**

Introduction to new problems in molecular biology and current computer applications for genetic database analyses. Use of software for: nucleic acid, genome and protein sequence analysis; genetic databases, database tools; industrial applications in bioinformatics; ethical and societal concerns. 3 lectures, 1 laboratory. Prerequisite: One course in college biology (BIO 111 or BIO 161 recommended). Recommended: BIO 303, BIO 351 or CHEM 373. *Crosslisted as BIO/CHEM 441.*

**CHEM 444 Polymers and Coatings I (3)**

Physical properties of polymers and coatings and their measurement. Molecular weight averages, glass transition, thermodynamics of polymers. Viscoelastic properties, rheology, molecular weight determination. Thermal analysis, spectroscopic analysis, mechanical testing. 3 lectures. Prerequisite: CHEM 212/312 or CHEM 216/316.

**CHEM 445 Polymers and Coatings II (3)**

Introduction to polymerization methods and mechanisms. Chemistry of initiators, catalysts and inhibitors, kinetics of polymerization. Uses of representative polymer types. Synthesis, film formation, structure and properties of polymers commonly used in coatings and adhesives. 3 lectures. Prerequisite: CHEM 217/317 and CHEM 444.

**CHEM 446 Surface Chemistry of Materials (3)**

Surface energy. Capillarity, solid and liquid interface, adsorption. Surface areas of solids. Contact angles and wetting. Friction, lubrication and adhesion. Relationship of surface to bulk properties of materials. Applications. 3 lectures. Prerequisite: CHEM 305 or CHEM 351 or **ME 302 course in engineering thermodynamics**. *Crosslisted as CHEM/MATE 446. Change effective Spring 2011.*

**CHEM 447 Polymers and Coatings Laboratory I (2)**

Experimental techniques of producing and characterizing coatings. Polymer characterization and analysis. Molecular weight analysis using viscometry, light scattering, and gel permeation chromatography. Thermal analysis using differential scanning calorimetry, thermal mechanical analysis and dynamic mechanical analysis. Polymer rheology. Infrared, Raman and FT-NMR spectroscopy. Atomic force microscopy. 2 laboratories. Prerequisite or corequisite: CHEM 444.

**CHEM 448 Polymers and Coatings Laboratory II (2)**

Polymer synthesis using solution, suspension, bulk, emulsion techniques. Synthesis of chain growth polymers using free radical, anionic, cationic, and other catalysts. Synthesis of step-growth polymers. Kinetics of polymer reactions. Synthesis of resins used in modern coatings. 2 laboratories. Prerequisite: CHEM 447. Corequisite: CHEM 445.

**CHEM 449 Internship in Polymers and Coatings (2)**

Selected students will spend up to 12 weeks with an approved polymers and coatings firm engaged in production or related business. Time will be spent applying and developing production and technical skills and abilities in the polymers and coatings industry. Prerequisite: CHEM 444 or consent of instructor.

**CHEM 455 FT-NMR Laboratory (1) (CR/NC)**

Basic theory and operation of the high-field Fourier transform nuclear magnetic resonance spectrometer. Credit/No Credit grading only. Not open to students with credit for CHEM 458. 1 laboratory. Prerequisite: CHEM 319.

**CHEM 458 Instrumental Organic Qualitative Analysis (3)**

Separation, purification, and identification of organic molecules using chemical and instrumental methods, including nuclear magnetic resonance, infrared and ultraviolet spectroscopy and mass spectroscopy, and techniques in high resolution FT-NMR. 1 lecture, 2 laboratories. Prerequisite: CHEM 319.

**CHEM 459 Undergraduate Seminar (2)**

Oral presentation of current developments in chemistry based on current literature. Searching for, organizing and presenting developments from current

literature in chemistry and biochemistry. Preparation for employment and for independent work, including senior project, in chemistry and biochemistry. 2 seminars. Prerequisite or corequisite: CHEM 318 and junior standing.

**CHEM 461 Senior Project Report (1)**

Completion of a senior project report under faculty supervision. Minimum 30 hours time commitment. Prerequisite: CHEM 459 and consent of instructor.

**CHEM 463 Honors Research (1)**

Advanced laboratory research. Results are presented in a poster session or other public forum. 1 laboratory. Prerequisite: CHEM 461 and consent of instructor.

**CHEM 465 College Teaching Practicum (1–2) (CR/NC)**

Teaching assignment in an undergraduate college classroom. Includes teaching and related activities under the direction of a permanent faculty member in the Department of Chemistry and Biochemistry. Total credit limited to 4 units. Prerequisite: Junior standing, CHEM 231/331 (or permission of instructor), evidence of satisfactory preparation in chemistry. Department chair approval required.

**CHEM 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: CHEM 305, or CHEM 351, or CHEM 217/317 or consent of instructor.

**CHEM 471 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Consent of instructor.

**CHEM 472 Plant Biochemistry (3)**

Application of plant biochemistry, molecular biology and physiology to topics, including plant secondary metabolism, defense mechanisms, drought tolerance, functional genomics, advanced photosynthesis, circadian rhythms, manipulation of plants for improved nutrition, other current research topics. 3 lectures. Prerequisite: CHEM 313 or CHEM 371 or BIO 435.

**CHEM 474 Protein Techniques Laboratory (2)**

Experiments in protein affinity chromatography, electrophoresis and blotting, immunoprecipitation techniques, antibody-enzyme conjugation, and immunoassay. 2 laboratories. Prerequisite: CHEM 371 or consent of instructor.

**CHEM 476 Gene Expression Laboratory (2)**

Heterologous gene expression of a recombinant protein in a microbial system: gene cloning, construction of expression plasmid, DNA sequence analysis, transformation of microbial host, selection and analysis of transformed host cells, expression and purification of recombinant protein. 2 laboratories. Prerequisite: BIO/CHEM 375; CHEM 313 or CHEM 371. *Crosslisted as BIO/CHEM 476.*

**CHEM 477 Biochemical Pharmacology (3)**

Consideration of current selected topics in pharmacology and drug targeting. 3 lectures. Prerequisite: CHEM 377 or consent of instructor.

**CHEM 478 Pharmaceutical Development (3)**

Process of drug development from research clinical candidate to market. Chemical process development, including synthesis optimization, scale up, pilot plant work, manufacturing, and good manufacturing procedure (GMP's). Role of pharmaceuticals in drug development, including various forms of formulation, analytical development requirements, and quality assurance. Project planning and timeline management, clinical trials, and regulatory affairs, including FDA filings. 3 lectures. Prerequisite: CHEM 318.

**CHEM 481 Inorganic Chemistry (3)**

A systematic study of chemical and physical properties of inorganic compounds based on periodic groupings with emphasis on chemical bonding and structure. Topics will include coordination chemistry and kinetics, organometallic chemistry, advanced acid-base relationships and bonding theories plus other selected topics. 3 lectures. Prerequisite: CHEM 352, and CHEM 231/331 or consent of instructor.

**CHEM 484 Inorganic Chemistry Laboratory (2)**

Laboratory techniques in inorganic chemistry. Synthetic and analytic techniques as applied to inorganic and organometallic chemistry. 2 laboratories. Prerequisite: CHEM 481.

**CHEM 485 Cooperative Education Experience (6) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and



registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. 2 units only applicable to approved chemistry electives. Major credit limited to 4 units; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**CHEM 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. 2 units only applicable to approved chemistry electives. Major credit limited to 4 units; total credit limited to 24 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**CHEM 500 Special Problems for Graduate Students (1-3)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 3 units per quarter. Prerequisite: Graduate standing and consent of department chair.

**CHEM 528 Nutritional Biochemistry (3)**

Nutritional aspects of biochemistry. Lecture, library research and student presentations. Topics include vitamins and minerals, essential and energy providing nutrients, deficiency, degenerative and genetic diseases of metabolism. Emphasis on current research and controversy. 3 seminars. Prerequisite: CHEM 313 or CHEM 372 or consent of instructor.

**CHEM 544 Polymer Physical Chemistry and Analysis (3)**

Physical properties of polymers and coatings and their measurement; molecular weight averages, glass transition, thermodynamics of polymers, viscoelastic properties, rheology; molecular weight determination, thermal analysis, spectroscopic analysis, mechanical testing, atomic force microscopy. Special individual project. Not open to students with credit in CHEM 444. 3 lectures. Prerequisite: CHEM 212/312 or CHEM 216/316 or equivalent; CHEM 351 or equivalent.

**CHEM 545 Polymer Synthesis and Mechanisms (3)**

Polymerization methods and mechanisms; chemistry of initiators, catalysts and inhibitors; use of representative types; synthesis, structure and properties of polymers commonly used in coatings and adhesives. Special individual project. Not open to students with credit in CHEM 445. 3 lectures. Prerequisite: CHEM 544.

**CHEM 547 Polymer Characterization and Analysis Laboratory (2)**

Polymer characterization and analysis. Molecular weight analysis using viscometry, light scattering, and gel permeation chromatography. Thermal analysis using differential scanning calorimetry, thermal mechanical analysis and dynamic mechanical analysis. Polymer rheology. Infrared, Raman and FT-NMR spectroscopy. Atomic force microscopy. Special individual project. Not open to students with credit in CHEM 447. 2 laboratories. Corequisite: CHEM 544.

**CHEM 548 Polymer Synthesis Laboratory (2)**

Polymer synthesis using solution, suspension, bulk, emulsion techniques. Synthesis of chain growth polymers using free radical, anionic, cationic, and other catalysts. Synthesis of step-growth polymers. Kinetics of polymer reactions. Synthesis of resins used in modern coatings. Special individual project. Not open to students with credit in CHEM 448. 2 laboratories. Prerequisite: CHEM 547; prerequisite or corequisite: CHEM 545.

**CHEM 550 Coatings Formulation Principles (3)**

Formulation of modern coatings. Raw materials including resins, solvents, pigments, and additives. Formulation principles for solvent-borne and high solids coatings, water-borne coatings, powder coatings, radiation cure coatings and architectural coatings. Regulatory issues; VOC's. Coating properties, film formation, film defects, application methods, color and color acceptance. Special individual project. 3 lectures. Prerequisite: CHEM 444 or CHEM 544.

**CHEM 551 Coatings Formulation Laboratory (2)**

Laboratory formulation of modern coatings. Formation of pigment dispersions. Formulation of solvent-borne and high solids coatings, water-borne coatings, powder coatings, radiation cure coatings and architectural coatings. VOC measurements. Measurement of coating properties, film formation, film defects, application methods, color and color acceptance, hiding, gloss. Accelerated weathering. Special individual project. 2 laboratories. Corequisite: CHEM 550.

**CHEM 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Graduate standing or consent of instructor.

**CHEM 571 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Graduate standing or consent of instructor.

**CHEM 590 Graduate Seminar in Polymers and Coatings (1)**

Problems and topics in polymers and coatings selected according to the interest and needs of the students enrolled. Total credit limited to 3 units. 1 seminar. Prerequisite: Graduate standing in the Polymers and Coatings program or consent of instructor.

**CHEM 598 Graduate Project (3)**

Supervised industrial graduate research in polymers and coatings science. Provides students with industrial research experience. Requires approval of graduate advisor. Total credit limited to 9 units. Prerequisite: CHEM 545, CHEM 547, CHEM 548, CHEM 550, CHEM 551.

**CHEM 599 Graduate Thesis (3)**

Directed graduate research in specialized advanced topics related to polymers and coatings science, leading to a graduate thesis of suitable quality. Requires approval of graduate advisor. Students are expected to work independently and report weekly to faculty advisor. Total credit limited to 9 units. Prerequisite: CHEM 545, CHEM 547, CHEM 548, CHEM 550, CHEM 551. *Formerly CHEM 570.*



## 2009-11 Cal Poly Catalog

### Materials Engineering Department

#### MATE–MATERIALS ENGINEERING

##### MATE 110 Introduction to Materials Engineering Design I (1)

Laboratory work in teams to design, build and test a product. Material from math, science and engineering courses tied together. 1 laboratory.

##### MATE 120 Introduction to Materials Engineering Design II (1)

Second design laboratory, working in teams to design, build and test a complex system that benefits humanity. Focus on complete design process including project management, documentation in design, manufacturing techniques, and analysis of testing data. Issues of engineering ethics, technology and society, the environment and sustainability also studied. 1 laboratory. Prerequisite: MATE 110. ~~Concurrent: ME 240.~~ *Change effective Spring 2011.*

##### MATE 130 Introduction to Materials Engineering Design III (1)

Third design laboratory in a sequence. Includes working in teams on project that benefits humanity. Issues of engineering ethics, technology and society, the environment and sustainability. 1 laboratory. Prerequisite: MATE 120. ~~Concurrent: ME 240.~~ *Change effective Spring 2011.*

##### MATE 200 Special Problems for Undergraduates (1-4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

##### MATE 210 Materials Engineering (3)

Structure of matter. Physical and mechanical properties of materials including metals, polymers, ceramics, composites, and electronic materials. Equilibrium diagrams. Heat treatments, materials selection and corrosion phenomena. 3 lectures. Prerequisite: CHEM 111 or CHEM 124 or CHEM 127. Recommended concurrent enrollment in MATE 215.

##### MATE 215 Materials Laboratory I (1)

Laboratory experiments on the heat treatment and resulting properties of metals. Effects of cold deformation of metals. Brittle-ductile fracture behavior, equilibrium phase relationships, corrosion. Mechanical behavior of polymers. Properties of semiconductor devices. 1 laboratory. Prerequisite or concurrent: MATE 210.

##### MATE 222 Materials Selection for the Life Cycle (4)

Materials and product design, materials selection methodologies using current software, principles of green engineering, eco-design, and sustainability. Life cycle analysis of engineered products using current software. Ecological impact of materials and processes. Case studies used to illustrate concepts. 4 lectures. Prerequisite: ARCH 106 or MATE 210 or consent of instructor.

##### MATE 225 Materials Laboratory II (1)

Microstructural analysis by qualitative and quantitative metallography. Computer acquisition of metallographic images. Emphasis on structure-property relationships. 1 laboratory. Prerequisite: MATE 215. Concurrent: MATE 232.

##### MATE 232 Materials, Ethics, and Society (4)

Examination of several current issues as focal points for themes of materials science and technology society, ethics, and systems thinking. The focal points provide natural contexts for learning fundamental materials engineering knowledge while simultaneously developing greater acuity in dealing with complex social problems. 4 lectures. Prerequisite: MATE 210.

##### MATE 235 Materials Laboratory III (1)

Interpretation of microstructures in metals and alloys from manufacturing processes; laboratory methods for revealing and documenting such microstructures. 1 laboratory. Prerequisite: MATE 225. Concurrent: MATE 222.

##### MATE 270 Selected Topics (1-4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### MATE 310 Noncrystalline Material Systems (4)

Design and synthesis of noncrystalline material systems. Synthesis, processing techniques, properties and fabrication methods of organic and inorganic polymeric materials. 3 lectures, 1 laboratory. Prerequisite: MATE 210, MATE 340, STAT 312. Concurrent: MATE 350.

##### MATE 322 Leadership and Project Management (2)

Theory and practice in leadership and project management skills for engineering design teams. Basic issues related to, and tools used for, managing projects and concepts comprising project management. Emphasis on situations requiring resolutions and management decisions by groups representing various elements of an enterprise. 2 lectures. Prerequisite: Junior standing in an engineering program, and one course in engineering design, or consent of instructor. *Crosslisted as HNRS/IME/MATE 322.*

##### MATE 330 Hybrid Material Systems (4)

Design of hybrid material systems, including polymer-matrix, ceramic-fiber composites. Materials (matrices, fibers) and manufacturing methods treated in detail. 3 lectures, 1 laboratory. Prerequisite: MATE 350 or consent of instructor. Concurrent: MATE 370, ME 240.

##### MATE 340 Electronic Materials Systems (4)

Design of electronic materials systems utilizing the basic concepts in electron theory of solids, electrical properties and conduction in materials, magnetic phenomena and optical properties in materials. 3 lectures, 1 laboratory. Prerequisite: MATE 210, PHYS 133. Concurrent: MATE 360. Prerequisite or concurrent: EE 201, EE 251.

##### MATE 350 Structural Materials Systems (4)

Design of structural materials systems. Topics include continuum mechanics — stress, strain, elasticity, anelasticity, plasticity. 3 lectures, 1 laboratory. Prerequisite: MATE 360, CE 204. Concurrent: MATE 310, ME 240.

##### MATE 359 Living in a Material World (4)

##### GE Area F

Evolution of materials (ceramics, metals, polymers, composites, semiconductors) in the context of history. Traces the link between historical and technological developments enabled by materials from the Stone Age to the Electronic Age. 4 lectures. Prerequisite: Junior standing and completion of GE Area B. *Crosslisted as HIST/MATE 359.* Fulfills GE Area F.

##### MATE 360 Metallurgical Materials Systems (4)

Mass and energy balances applied to metallurgical materials systems, design of materials products and processes including evaluation of energy needs and input/output stream compositions. 3 lectures, 1 laboratory. Prerequisite: IME 144. ~~Prerequisite or concurrent~~ Corequisite: MATE 215. Concurrent: MATE 340, ~~ME 240.~~ *Change effective Spring 2011.*

##### MATE 370 Process Design (4)

Design of processes for engineering materials. Topics include kinetics in materials: solid-state diffusion (steady-state and non-steady-state), nucleation and growth kinetics, solid state phase transformations. 3 lectures, 1 laboratory. Prerequisite: MATE 310, CHEM 305. Concurrent: MATE 330.

##### MATE 400 Special Problems for Advanced Undergraduates (1-4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

##### MATE 401 Materials Characterization (3)

Metallographic practices for metals and non-metals. Theory and application of quantitative microscopy and image analysis. Fundamental and advanced Scanning Electron Microscopy (SEM) and Energy Dispersive Spectroscopy (EDS) analysis of metals, ceramics, and polymers. Introduction to Differential Scanning Calorimetry (DSC). 3 lectures. Prerequisite: MATE 210, MATE 215. Corequisite: MATE 406.

##### MATE 406 Materials Characterization Laboratory (2)

Interpretation of microstructures in metals and non-metals and laboratory methods for revealing and documenting such microstructures. Fundamental and advanced Scanning Electron Microscopy (SEM) and Energy Dispersive Spectroscopy (EDS) analysis of metals, ceramics, and polymers. Introduction to Differential Scanning Calorimetry (DSC). 2 laboratories. Prerequisite: MATE 210, MATE 215. Corequisite: MATE 401.

##### MATE 425 Corrosion Engineering (4)

Forms of corrosion. Influences of environmental variables on corrosion. Methods of corrosion control. 3 lectures, 1 laboratory. Prerequisite: CHEM 125 or CHEM 128, MATE 210, MATE 215.

##### MATE 430 Microfabrication (3)

Silicon-based fabrication science and technology. Oxidation, diffusion, ion implantation, etching, chemical and physical vapor deposition, photolithography. 3 lectures. Prerequisite: MATE 210. ~~Prerequisite or concurrent: MATE 360 or permission of instructor.~~ *Change effective Spring 2011.*

**MATE 435 Microfabrication Laboratory (2)**

Basic processes involved in microfabrication; cleanroom protocol, oxidation, diffusion, photolithographic and etching processes, sputtering and evaporation, process development through experimentation, device testing. Each student will be part of a 4-6 person team that will fabricate a micro electronic device or integrated circuit. 2 laboratories. Prerequisite or concurrent: MATE 430, STAT 312 or equivalent.

**MATE 440 Welding Metallurgy and Joining of Advanced Materials (3)**

Principles, primary variables, and microstructural changes associated with the joining process. Physics of energy transfer. Heat and mass balances in joining, thermodynamic and kinetic justification of solidification and near interface microstructures. Heterogeneous interfaces, adhesion, wetting. Relation between process selection, interface design, microstructure, and properties, weldability. 3 lectures. Prerequisite: MATE 210.

**MATE 445 Joining of Advanced Materials Laboratory (2)**

Laboratory to accompany MATE 440. Illustration of principles, primary variables, and microstructural changes associated with the joining process. Physics of energy transfer. Heat and mass balances in joining, thermodynamic and kinetic justification of solidification and near interface micro-structures. Heterogeneous interfaces, adhesion, wetting. Relation between process selection, interface design, microstructure, and properties, weldability. 2 laboratories. Prerequisite: MATE 210.

**MATE 446 Surface Chemistry of Materials (3)**

Surface energy. Capillarity, solid and liquid interface, adsorption. Surface areas of solids. Contact angles and wetting. Friction, lubrication and adhesion. Relationship of surface to bulk properties of materials. Applications. 3 lectures. Prerequisite: CHEM 305 or CHEM 351 or **ME 302 course in engineering thermodynamics**. *Crosslisted as CHEM/MATE 446. Change effective Spring 2011.*

**MATE 450 Failure Analysis (4)**

Procedures for analyzing failed materials and processes. Actual failure analysis of a component by each student. Topics include fracture, fatigue, wear and overload failures, exposure to techniques of metallography, electron microscopy, energy dispersive x-ray spectroscopy, chemical analysis and heat treatment. 3 lectures, 1 laboratory. Prerequisite: MATE 210, MATE 360, MATE 350.

**MATE 458 Microelectronics and Electronics Packaging (4)**

Materials, processes, and reliability of microelectronics and electronics packaging, surface mount assembly and printed circuit board fabrication. Overview of semiconductor manufacturing and optoelectronics packaging. 3 lectures, 1 laboratory. Prerequisite: MATE 210 and PHYS 133 or consent of instructor. *Crosslisted as CPE 488/IME 458/MATE 458.*

**MATE 460 Materials Selection in Mechanical Design (4)**

Materials-based approach to mechanical design. Using mechanical and physical properties of materials (performance indices) to select them for design needs (Materials Selection Charts). Detailed background of material properties – information from materials and mechanics. Numerous case studies highlight the concepts covered. 4 lectures. Prerequisite: MATE 210, MATE 222, CE 204, or consent of instructor.

**MATE 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**MATE 471 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

**MATE 481 Corporate Culture (1)**

Practical working knowledge of key corporate topics such as leadership, ethics, organizational structure, intellectual property, professional communications, life-long learning, global and social impacts of technology. The product development process. 1 activity. Prerequisite: Senior standing.

**MATE 482 Senior Project Design I (1)**

Foundations of senior project design. Completion of the preliminary stages of selecting a senior project, designing experiments, evaluating realistic constraints, conducting initial experiments, and managing a project timeline. 1 lecture. Prerequisite: Senior standing. For MATE majors.

**MATE 483 Senior Project II (2)**

Continuation of senior project. Completion of a senior project experimental component under the guidance of a faculty supervisor. Research methodology, experimental design, experimental work and data analysis. 1 lecture and supervised work. Prerequisite: MATE 482.

**MATE 484 Senior Project III (2)**

Continuation of MATE 483. Completion of a senior project data analysis and communication under the guidance of a faculty supervisor. Mathematical modeling and technical communication. 1 lecture and supervised work. Prerequisite: MATE 483.

**MATE 493 Cooperative Education Experience (2) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 6 units. Prerequisite: Sophomore standing and consent of instructor.

**MATE 494 Cooperative Education Experience (6) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 18 units. Prerequisite: Sophomore standing and consent of instructor.

**MATE 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units. Prerequisite: Sophomore standing and consent of instructor.

**MATE 500 Individual Study (1–4)**

Advanced study planned and completed under the direction of a member of department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Total credit limited to 12 units. Prerequisite: Consent of department head, graduate advisor, or supervising faculty member.

**MATE 501 Advanced Engineering Materials (4)**

An advanced treatment of the structure of matter. Physical and mechanical properties of materials including metals, alloys, ceramics, insulating materials, semiconductors, super semiconductors, polymers and composites based on detailed theoretical understanding of material microstructures. Discussions of Equilibrium diagrams, processing approaches, material selection based on thermodynamic and kinetic arguments. Degradation and failure, fitness for purpose. 4 lectures. Prerequisite: Graduate standing or permission of instructor. *Formerly MATE 570.*

**MATE 504 Research and Development in Materials Engineering (4)**

Overview of the materials science and engineering field. Current materials research and technologies, such as fuel cells, nanotechnology, etc. Emphasis on independent learning, individual research topics, and presentations. Analysis of information from different media used to comprehend how advancements in materials research and development are made. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 lectures. Prerequisite: MATE 210 and graduate standing or consent of instructor.

**MATE 510 Materials Analysis (4)**

Fundamentals of materials surface analysis methods and thin-film microanalytical techniques, including SPM, AES, XPS, SIMS, Raman and FTIR. 4 lectures. Prerequisite: MATE 210, MATE 340.

**MATE 520 X-Ray Diffraction (3)**

Theory and application of x-ray diffraction as applied to advanced materials problems such as crystal quality and identification, thin film applications and structural transformations at high and low temperatures. Course will cover techniques in sample preparation, operation of equipment and interpretation of diffraction data. 3 lectures. Prerequisite: Graduate status or instructor's permission.

**MATE 522 Advanced Ceramics (5)**

Development, utilization, and control of properties in ceramic materials (inorganic-nonmetallic solids). Emphasis on application on processing to achieve

structure and properties. Structure of crystalline ceramics and of glasses. Mechanical, thermal, optical, magnetic, and electrical properties. Application of ceramics in technology. Physical chemistry of ceramics. 4 lectures, 1 seminar. Prerequisite: Graduate standing or permission of instructor.

#### **MATE 525 X-Ray Diffraction Laboratory (2)**

X-ray diffraction laboratory experiments of advanced materials problems such as crystal quality and identification, thin film applications and structural transformations at high and low temperatures. Radiation safety training, techniques in sample preparation, operation of equipment and interpretation of diffraction data. 2 laboratories. Prerequisite: Graduate standing in engineering or science or instructor's permission. Concurrent: MATE 520.

#### **MATE 530 Biomaterials (4)**

Structure-function relationships for materials in contact with biological systems. Interactions of materials implanted in the body. Histological and hematological considerations including foreign body responses, inflammation, carcinogenicity, thrombosis, hemolysis, immunogenic and toxic properties. Microbial interaction with material surfaces, degradation. 4 lectures. Prerequisite: BIO 213, ENGR 213, MATE 210 and graduate standing or consent of instructor. *Crosslisted as BMED/MATE 530.*

#### **MATE 540 Tribology (3)**

Wear and degradation of engineering systems. Dry and lubricated wear modes, identification, and prevention. Materials selection. Friction, contact mechanics, and lubrication theory. Case studies of mechanical systems and failure analysis. Wear Modeling and testing. 3 lectures. Prerequisite: MATE 210, MATE 215.

#### **MATE 545 Tribology Laboratory (1)**

Wear testing and measurement through various processes including dry sand rubber wheel, cavitation/erosion, and simulated chemical/mechanical polishing. Wear analysis to include wear modeling, materials characterization via metallography, scanning electron microscopy, and surface profilometry. Experiments focus on real engineering systems and their degradation as a result of wear. 1 laboratory. Prerequisite: MATE 210, MATE 215, MATE 235 or consent of instructor. Corequisite: MATE 540.

#### **MATE 550 Micro Systems (4)**

Fundamentals of intelligent systems employing sensors, actuators and intelligent controls. Impact on material properties as devices shrink in the micrometer realm. Applications toward exploring nanotechnology. 4 lectures. Prerequisite: MATE 210, graduate standing or consent of instructor.

#### **MATE 555 Micro Systems Laboratory (2)**

Design, fabrication, and testing of a microfluidic device. Utilization of a rapid prototype soft lithography processing technique to create micro channels, valves, mixing chambers, etc. for controlling fluid flow dynamics. 2 laboratories. Prerequisite: Senior or graduate standing or consent of instructor. Corequisite: MATE 550. *Crosslisted as MATE/ME 555.*

#### **MATE 560 Thin-Film Processing (3)**

Thin film science and technology: deposition techniques, surface crystal notation, energy and kinetic processes, epitaxy. Schottky barriers and surface states, stress analysis, characterization techniques, electronics devices incorporating thin films. The Schedule of Classes will list topic selected. Total credit limited to 6 units. 3 lectures. Prerequisite: Graduate standing or permission of instructor.

#### **MATE 565 Thin-Film Processing Laboratory (2)**

Thin film processing and analytical techniques: direct current and radio frequency magnetron sputtering, reactive sputtering, co-evaporation, epitaxy, grazing incidence x-ray diffraction, magnetic force imaging. The Schedule of Classes will list topic selected. Total credit limited to 6 units. 2 laboratories. Concurrent: MATE 560 or consent of instructor.

#### **MATE 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Graduate standing or consent of instructor.

#### **MATE 571 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Senior or graduate standing or consent of instructor.

#### **MATE 580 Fracture Mechanics and Failure Mechanisms in Materials (4)**

Fracture modes and mechanisms in engineering materials, fracture mechanics fundamentals (stress analysis of cracks, energy analysis of fracture process). Use of fracture mechanics in design. Laboratory gives concentrated exposure to fracture development in materials, fracture surface evaluation, fracture toughness testing. 3 lectures, 1 laboratory. Prerequisite: MATE 350, or graduate standing.

#### **MATE 590 Solidification and Densification (4)**

Thermodynamics, kinetics and morphologies of solid-liquid interfaces. Heat flow in castings, crystal growth. Solidification mechanics, solute redistribution. Production, characterization and testing of metal powders. Compacting of powder. Sintering with/without liquid phase. Hot pressing, properties of sinterings as a function of processing conditions. Application of theory to the production of useful materials. 4 lectures. Prerequisite: Graduate standing or permission of instructor.

#### **MATE 599 Design Project (Thesis) (2) (2) (5)**

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis. Prerequisite: Graduate standing.

**2009-11 Cal Poly Catalog****Chemistry & Biochemistry Department****Flowchart****BS CHEMISTRY**

☐ 60 units upper division

☐ GWR

☐ 2.0 GPA

☐ USCP

\* = Required in Major/Support; also satisfies GE

Course sequencing: See flowcharts at

[www.csmadvising.calpoly.edu](http://www.csmadvising.calpoly.edu)Note: No major, support or concentration courses  
may be taken as credit/no credit.**MAJOR COURSES**

CHEM 127 General Chemistry (B3 & B4)* .....	4
CHEM 128 General Chemistry .....	4
CHEM 129 General Chemistry .....	4
CHEM 316 Organic Chemistry I .....	5
CHEM 317 Organic Chemistry II .....	5
CHEM 318 Organic Chemistry III .....	3
CHEM 319 Advanced Organic Chemistry Lab .....	2
<sup>1</sup> CHEM 331 Quantitative Analysis .....	5
CHEM 351 Physical Chemistry I .....	3
CHEM 352 Physical Chemistry II .....	3
CHEM 353 Physical Chemistry III .....	3
CHEM 354 Physical Chemistry Laboratory .....	2
CHEM 357 Physical Chemistry III Laboratory .....	1
CHEM 371 Biochemical Principles .....	5
CHEM 439 Instrumental Analysis .....	5
<sup>2</sup> CHEM 459 Undergraduate Seminar (2) or SCM	
491 Student Teacher Seminar (1) (1) .....	2
CHEM 461 Senior Project Report .....	1
CHEM 481 Inorganic Chemistry .....	3
CHEM 484 Inorganic Chemistry Lab .....	2
<sup>3</sup> Select 15 units from the list of advanced	
approved chemistry electives (a minimum of	
<del>three courses from List B</del> ) or Polymers and	
Coatings Concentration to complete major .....	15/18
List A	
CHEM 252, 341, 349, 372, 373, 377, 400 <sup>3</sup> , 401 <sup>4</sup> ,	
447, 448, 449, 465, 474, 477, 478, 485 <sup>3</sup> , 495 <sup>3</sup> ,	
528;	
BIO/CHEM 375;	
PSC/BIO 424; SCM 325, 451	
List B (Select at least 3 courses)	
CHEM 405, 414, 419, 420, 444, 445, 446, 458,	
463, 470	
(11/4/11) (11/17/14)	<b>77/80</b>

**SUPPORT COURSES**

BIO 161 Intro to Cell & Molecular Biology (B2)*	4
MATH 141, 142, 143 Calculus I, II, III (B1)* .....	4,4,4
MATH 241 Calculus IV .....	4
MATH 244 or 200-400 level STAT or CSC course	4
PHYS 141 General Physics IA .....	4
PHYS 132 General Physics II .....	4

PHYS 133 General Physics III .....	4
Physics elective (200-level and above) .....	3
	<b>39</b>

**GENERAL EDUCATION (GE)**

72 units required, 16 of which are specified in Major/Support.

→ See page 50 for complete GE course listing.

→ Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (no additional units are required)**

B1 Mathematics/Statistics * 8 units in Support .....	0
B2 Life Science * 4 units in Support .....	0
B3 Physical Science * 4 units in Major .....	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division)**

(4 units) .....	4
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	<b>56</b>
<b>FREE ELECTIVES</b> .....	<b>8/5</b>
	<b>180</b>

**Concentrations**

(Students may select the following concentration)

**Polymers and Coatings Concentration**

CHEM 444 Polymers and Coatings I .....	3
CHEM 445 Polymers and Coatings II .....	3
CHEM 446 Surface Chemistry of Materials .....	3
CHEM 447 Polymers and Coatings Lab I .....	2
CHEM 448 Polymers and Coatings Lab II .....	2
CHEM 449 Internship in Polymers and Coatings ....	2
MATE 210 Materials Engineering .....	3
	<b>18</b>

<sup>1</sup> Students should take CHEM 331 during their second year.<sup>2</sup> SCM 491 only for students pursuing Single-Subject Teaching  
Credential.<sup>3</sup> Consultation with advisor is recommended prior to selecting approved  
electives; bear in mind your selections may impact pursuit of post-  
baccalaureate studies and/or goals.<sup>4</sup> No more than 2 units may apply to approved advanced chemistry  
electives.<sup>5</sup> No more than 4 units may apply to approved advanced chemistry  
electives.

**2009-11 Cal Poly Catalog**  
**Psychology and Child Development**  
**Department**

**BS CHILD DEVELOPMENT**

☐ 60 units upper division ☐ GWR

☐ 2.0 GPA ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major or support-courses may be taken as credit/no credit.

**MAJOR COURSES**

CD 102 Orientation to the Child Dev. Major .....	2
CD 131 Observing and Interacting with Children....	4
CD 230 Preschool Laboratory .....	4
CD/PSY 254 Family Psychology .....	4
<del>CD</del> <b>PSY</b> 256 Developmental Psychology <i>4/10/09</i> ...	4
CD 304 Infant and Toddler Development .....	4
CD 305 Early/Middle Childhood Development .....	4
CD/PSY 306 Adolescence.....	4
PSY 323 The Helping Relationship .....	4
CD 329 Research Methods-Child Development .....	4
CD 330 Supervised Internship .....	4
CD 350 Developmental Issues in Education .....	4
CD 401 Perspectives on Child/Adolescent Dev .....	4
CD 413 Children, Adolescents and Technology .....	6
CD 424 Children's Learning in Families and Communities.....	4
CD 430 Advanced Internship <i>or</i> CD 432 Research Internship .....	4
CD 431 Assessing Children's Dev. and Envmts .....	4
CD 461 Senior Project Seminar .....	2
CD 462 Senior Project.....	2
	<b>72</b>

**SUPPORT COURSES**

\* = Satisfies General Education requirement

BIO 302 Human Genetics (B5)* .....	4
PSY 201/PSY 202 General Psychology (D4)* .....	4
Select one of the following:	
PSY 413/419/420/421/456/460 .....	4
Select one of the following:	
PSY <b>350/351/465/472</b> <i>12/15/09</i> .....	4
STAT 217 Intro to Statistical Concepts and Methods (B1)* .....	4
Advisor approved electives .....	16

Select 16 units from the following:

ANT 345;

BIO 306;

BUS 211;

CD 404;

COMS 308, 416, 418, 420, 421, 424;

EDUC 300, 310, 423, 433, 440, 446, 480;

ENGL 360;

ES 320, 323; ES/WGS 350;

FSN 310, 415, 416, 417;

HUM 310, 320;

KINE 308, 310, 323, 324, 354, 401, 402, 405, 443;

LS 310, 311;

MU 360;

PHIL 335, 341;

PSY 301, 314, 318, 325, 413, 419, 420, 421, 422,

456, 457, 458, 459, 460, 472;

SOC 306, 310, 311, 315, 316, 326, 406, 413;

SPAN 101, 102, 103;

TH 380;

WGS 301, 311, 320

(2/24/15)

**36**

**GENERAL EDUCATION (GE)**

72 units required, 12 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (12 units)**

B1 Mathematics/Statistics * 4 units in Support plus	4
B2 Life Science .....	4
B3 Physical Science.....	4
B4 One lab taken with either a B2 or B3 course	
B5 elective	
Area B elective (select one course from B1-B5)	
* 4 units in Support.....	0

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) * 4 units in Support.....	0
D5 Upper-division elective (not PSY courses).....	4

**Area F Technology Elective (upper division)**

(4 units) .....	4
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**60**

**FREE ELECTIVES .....**

**12**

**180**



**2009-11 Cal Poly Catalog****City and Regional Planning Department****BS CITY AND REGIONAL PLANNING**

□ 60 units upper division

□ GWR

□ 2.0 GPA

□ USCP

\* = Required in Support; also satisfies GE

Note: No major or support-courses  
may be taken as credit/no credit.**MAJOR COURSES**

CRP 101 Intro to Profession of CRP .....	1
CRP 201 Basic Graphic Skills.....	4
CRP 202 Urban Design Studio I .....	4
CRP 203 Urban Design Studio II .....	4
CRP 211 Cities: Form, Culture and Evolution .....	4
CRP 212 Introduction to Urban Planning.....	4
CRP 213 Population, Housing and Econ Apps .....	4
CRP 214 Land Use and Transportation Studies .....	4
CRP 215 Planning for and with Multiple Publics.....	4
CRP 216 Computer Applications for Planning.....	2
CRP 314 Planning Theory.....	3
CRP 315 Fiscal and Project Feasibility .....	4
CRP 336 Intro to Environmental Planning.....	4
CRP 341 Community Design Laboratory .....	4
CRP 342 Environmental Planning Methods .....	4
CRP 409 Planning Internship .....	2
CRP 410, 411 Community Planning Lab I, II .....	5,5
CRP 412 Plan Implementation .....	4
CRP 420 Land Use Law .....	4
CRP 430 Public Sector Planning Practice .....	3
<sup>3</sup> CRP 436 Collaborative Planning .....	4
CRP 461, CRP 462 Senior Project I, II or CRP 463 Senior Project Professional Practice .....	4
<sup>1</sup> Approved electives.....	12

Note: If any course listed here is taken to meet a  
curriculum requirement, it cannot be double-  
counted as an approved elective.

Select 12 units from:

AG 350; AGB 312, 315;

ANT 310, 360;

ARCE 311;

ARCH 310, 339, 401, 420, 445, 446, 447, 460, 461, 513;

ART 121, 225, 313, 388, 484;

BIO 325, 328, 415;

BRAE 239;

BUS 207, 350, 382, 384, 387, 404, 475, 477;

CE 321, 421, 424, 523, 525;

CM 325, 341, 342, 430, 431, 432, 475;

CRP 211, 310, 334, 338, 375, 400, 402, 404,  
408, 409, 424, 427, 435, 438, 442, 444, 445,  
446, 447, 452, 453, 457, 458, 470, 471, 472,  
483, 500, 505, 513, 516, 520, 525, 545, 548,  
553; (2/19/11)

CSC 270;

ECON 201, 222, 303, 304, 324, 325, 410, 431,  
432, 434, 435;

EDES 350, 406, 408, 410, 420;

ENGL 310, 317, 319;

ENGR 350;

ENVE 324, 330, 411, 421, 434, 436, 438, 439, 450,

ERSC 323, 325, 333;

GEOG 308, 317, 318, 325, 328, 333, 340, 414;

GEOL 205;

HIST 438, 468;

HNRS 212, 303, 319, 475; HUM 330, 350;

IME 314;

IT 454;

JOUR 312, 413;

KINE 405, 416, 434, 510;

LA 221, 318, 320, 330, 363, 411, 481, 482, 551, 552;

NR 142, 306, 311, 317, 318, 323, 326, 335,

404, 408, 416, 420, 425, 435, 450, 455, 465;

PHIL 321, 333, 334, 335, 336, 337, 340, 350;

POLS 310, 316, 325, 328, 330, 333, 338, 351,

375, 419, 451, 456, 459, 471, 515, 516, 517, 518;

PSC 320;

PSY 252, 302, 303, 311, 350, 351, 352, 360;

(4/3/14)

RPTA 311, 313, 314, 350, 360, 375, 405, 410,

413, 417, 424, 450;

SCM 350;

SOC 301, 309, 313, 315, 316, 323, 356, 395,

413, 421, 431;

SS 310, 321, 345, 421, 431, 433, 440, 442, 508;

STAT 313, 321; UNIV 350

Total units for Major Courses:

**97****SUPPORT COURSES**

EDES 101 Intro to Arch and Env Design.....	2
NR 306/NR 319/BIO 112 .....	4
GEOL 102 (B3)*/GEOL 205 (B3*)/CHEM 110 (B3&B4)* .....	4
MATH 118 Pre-Calculus Algebra (B1)* .....	4
POLS 316/340/349/375/471/516 (5/6/14) .....	4
<sup>2</sup> STAT 221 Intro to Probability & Statistics (5) (B1)* or STAT 217 (4) (B1)* (4/17/14) .....	5
	<b>23</b>

**GENERAL EDUCATION (GE)**

72 units required, 12 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
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<sup>1</sup> Consultation with advisor is recommended prior to selecting approved  
electives; bear in mind your selections may impact pursuit of post-  
baccalaureate studies and/or goals.<sup>2</sup> If STAT 217 is taken for 4 units then 1 additional unit of Approved  
Electives is required. (4/17/14)<sup>3</sup> An additional 4 units of upper division Approved Electives and/or  
upper division CRP courses may substitute. (2/21/15)



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A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing.....	4
<b>Area B Science and Mathematics (4 units)</b>	
B1 Mathematics/Statistics * 8 units in Support ....	0
B2 Life Science .....	4
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	
<b>Area C Arts and Humanities (20 units)</b>	
C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4
<b>Area D/E Society and the Individual (20 units)</b>	
D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4
<b>Area F Technology Elective (upper division)</b>	
(4 units).....	4
	<b>60</b>
<b>FREE ELECTIVES .....</b>	<b>0</b>
	<b>180</b>

**2009-11 Cal Poly Catalog****Civil & Environmental Engineering Department****Flowchart****BS CIVIL ENGINEERING**

☐ 60 units upper division

☐ GWR

☐ 2.0 GPA

☐ USCP

\* = Required in Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

CE 111 Introduction to Civil Engineering.....	1
<sup>1</sup> CE 112 Design Principles in Civil Engineering.....	2
<sup>1</sup> CE 113 Computer-Aided Drafting in Civ Engr .....	2
CE 201 Mechanics of Materials (6) or CE 204, CE 207 Mechanics of Materials I, II (3)(3) .....	6
CE 321, 322 Fund Transportation Engr and Lab.....	3,2
<sup>5</sup> CE 251 Numerical Methods in Civil Engineering ....	4
CE 259 Civil Engineering Materials.....	2
CE 336 Water Resources Engineering .....	4
CE 337 Hydraulics Laboratory.....	1
CE 351 Structural Analysis .....	4
CE 355 Reinforced Concrete Design.....	4
CE 356 Structural Steel Design.....	4
CE 381, 382 Geotechnical Engineering and Lab.....	4,1
CE 461, 462 or CE 466, 467 or CE 468, 469 .....	3,3
<sup>2</sup> Select one of the following: .....	4
CE 422, 440, 454, 481, 522	
<sup>2,3</sup> Technical electives .....	20
	24

In consultation with faculty advisor, select **20 24** units from: **CE 371 or CM 371**, any 400-500 level CE and ENVE courses not required in the major, ENVE 325, and a maximum of 4 units from the following list: (5/21/13)

ARCE 305, 372, 403;  
BRAE 345, 446, 447, 532;  
CE/ME 404;  
CHEM 318, 341;  
CM 333, 341, 342, 343, 364, 432, 435, 454;  
CRP 404, 408, 420, 435;  
GEOL 401, 402, 415;  
IME 314;  
MATE 425, 450;  
MATH 344;  
LA/NR 318;  
SS 421, 423, 442 (Updated 1/15/10); (9/6/11)

**74****SUPPORT COURSES**

BIO 213 and ENGR/BRAE 213 (B2)* .....	2,2
BRAE 239 Engineering Surveying .....	4
CHEM 124 Gen Chem for Engineering (B3/B4)* .....	4
CHEM 125 Gen Chem for Engineering .....	4
ENGL 149 Technical Writing for Engineers (A3)* .....	4
ENVE 331 Intro to Environmental Engineering.....	4
GEOL 201 Physical Geology .....	3
MATE 210 Materials Engineering .....	3
MATE 215 Materials Laboratory I.....	1

MATH 141, 142 Calculus I, II (B1)* .....	4,4
MATH 143 Calculus III (Add'l Area B)* .....	4
MATH 241 Calculus IV .....	4
MATH 244 Linear Analysis I .....	4
ME 211 Engineering Statics.....	3
ME 212 Engineering Dynamics .....	3
ME 302 Thermodynamics I.....	3
ME 341 Fluid Mechanics I.....	3
PHYS 141 General Physics IA (Add'l Area B)* ....	4
PHYS 132, 133 General Physics II, III .....	4,4
STAT 312 Statistical Methods for Engineers (B6)* .....	4
<sup>2,4</sup> Approved engineering science elective.....	3
Select 3 units from:	
CSC 231, 234, 270, 341, 342;	
EE 201;	
IME 314;	
MATH 206, 211, 304, 344	

**82****GENERAL EDUCATION (GE)**

72 units required, 32 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 8 units required at the 300 level.

**Area A Communication (8 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing * 4 units in Support .....	0

**Area B Science and Mathematics (no addl units req'd)**

B1 Mathematics/Statistics * 8 units in Support.....	0
B2 Life Science * 4 units in Support .....	0
B3 Physical Science * 4 units in Support.....	0
B4 One lab taken with either a B2 or B3 course	
B5 (requirement for Liberal Arts students only)	
B6 Upper-division Area B * 4 units in Support .....	0
Additional Area B units * 8 units in Support .....	0

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4

<sup>1</sup> CE 114 substitutes for CE 112 and CE 113. (7/24/09)<sup>2</sup> Consultation with advisor is recommended prior to selecting technical electives or approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.<sup>3</sup> Additional guidelines for technical electives:

- More than 4 units of coursework outside CE/ENVE is only permitted in special/unusual cases and requires written justification by the student, and approval by the Department Chair.
- CE 400, 500 and ENVE 400, 500 require a course substitution form and no more than 4 total units are allowed.
- No more than 8 combined units of CE/ENVE 470, 471, 570, 571 can be credited.
- Co-op, graduate seminar, senior project/design, and thesis courses are not permitted.
- Only one course can be credited for CE 458/558, and only one for CE 459/556.

<sup>4</sup> The courses selected to satisfy this requirement may not be used to satisfy other major, support, or general education requirements (no double counting of coursework).<sup>5</sup> If CE 251 is taken for 2 units then an additional 2 units of Technical Electives is required. (6/7/13)

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C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
<b>Area D/E Society and the Individual (16 units)</b>	
D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
	<u>40</u>
<b>FREE ELECTIVES .....</b>	<u><b>0</b></u>
	<b>196</b>

## 2009-11 Cal Poly Catalog

### Construction Management Department

#### CM–CONSTRUCTION MANAGEMENT

##### CM 102 Introduction to Construction Management (2)

Introduction to the fundamental concepts and overview of the essential elements associated with the construction profession, to include: construction trends, ethics, safety and health issues, and professional practice methods. 2 lectures.

##### CM 115 Fundamentals of Construction Management (6)

Production of drawings and specifications for residential and light commercial construction. Integration of scheduling, estimating, codes, and contracts with a project based approach. Manual drawing techniques and computer aided drafting with building information modeling develop visualization skills for architectural systems. 6 laboratories. Prerequisite: ~~CM 102~~; ARCH 106, MATH 141, and PHYS 141, ~~and consent of department head~~. *Change effective Winter 2010.*

##### CM 211 Construction Drawings and Specifications (4)

Basic skills and techniques required to produce construction drawings and specifications conforming to current building codes and standards, including using manual drawing techniques and Computer Aided Drafting. Laboratory assignments develop visualization skills in order to examine the integration of construction systems, architectural conventions, organization of working drawings and specifications. 4 laboratories. Prerequisite: Consent of department head and ARCH 105 and ARCH 106.

##### CM 212 Fundamentals of Construction Management (3)

Introduction to the fundamental concepts of construction management. Primary areas of focus are quantity surveying and basic scheduling techniques. Additional topics of study to include work activity durations and sequencing, and computer applications in scheduling. *Course does not satisfy approved technical elective requirement for CM majors.* 3 laboratories. ~~Prerequisite: CM 211~~. *Change effective Winter 2011.*

##### CM 213 Heavy Civil Construction Management (6)

Materials, methods, and techniques associated with civil engineering projects and heavy construction operations. Topics include tunnel, bridge, dam, and road construction; equipment selection; and temporary structures. Integration of scheduling, estimating, and construction contracts with a project based approach. 6 laboratories. Prerequisite: ~~CM 102~~, CM 115 and CM 221. Prerequisite or concurrent: ARCE 211; BRAE 239; and BUS 207. *Change effective Winter 2010.*

##### CM 221 Concrete and Formwork Technology (3)

Modern concepts of concrete and formwork construction. Significant developments in concrete chemistry and strength theory. Formwork systems, concrete mix design, admixtures, batching, finishing, curing and testing. Includes physically building basic forms, finishing and curing concrete, and testing of designed mixes. 2 lectures, 1 laboratory. Prerequisite: CM 102 and ARCH 106.

##### CM 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### CM 311 Residential Construction Management (6)

Materials, methods, and techniques associated with residential and light commercial construction operations. Topics include shallow foundations, timber and masonry framing, roofing, and exterior and interior finishes. Integration of scheduling, estimating, and construction contracts with a project based approach. 6 laboratories. Prerequisite: CM 213, PHYS 132, and CM 332.

##### CM 313 Commercial Construction Management (6)

Materials, methods, and techniques associated with large commercial and institutional construction operations. Topics include building systems analysis of foundations, waterproofing, structural framing, exterior cladding, and finishes. Integration of scheduling, estimating, and construction contracts with a project based approach. 6 laboratories. Prerequisite: CM 311.

##### CM 315 Fiscal and Project Feasibility (4)

Analysis of the revenue streams and costs involved in project development. Impact analysis of costs and revenues on private and public sectors included. Construction of pro-formas for various project types. 3 lectures, 1 laboratory. Prerequisite: Completion of GE Area D2. *Crosslisted as CM/CRP 315.*

##### CM 325 Construction Management Practices (3)

Overview of construction methods, building systems, construction and contract documents, cost estimating and scheduling and other practices used in the contracting process. For non-majors. 2 lectures, 1 activity. Prerequisite: Minimum junior standing or consent of instructor.

##### CM 331 Construction Accounting (3)

Fundamentals of construction accounting principles to include income recognition, job cost control, cash flow analysis and associated cost reports. 3 lectures. Prerequisite: ~~BUS 215~~, and either BUS 212 or BUS 214. *Change effective Winter 2010.*

##### CM 332 Evaluation of Cost Alternatives (3)

Basic principles of economic evaluations using fundamental concepts of time value of money to compare cost alternatives related to construction, design, and real property development. 3 lectures. Prerequisite: Completion of GE Area D2 and MATH 142 or MATH 182.

##### CM 333 Construction Contracts and Law (3)

~~Legal and contractual aspects of the construction industry. Topics of study to include the different types of contracts and clauses associated with the various project delivery systems. 3 lectures. Prerequisite: BUS 207.~~

##### CM 333 Construction Law (3)

*Change effective Winter 2010*

The intersection of law and the construction industry. Topics of study include a survey of most major legal issues potentially encountered during construction activity. 3 lectures. Prerequisite: BUS 207 and CM 313, or consent of instructor.

##### CM 341 Residential Construction Practices (3)

Materials, methods, and techniques associated with residential and light commercial construction operations. Topics of study to include shallow foundation systems, structural framing systems (timber and masonry), roofing systems, and exterior and interior finish systems. 3 laboratories. Prerequisite: CM 212.

##### CM 342 Commercial Construction Practices (3)

Materials, methods, and techniques associated with large commercial construction operations. Topics of study to include earth retainage and foundation systems, structural framing systems (steel and concrete), roofing and exterior cladding systems, conveyance systems, and interior finish systems. 3 laboratories. Prerequisite: CM 212 and ARCE 211.

##### CM 343 Heavy Civil Construction Practices (3)

Materials, methods and techniques associated with heavy civil construction operations. Topics of study to include earthwork and associated heavy equipment, roadway work, bridge work, and various other types of heavy civil construction operations. 3 laboratories. Prerequisite: CM 212 and CM 221.

##### CM 350 Computer Applications in Construction Management (2)

Application of computer systems to control construction operations in the building industry. Development of construction management games. 2 lectures. Prerequisite: CSC 110 or ARCH 250.

##### CM 352 Electrical Systems for Buildings (3)

Materials, methods and techniques associated with the construction and installation of electrical power systems, lighting systems, and other wiring systems within the building. Additional topics of study to include electrical power generation and distribution to the building. 3 laboratories. Prerequisite: CM 212.

##### CM 353 Mechanical Systems for Buildings (3)

Materials, methods and techniques associated with the construction and installation of HVAC (Heating, Ventilating, and Air Conditioning) systems, plumbing systems and fire suppression systems within the building. Additional topics of study to include domestic water supply to the building and drainage systems (storm drains and sewers) from the building. 3 laboratories. Prerequisite: CM 212.

##### CM 364 Construction Jobsite Management (3)

Procedures, methods and documentation associated with project level management of the construction process. Administrative roles and managerial relationships among the various members of the project team, primarily constructors, designers and owners. 3 laboratories. Prerequisite: CM 212.

##### CM 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to ~~6–4~~ units, *with a maximum of 4 units per quarter* ~~with a maximum of 2 units per quarter~~. Prerequisite: Consent of instructor. *Change effective Spring 2009. Change effective Spring 2010.*

**CM 411 Specialty Contracting Construction Management (6)**

Materials, methods, and techniques associated with mechanical, electrical, and plumbing systems. Topics include heating, ventilating, air conditioning, power distribution, grounding, lighting, communication, fire detection/protection, and plumbing. Integration of scheduling, estimating, and construction subcontracts with a project based approach. 6 laboratories. Prerequisite: CM 313.

**CM 413 Jobsite Construction Management (6)**

Management activities applicable to the construction process involving techniques, applications, and theory needed in a jobsite environment. Addresses the relationships, roles, and perspectives of all stakeholders. Integrated utilization of temporary structures associated with field construction. 6 laboratories. Prerequisite: CM 313 and CM 331.

**CM 415 Interdisciplinary Project Management (5)**

Team based collaborative effort to analyze and evaluate the unique interdisciplinary challenges associated with coordinating and integrating the design and construction processes to deliver a project with respect to the design, budget, schedule, quality, and performance expectations of a client. 5 laboratories. Prerequisite: CM 411 and CM 433.

**CM 430 Collaborative Process (3)**

A comprehensive set of tools and practices that allow for high performance, interdisciplinary collaborative teams to focus on extraordinary outcomes at each step of project development, including planning, design, bidding, permitting, construction and management phases. 3 activities. Prerequisite: Minimum junior standing or consent of instructor. *Crosslisted as CM/EDES 430.*

**CM 431 Integrated Project Services (3)**

Overview of project delivery methods with an emphasis on trends in integrated services project delivery. Integrated services entity organization structures, process variations, procurement and selection methodologies. Integration of planning, design and construction efforts to achieve maximum project quality and value. 3 laboratories. Prerequisite: Minimum senior standing. *Crosslisted as CM/EDES 431.*

**CM 432 Design-Build Project Management (3)**

Management issues applicable to the design and construction integration method of project delivery. Project sponsor/project advocate techniques, monitoring the evolving design, detecting and controlling change, early warning systems, cost trending, schedule impacts, cost impacts, systems integration, contract/scope modifications, procurement, contingencies, quality, and overall process control. 3 activities. Prerequisite: Minimum junior standing.

**CM 433 Design-Build Seminar (2)**

Investigation and analysis of special advanced topics in design-build project delivery and project management, and application to design-build project case studies across a wide range of project types. Topics include source selection, acquisitions, contracting, performance criteria, design management, and others. 2 lectures. Prerequisite: CM 431 or consent of instructor.

**CM 433 Integrated Project Delivery (2)**

*Change effective Fall 2009*

Investigation and analysis of special advanced topics in Integrated Project Delivery including Design-Build, CM-at-Risk, Alliance Contracting and other alternative delivery models and application across a wide range of project types. Topics include source selection, acquisitions, contracting, performance criteria, design management, and others. 2 activities. Prerequisite: ~~CM 431~~ **CM 311** (*Prerequisite change effective Winter 2010*) or consent of instructor.

**CM 435 Capital Projects Planning (4)**

Planning, programming, and management requirements of owner and end users in relationship to the design and construction of capital projects, improvements, and facilities. Identification of facility requirements, and coordination of the physical workplace, its people, and the work of the organization with the design and construction process. 4 activities. Prerequisite: **CM 313 and CM 332**, ~~CM 431~~. *Change effective Winter 2011.*

**CM 443 Management of the Construction Firm (4)**

Applications of strategic management techniques and business strategy for managing and long-range planning of the construction firm, including accounting practices. 4 activities. Prerequisite: CM 413.

**CM 444 Concrete Formwork and Other Temporary Structures (3)**

Materials, methods and techniques associated with concrete formwork construction. Design and analysis of vertical and horizontal formwork systems. Additional topics of study to include temporary earth retainage systems (large excavations and trenches), dewatering systems, access scaffolding, and various

other temporary structures utilized in building construction. 3 activities.

Prerequisite: CM 341, CM 342, CM 343, CM 352, CM 353 and CM 364, and ARCE 226.

**CM 452 Project Controls (3)**

Planning, organization, scheduling, and control of construction projects including cost control and resource control. Use of Critical Path Method (CPM) in planning and scheduling computer applications for CPM. 3 laboratories. Prerequisite: CM 341, CM 342, CM 343, CM 352, CM 353 and CM 364.

**CM 454 Construction Estimating (3)**

Methods, procedures and computer applications associated with estimating the costs of construction projects. Additional topics of study to include analysis of the bidding process and conceptual estimating. 3 laboratories. Prerequisite: CM 341, CM 342, CM 343, CM 352, CM 353 and CM 364.

**CM 461, 462 Senior Project I, II (2) (1-2)**

Selection and completion of a comprehensive project under faculty supervision. Problems to involve the student's technical and creative skills. Student proposal must be submitted and approved by project advisor and department head prior to registration for course. Construction and team projects encouraged. Prerequisite: Consent of project advisor and department head. See department for additional guidelines and requirements.

**CM 463 Senior Project: Professional Practice for Constructors (3)**

Practical application of construction management theory and practice solving problems related to the built environment. 3 laboratories. Prerequisite: **CM 413**; prerequisite or concurrent: **CM 443**, **CM 452** and **CM 454** or consent of department head. *Change effective Winter 2011.*

**CM 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**CM 471 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Consent of instructor.

**CM 475 Real Property Development Principles (4)**

Development process and its major actors: investors, developers, government agencies, environmental and local stakeholders; their development roles, objectives, approaches. Basics of urban markets and economics, financing, regulation, public planning; value added, contractual, environmental and community context factors. 4 lectures. Prerequisite: Minimum junior standing.

**CM 485 Cooperative Education Experience (3-6) (CR/NC)**

Full-time work experience in an area directly related to the construction industry for 3 months. Positions are paid and usually require relocation and registration in course for one quarter. Registration in course is required at start of work experience. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. May be repeated for credit. Major credit limited to 6 units; total credit limited to 12 units. See department for additional requirements. Prerequisite: Consent of instructor.

**CM 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in an area directly related to the construction industry for 6 months. Positions are paid and usually require relocation for two consecutive quarters. Registration in course is required at start of work experience. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. May be repeated for credit. Major credit limited to 6 units; total credit limited to 24 units. See department for additional requirements. Prerequisite: Consent of instructor.

**CM 531 Construction Cost and Material Control (3)**

Advanced theory and practice of cost and material control for construction projects. Emphasis on computer applications. 2 lectures, 1 activity. Prerequisite: Graduate standing and **CM 331** or consent of instructor. *Change effective Winter 2011.*

**CM 533 Case Histories in Contract Administration (3)**

Common points of disputes between design professional, owner, and contractor. Methods of avoidance and dispute resolution. 3 activities. Prerequisite: Graduate standing and **CM 333**, **4th year architectural practice** or consent of instructor. *Change effective Winter 2011.*

**CM 542 Advanced Construction Estimating (3)**

Advanced theory and practice of cost estimating techniques. Includes standard, conceptual and parameter estimating; bidding strategies, value engineering concepts, and risk analysis. Emphasis on computer applications. 2 lectures, 1 activity. Prerequisite: Graduate standing and ~~CM-454~~ or consent of instructor. *Change effective Winter 2011.*

**CM 552 Construction Project Scheduling (3)**

Basic and advanced network scheduling techniques as applied to architectural building projects. Emphasis on computer applications. 2 lectures, 1 activity. Prerequisite: Graduate standing and ~~CM-542~~ or consent of instructor. *Change effective Winter 2011.*

**CM 570 Selected Advanced Topics in Construction Management (4)**

Directed study of selected topics in Construction Management. The Schedule of Classes will list title selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**CM 571 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Graduate standing or consent of instructor.



**2009-11 Cal Poly Catalog****Communication Studies Department****BA COMMUNICATION STUDIES**

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA      ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major or support-courses may be taken as credit/no credit.

**MAJOR COURSES**

Take one of the following courses: .....	4
COMS 201 Advanced Public Speaking	
COMS 208 Performance of Literature	
COMS 226 Applied Argumentation	
COMS 212 Interpersonal Communication .....	4
COMS 213 Organizational Communication .....	4
COMS 217 Small Group Communication.....	4
COMS 250 Forensic Activity .....	2
COMS 311 Communication Theory .....	4
COMS 312 Communication Research Methods.....	4
COMS 322 Persuasion .....	4
COMS 330 Classical Rhetorical Theory .....	4
COMS 331 Contemporary Rhetorical Theory or	
COMS 435 American Political Rhetoric .....	4
COMS 332 Rhetorical Criticism .....	4
COMS 350 Advanced Forensic Activity.....	2
COMS 385 Media Criticism or	
COMS 419 Media Effects .....	4
COMS 460 Undergraduate Seminar.....	1
COMS 461 Senior Project.....	3
COMS electives (300–400 level) to be selected	
with advisor approval .....	16
Only 4 units of supervised instruction, including	
COMS 400, COMS 450, and COMS 485, may be	
counted here.	
	<b>68</b>

**SUPPORT COURSES**

Upper division writing intensive class.....	4
Choose from the following:	
ENGL 302, 310, 386, or JOUR 407	
Modern language 103 or 121 (FR, GER, MLL,	
SPAN) or demonstration of comparable level of	
proficiency (5/9/11) .....	4
HIST 110 Western Civilization: Ancient to	
Renaissance .....	4
HIST 111 Western Civilization: Reformation to the	
Present or HIST 202 United States History Since	
1865 or HIST 207 Freedom and Equality in	
American History or HIST 223 World History,	
1800-Present (7/26/13) .....	4
PSY 201 or PSY 202 General Psychology (D4)* ....	4
STAT 217 Intro to Statistical Concepts and	
Methods (B1)* .....	4
	<b>24</b>

**GENERAL EDUCATION (GE)**

72 units required, 8 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (16 units)**

B1 Mathematics/Statistics * 4 units in Support plus	4
B2 Life Science .....	4
B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	
B5 elective	
Area B elective (select one course from B1-B5) ...	4

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective (Not COMS) 4/13/09 .	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) * 4 units in	
Support .....	0
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division)**

(4 units) .....	4
	<b>64</b>

**FREE ELECTIVES .....** **24**

**180**

**2009-11 Cal Poly Catalog****Ethnic Studies Department****BA COMPARATIVE ETHNIC STUDIES**

□ 60 units upper division

□ GWR

□ 2.0 GPA

□ USCP

\* = Required in Major/Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

ES 112 Race, Culture and Politics in the U.S. (D1)*(USCP) .....	4
Choose any 3 courses (D3)*(USCP) .....	12
ES 241 Survey of Indigenous Studies (4)	
ES 242 Survey of Africana Studies (4)	
ES 243 Survey of Latino/a Studies (4)	
ES 244 Survey of Asian American Studies (4)	
ES 350 Gender, Race, Science & Technology (Area F)*(USCP) .....	4
ES 390 Research Methodology in Comparative Ethnic Studies .....	4
ES 410 Advanced Topics in Comparative Ethnic Studies .....	4
ES 450 Fieldwork in Comparative Ethnic Studies ...	4
ES 461 Senior Project.....	4
<sup>1</sup> Approved electives. ....	40

(Minimum 20 elective units must be 300-400 level.)

Minimum 20 units must be from courses offered by the Ethnic Studies Department. The remaining elective courses can be chosen from any ES prefix course or from the following Ethnic Studies-related courses:

AG/BUS/EDES/ENGR/HUM/SCM/UNIV 350;  
 AGB 370, 401;  
 ANT 201, 325, 415, 433;  
 ARCH 320;  
 ART 317, 318  
 BUS 402, 403, 407, 433, 446;  
 CD/EDUC 207;  
 COMS 416;  
 CRP 334;  
 DANC 321;  
 ECON 330;  
 ECON/HNRS 303;  
 EDES 406  
 ENGL 345, 346, 349;  
 ENGL/HNRS 347  
 ERSC/GEOG 325;  
 ES/HNRS 212;  
 ES/NR 308, 360; 406 (10/7/13)  
 GEOG 150, 300, 308, 340, 370;  
 HIST 206, 214, 310, 314, 339, 340, 341, 405, 406, 410, 414, 416, 417, 418, 429, 430, 431, 432, 443;  
 HIST/HNRS 207, 223;  
 HIST/WGS 434, 435;  
 HUM 312;  
 JOUR 401;

KINE 255;  
 MU 121, 221, 229, 325, 336;  
 PHIL 320;  
 POLS 225, 229, 310, 320, 324, 325, 328, 339, 343, 419, 420, 427;  
 POLS/UNIV 333;  
 PSY 303, 465; (1/24/13)  
 RELS 302, 306, 307;  
 RELS/WGS 370;  
 SOC 110, 218, 309, 315, 316, 323, 350, 351;  
 SPAN 233, 305, 340, 350, 351, 410;  
 TH 320, 390;  
 WGS 301, 320, 450

Total units for Major Courses:	<b>76</b>
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**SUPPORT COURSES**

Language other than English ( <i>all 8 units must be in the same language</i> ) .....	8
STAT 217 Introduction to Statistical Concepts and Methods (B1)* .....	4
	<b>12</b>

**GENERAL EDUCATION (GE)**

72 units required, 16 of which are specified in Major/Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (16 units)**

B1 Mathematics/Statistics *4 units in Support plus	4
B2 Life Science .....	4
B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	
B5 elective	
Area B elective (select one course from B1-B5) ...	4

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective (no ES course <b>except</b> ARCH/ES 326 or ES/NR 360) (3/2/15).....	4

**Area D/E Society and the Individual (12 units)**

D1 The American Experience (40404) *4 units in Major .....	0
D2 Political Economy .....	4
D3 Comparative Social Institutions *4 units in Major .....	0

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective (no ES course <b>except</b> ES/NR 308) (3/2/15) .....	4

**Area F Technology Elective (upper division)**

* 4 units in Major ( <i>Corrected 1/21/10</i> ) .....	<del>4</del> 0
	<del>60</del> 56

**FREE ELECTIVES..... ~~32~~ 36**

*Some free electives may need to be 300-400 level  
to ensure completion of the required minimum of  
60 units upper division. Consult college advisor  
for additional information.*

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**180**

**2009-11 Cal Poly Catalog****Computer Engineering Program****Flowchart****BS COMPUTER ENGINEERING**

□ 60 units upper division

□ GWR

□ 2.0 GPA

□ USCP

\* = Required in Major/Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

CPE 100 Computer Engineering Orientation .....	1
CPE 101 Fundamentals Computer Science I.....	4
CPE 102 Fund Computer Science II <i>or</i> CPE 108 <i>Accelerated Intro to Computer Science (3/10/10)</i>	4
CPE 103 Fund Computer Science III .....	4
CPE 129, 169 Digital Design and Lab (3)(1) <i>or</i> <i>CPE/EE 133 Digital Design (4) (10/22/10)</i>	4
CPE 229, 269 Comp Des/Assembly Lang Prog, Lab (3)(1) <i>or</i> CPE/EE 233 Comp Des/Assembly Lang <i>Prog (4) (10/22/10)</i> .....	4
CPE 315 Computer Architecture .....	4
CPE 329 Progr Logic/Micro-Based Sys Des.....	4
CPE 350 Capstone I .....	4
CPE 357 Systems Programming.....	4
CPE 450 Capstone II.....	4
CPE 453 Operating Systems I.....	4
CPE 461, 462 Senior Project I, II.....	3,2
CPE 464 Introduction to Computer Networks.....	4
CSC 141 Discrete Structures I.....	4
EE 112 Electric Circuit Analysis I.....	2
EE 211, 241 Electric Circuit Analysis II and Lab	3,1
EE 212, 242 Electric Circuit Analysis III and Lab	3,1
EE 228 Continuous-Time Signals and Systems.....	4
EE 306, 346 Semiconductor Device Electr, Lab .....	3,1
EE 307, 347 Digital Integrated Electronics and Lab	3,1
<sup>1,2,3</sup> Technical electives.....	12

Select 12 units from the following:

Any 300-500 level CPE, CSC<sup>3</sup> or EE<sup>3</sup> course;<sup>5</sup> CPE 400 (up to 4 units);

Up to four units from the following:

BMED 440, 450 (Topic: Tissue Engineering);

CHEM 312, 316;

CSC 300;

ENGR 551 (Topic: Microcirculation);

IME 301, 303, 314, 319, 351, 401, 457;

IME/MATE 458/CPE 488;

MATE 430, 435, 550, MATE/ME 555;

MATH 304, 408, 409, 412, 413, 414, 417,  
432, 451<sup>†</sup>, 453;

ME 318, 341, 342, 343, 405, 415;

PHYS 322, 323, 403, 408, 412, 424, 452;

UNIV/HNRS 424 (3/29/12)(3/1/13)

**92****SUPPORT COURSES**

BIO 213 and ENGR/BRAE 213 (B2)* .....	2,2
CHEM 124 Gen Chem for Engineering (B3/B4)*	4

<sup>1</sup> Approved CSC, EE, Math or Science elective. ....	3
Select from:	
CHEM 125,	
CSC 349,	
EE 328,	
MATE 210/215 (both needed), or	
ME 211	

ENGL 149 Technical Writing for Engineers (A3)*	4
IME 156/IME 157/IME 458 .....	2
MATH 141, 142 Calculus I, II (B1)* .....	4,4
MATH 143 Calculus III (Add'l Area B)* .....	4
MATH 241 Calculus IV .....	4
MATH 244 Linear Analysis I .....	4
<sup>4</sup> ME 211 Engr Statics <i>or</i> MATE 210, 215 (4) .....	3
PHYS 141 General Physics IA (Add'l Area B)* ....	4
PHYS 132, 133 General Physics II, III .....	4,4
PHYS 211 Modern Physics I .....	4
STAT 350 Prob/Random Processes Engr (B6)* .....	4

**60****GENERAL EDUCATION (GE)**

72 units required, 32 of which are specified in Major/Support.

→See page 50 for complete GE course listing.

→Minimum of 8 units required at the 300 level.

**Area A Communication (8 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing * 4 units in Support .....	0

**Area B Science and Mathematics (no add'l units reqd)**

B1 Mathematics/Statistics * 8 units in Support .....	0
B2 Life Science * 4 units in Support .....	0
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	
B5 (requirement for Liberal Arts students only)	
B6 Upper-division Area B * 4 units in Support.....	0
Additional Area B units * 8 units in Support.....	0

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved elective; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.<sup>2</sup> The courses selected to satisfy this requirement may not be used to satisfy other major, support, or general education requirements (no double counting of coursework).<sup>3</sup> The following courses may not be used to satisfy this requirement: COOP units; any 100 or 200 level course; BUS 499; CSC 302, 303, 310, 400, 500; EE 321, 361, 400, 460, 500, 563.<sup>4</sup> CSC/CPE 123 replaces ME 211 *or* MATE 210, 215 for freshmen and transfer students admitted Fall 2010. (5/25/10)<sup>5</sup> CPE 400 requires an approved course substitution form and up to 4 units may be used. (3/1/13)<sup>†</sup> Not for students with credit in CSC 341 or 342 or 343.

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4

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**40**

<b>FREE ELECTIVES</b> .....	<b>0</b>
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**192**

**2009-11 Cal Poly Catalog****Computer Science Department****Flowchart****BS COMPUTER SCIENCE**

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                              ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

CSC 101 Fundamentals of Computer Science I.....	4
CSC 102 Fundamentals of Computer Science II or CSC 108 Accelerated Intro Computer Science	4
CSC 103 Fundamentals of Computer Science III.....	4
CSC 141 Discrete Structures I.....	4
<sup>1</sup> CSC 225 Intro to Computer Organization (4).....	4
CSC 300 Professional Responsibilities .....	4
CSC 307 Intro to Software Engineering (4) or <sup>2</sup> CSC 308, 309 Software Engineering I, II (4)(4)	4/8
CSC 315 Computer Architecture.....	4
CSC 349 Design and Analysis of Algorithms .....	4
CSC 357 Systems Programming.....	4
CSC 430 Programming Languages I .....	4
<sup>3</sup> CSC 431 Programming Languages II .....	4
CSC 445 Theory of Computing .....	4
CSC 453 Introduction to Operating Systems.....	4
CSC 491, 492 Senior Project Design Lab I, II .....	2,3
<sup>4</sup> Technical electives. ....	28/24
Select from lists in technical electives guidelines, below.	
	<b>89</b>

**SUPPORT COURSES**

BIO 213 (2) and ENGR/BRAE 213 (2) or .....	2,2
BIO 111 (4) or BIO 115 (4) or BIO 161 (4) or BOT 121 (4) or MCRO 221 (4) or MCRO 224 (5) (B2)* (4/3/12)	
ENGL 149 Technical Writing for Engineers (A3)*	4
MATH 141, 142 Calculus I, II (B1)* .....	4,4
STAT 321 Prob/Stats for Engrs/Scientist or STAT 312 Stat Methods for Engrs (B6)* (7/23/09)	4
<sup>4</sup> Approved support electives. ....	8
The courses selected may not be used to satisfy other major, support, or General Education requirements (no double counting of coursework) Select 8 units from the following: ENGL 302, 310, 392; PSY 252, 302; RELS 370; COMS 201, 301, 315	
Mathematics/statistics electives. Select from .....	8
CSC 142; MATH 143, 206, 241, 244, 248, 306, 335, 336, 437, 470; STAT <del>322</del> 325. Corrected effective Summer 2009.	

Science elective (Add'l Area B)* Select from BIO 111, 115, 161; BOT 121; CHEM 124; MCRO 221, 224; PHYS 141 (no double counting of units)....	4
Physical science electives (B3/4)* (Add'l Area B)* CHEM 124, 125, 129 or PHYS 141, 132, 133	12
	<b>52</b>

**GENERAL EDUCATION (GE)**

72 units required, 32 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 8 units required at the 300 level.

**Area A Communication (8 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing * 4 units in Support .....	0

**Area B Science and Mathematics (no add'l units req'd)**

B1 Mathematics/Statistics * 8 units in Support.....	0
B2 Life Science * 4 units in Support.....	0
B3 Physical Science * 4 units in Support.....	0
B4 One lab taken with a B3 course	
B5 (requirement for Liberal Arts students only)	
B6 Upper-division Area B * 4 units in Support .....	0
Additional Area B units * 8 units in Support .....	0

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4

<b>FREE ELECTIVES</b> .....	<b>0</b>
	<b>181</b>

**Technical Electives Guidelines**

Courses used to satisfy any other major, support, or general education requirement are not allowed to count toward Technical Elective requirement. Credit/No Credit grading is not allowed. Contact the CSC Department for further information.

**Category 1** ..... 16**Category 1a: Prerequisites and Individual Courses**

Select 8 units from the following:

CSC/CPE 305, 341/342, 365, 369, 448, 464, 471,  
477, 480, 484, 488, 587

<sup>1</sup> CPE 129/169 and CPE 229/269 may be substituted for CSC 225.

<sup>2</sup> CSC 309 counts as technical elective.

<sup>3</sup> CSC/CPE 123 replaces CSC 431 for freshmen and transfer students admitted Fall 2010. (4/29/10) Alternately, an additional 4 units of CSC/CPE technical electives may be substituted. (2/27/12)

<sup>4</sup> Consultation with advisor is recommended prior to selecting technical electives or approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.



**Category 1b: Specialization Areas**

*Select 4 units from each of two separate areas:*

Graphics: CSC/CPE 473, 474, 475, 476, 478, or  
CSC 572

Databases: CSC/CPE 366, 466, 468, or CSC 560

Networks: CSC/CPE 465 or 564

Distributed Computing: CSC/CPE 469 or 569

OS: CSC/CPE 454, 456, 458, 556, or CSC 550

Architecture: CSC/CPE 316, 416, 459, 520, or  
CPE 482 "Robotics"

Languages/Compilers: CSC/CPE 434 or CSC 530

Software Engineering: CSC/CPE 402, 405, 406, 409,  
437; CSC 508, or 509

GUI/HCI: CSC/CPE 435, 483, 487, 581, or CSC 486

Artificial Intelligence: CSC/CPE 416, 481, 485, 489,  
580, 581, or CPE 482 "Autonomous Mobile Robots  
or Multi-Robot Systems",

Computational Sciences/Theory: CSC/CPE 449, CSC  
343, 540, or 541

**Category 2 ..... 8/12**

*Select from Categories 2a, 2b, and/or 2c.*

If CSC 308 and 309 are taken for the Major Core,  
only 8 units are required for Category 2.

**Category 2a: Additional CSC/CPE Electives**

*Select **CSC 570** or any unused course from  
Categories 1a and 1b (maximum 12 units) (5/14/13).*

**Category 2b: Auxiliary CSC/CPE Electives**

(maximum 4 units)

*Select from:*

CSC 358, 400 (requires form/approval), 479  
(maximum 2 units), 490, **496 (6/24/14)**

**Category 2c: External Electives**

(maximum 4 units)

*Select from:*

AERO 450;

ART 384;

BUS 310, 320;

CHEM **216, 217, 218**, 312, 316, 317, 318; (**7/5/12**)

ECON 339;

EE 201/251, 314, 336, 424;

ENVE 542;

GRC 316, 331, 338 ;

IME 301, 314, 356;

MATH 206, 241, 242, 244, 248, 304, 341, 350,  
412;

ME 211, 212, 405;

PHIL 412, 422;

PSY 329, 333, 351, 366, 457;

STAT 323, 324, 330

2009-11 Cal Poly Catalog

Computer Science Department

**Computer Science Minor**

Nearly all disciplines use the capabilities of computers. The minor consists of a core and upper-division courses selected in consultation with an advisor. The core provides common knowledge and skills needed by anyone who wishes to advance further in computer science. The remaining courses enable students to specialize in areas relevant to their goals.

**Prerequisite.** CSC 101 (Fundamentals of Computer Science I) must be taken *before* admission to the minor.

Admission to the minor is limited and selection is based upon the applicant's performance in CSC 101, CSC 102, CSC 103, and CSC 141. Students who intend to minor in computer science should consult the College of Engineering Advising Center website for GPA and course grade requirements for admission to the minor. In addition, they should contact the Advising Center for further information *before* planning to enter the minor.

Before formally applying, students must make an appointment at the College of Engineering Advising Center. The computer science minor is not open to CSC, CPE or Software Engineering (SE) major students. Questions concerning the minor should be directed to the Advising Center.

**Curriculum for Computer Science Minor**

**Core courses (20)**

CSC 102, 103 Fund Computer Science II, III .....	4,4
CSC 141 Discrete Structures I.....	4
CSC 225 Intro to Computer Organization .....	4
CSC 357 Systems Programming.....	4

**Advisor approved courses** ..... 12

Choose from **CSC 570** *or* CSC/CPE upper-division courses open to CSC majors. Must be approved via the CSC minor form upon acceptance to the minor.  
*(5/14/13)*

## 2009-11 Cal Poly Catalog

### English Department

#### ENGL–ENGLISH

##### ENGL 102 Basic Writing II (4) (CR/NC)

Instruction in the writing process. Practice in the strategies of writing, revising, and editing paragraphs and essays with attention paid to focus, support, and organization. Directed readings of exemplary prose. Not for baccalaureate credit. Credit/No Credit grading only. Repeatable. 4 lectures.

##### ENGL 103 Writing Laboratory (1) (CR/NC)

Directed practice in writing in a laboratory environment. Required of all students scoring below 151 on the English Placement Test (EPT). Students scoring below 146 must take an additional remedial course before registering for ENGL 103. Not for baccalaureate credit. Credit/No Credit grading only. To be taken concurrently with ENGL 134. 1 laboratory.

##### ENGL 104 Writing Lab Tutorial (1) (CR/NC)

Individual tutorials of at least three hours a week in the University Writing Lab. Practice in various essay writing strategies based on a student's needs and at a student's own pace. Preparation for freshman composition. Not for baccalaureate credit. Credit/No Credit grading only. Repeatable. 1 laboratory. Prerequisite: At least one quarter of basic writing.

##### ENGL 111 English Sentence Structure for ESL/EFL Students (4) (CR/NC)

Focus on the fundamentals of sentence patterns, sentence construction, and sentence combining within the context of the paragraph and story. Practice in writing a variety of effective sentences; practice in linking sentences in a unified paragraph controlled by a topic sentence. Not for baccalaureate credit. Credit/No Credit grading only. 4 lectures. Prerequisite: Non-native English speakers who need to develop skill in writing English sentences.

##### ENGL 112 English Paragraph Development for ESL/EFL Students (4) (CR/NC)

Focus on the fundamentals of paragraph development within the context of the essay and story. Writing paragraphs with strong topic sentences that control paragraph unity; linking paragraphs for a unified essay through transitions and the control of the thesis statement. Not for baccalaureate credit. Credit/No Credit grading only. 4 lectures.

##### ENGL 113 Essay Writing/ESL (4) (CR/NC)

Practice in essay writing with special attention paid to the writing process. Focus on using details and examples for effective development. Review of grammar problems specific to ESL students. Journal writing to enhance fluency. Directed readings of essays and fiction. Not for baccalaureate credit. Credit/No Credit grading only. 4 lectures. Prerequisite: ENGL 111 or ENGL 112, or consent of instructor.

##### ENGL 115 Graduation Writing Requirement Preparation (4) (CR/NC)

Writing practice of extemporaneous expository and argumentative essays under time pressure. Discussion and application of rhetorical and grammatical principles through critical reading of student and professional essays. Satisfactory completion of the course fulfills the Graduate Writing Requirement. Not for baccalaureate credit. Credit/No Credit grading only. 4 lectures. Prerequisite: At least two unsuccessful attempts at the GWR.

##### ENGL 133 Writing and Rhetoric for English as a Second Language Students (4) GE A1

Rhetorical principles and tactics applied to written work. Writing as a recursive process that leads to greater organizational coherency, stylistic complexity, and rhetorical awareness with an emphasis on grammatical elements appropriate for English as a Second Language students. 4 lectures. Prerequisite: ENGL 111, 112, and 113, or satisfactory score on the English Placement Test, or consent of instructor. Fulfills GE A1.

##### ENGL 134 Writing and Rhetoric (4) GE A1

Rhetorical principles and tactics applied to written work. Writing as a recursive process that leads to greater organizational coherency, stylistic complexity, and rhetorical awareness. 4 lectures. Prerequisite: Satisfactory score on the English Placement Test. Fulfills GE A1.

##### ENGL 145 Reasoning, Argumentation, and Writing (4) GE A3

The principles of reasoning in argumentation. Examination of rhetorical principles and responsible rhetorical behavior. Application of these principles to written and oral communications. Effective use of research methods and sources. 4 lectures. Prerequisite: Completion of GE Area A1 or and A2. *Crosslisted as COMS/ENGL/HNRS 145*. Fulfills GE A3. *Corrected 11/17/10*.

##### ENGL 148 Reasoning, Argumentation and Professional Writing (4) GE A3

The principles of reasoning in professional writing. Discussion and application of rhetorical principles, both oral and written, in professional environments. Study of methods, resources and common formats used in corporate or research writing. 4 lectures. Prerequisite: Completion of GE Areas A1 and A2. *Crosslisted as ENGL/HNRS 148*. Fulfills GE A3.

##### ENGL 149 Technical Writing for Engineers(4) GE A3

The principles of technical writing. Discussion and application of rhetorical principles in technical environments. Study of methods, resources and common formats used in corporate or research writing. 4 lectures. Prerequisite: Completion of GE Areas A1 and A2. For Engineering students only. *Crosslisted as ENGL/HNRS 149*. Fulfills GE A3.

##### ENGL 203 Core I: 450–1485 (4)

Representative canonical and non-canonical readings in the literature of the period. Selections may include such readings as *Beowulf*, Chaucer, Dante, a mystery or morality play, the Pearl Poet and others, as chosen by the instructor. 4 lectures. Prerequisite: Completion of GE Area A, and ENGL 251; for English majors only.

##### ENGL 204 Core II: 1485–1660 (4)

Representative canonical and non-canonical readings in the literature of the period. Selections may include such readings as Bradstreet, Donne, Milton, Shakespeare, Spenser, and others, as chosen by the instructor. 4 lectures. Prerequisite or concurrent: ENGL 203; for English majors only.

##### ENGL 205 Core III: 1660–1789 (4)

Representative canonical and non-canonical readings in the literature of the period. Selections may include such readings as Defoe, Franklin, Pope, Swift, Wheatley, and others, as chosen by the instructor. 4 lectures. Prerequisite or concurrent: ENGL 204; for English majors only.

##### ENGL 210 New Media Technology (4) (CR/NC)

An introduction to and application of new media software used for the production of online help, professional live technical presentations, and high-level technical document design, production and distribution. Credit/No Credit grading only. 4 lectures.

##### ENGL 225 Introduction to Creative Writing (4)

Creative process employed by poets, fiction writers, playwrights, and essayists. Reading model works, and writing in each of the genres. Creative process in other arts and in science. 4 lectures. Prerequisite: Completion of GE Area A.

##### ENGL 230 Masterworks of British Literature through the Eighteenth Century (4) GE C1

Covers a thousand years of British literature, from the eighth to the eighteenth century and may include such readings as *Beowulf*, *The Canterbury Tales*, *Utopia*, *Othello*, *Paradise Lost*, *Oroonoko* and *Gulliver's Travels*. 4 lectures. Prerequisite: Completion of GE Area A. Fulfills GE C1.

##### ENGL 231 Masterworks of British Literature from the Late 18<sup>th</sup> Century to the Present (4) GE C1

Broadly surveys Romantic, Victorian, Modern, and Contemporary British literature in an historical-cultural context. Investigates works from several genres and a variety of national and cultural voices. May include such writers as Wordsworth, Wollstonecraft, Dickens, G. Eliot, Wilde, Woolf, Yeats, and Gordimer. 4 lectures. Prerequisite: Completion of GE Area A. *Crosslisted as ENGL 231/HNRS 232*. Fulfills GE C1.

##### ENGL 240 The American Tradition in Literature (4) GE C1

A broadly based survey of American literature, exploring the impact of various world cultures on the evolving definition of the American experience. Literary expression of movements that shape the American character over time, such as Puritanism, Transcendentalism, and Naturalism. 4 lectures. Prerequisite: Completion of GE Area A. Fulfills GE C1.

##### ENGL 251 Great Books I: Introduction to Classical Literature (4) GE C1

Examination of the ancient epics and classical literature of Mesopotamia, Greece, and Rome. May include such readings as *The Epic of Gilgamesh*, the *Iliad*, the *Odyssey*, *Genesis*, *Exodus*, *Antigone*, the *Symposium*, the *Aeneid*, and

Marcus Aurelius's *Meditations*. 4 lectures. Prerequisite: Completion of GE Area A. *Crosslisted as ENGL/HNRS 251*. Fulfills GE C1.

**ENGL 252 Great Books II: Medieval to Enlightenment Literature (4) GE C1**

Examination of key works marking the transition from Mediterranean Classicism (c. 500 CE) to an emergent European tradition (c. 1800 CE). May include such readings as Augustine's *Confessions*, *Song of Roland*, *Egil's Saga*, the *Consolation of Philosophy*, *The Romance of Tristan*, the *Inferno*, Cellini's *Autobiography*, *Utopia*, *Princess of Cleves*, *Candide*, *Discourse on Method*, and Rousseau's *Confessions*. 4 lectures. Prerequisite: Completion of GE Area A. Fulfills GE C1.

**ENGL 253 Great Books III: Romanticism to Modernism Literature (4) GE C1**

Examination of key works marking the Romantic Revolution and the realist and modernist movements that followed in its wake. May include such readings as the poetry of Blake, Wordsworth, Eliot, Rimbaud, Plath, Ginsberg, and Stein; *Notes from Underground*, *The Death of Ivan Ilych*, *The Metamorphosis* and/or *The Hunger Artist*, *Heart of Darkness*, "Sonny's Blues," and Virginia Woolf's short fiction and essays. 4 lectures. Prerequisite: Completion of GE Area A. Fulfills GE C1.

**ENGL 260 Children's Literature (4)**

Analysis and evaluation of traditional literature, fantasy, realistic fiction, historical fiction, informational books, picture books, and poetry for children in multiple subject classroom grades K–6. Emphasis on multicultural texts. 4 lectures. Prerequisite: Completion of GE Area A. *Crosslisted as ENGL/LS 260*.

**ENGL 270 Selected Topics (1–4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

**ENGL 290 Introduction to Linguistics (4)**

Introduction to the nature of language; concepts and methods of linguistic science. 4 lectures. Prerequisite: Completion of GE Area A.

**ENGL 301 Advanced Composition – ESL (4) GWR**

Writing and critical analysis of expository and argumentative papers. Emphasis on rhetorical, stylistic, and grammatical problems specific to non-native speakers. Critical reading of essays and/or fiction. Practice in revision and editing of papers. Journal writing to promote fluency. 4 lectures. Prerequisite: Completion of GE Area A. Fulfills GWR.

**ENGL 302 Writing: Advanced Composition (4) GWR**

Writing and analysis of expository and argumentative papers at an advanced level. Special attention paid to issues of style and voice. Critical reading of models of effective writing. 4 lectures. Prerequisite: Completion of GE Area A. Fulfills GWR.

**ENGL 303 Core IV: 1789–1861 (4)**

Representative canonical and non-canonical readings in the literature of the period. May include such authors as Austen, Emerson, Hawthorne, Keats, Wordsworth, and others, as chosen by the instructor. 4 lectures. Prerequisite or concurrent: ENGL 205; for English majors only.

**ENGL 304 Core V: 1861–1914 (4)**

Representative canonical and non-canonical readings in the literature of the period. May include such authors as Arnold, Dickinson, James, Tennyson, Whitman, and others, as chosen by the instructor. 4 lecture. Prerequisite or concurrent: ENGL 303; for English majors only.

**ENGL 305 Core VI: 1914–Present (4)**

Representative canonical and non-canonical readings in the literature of the period. May include such authors as Eliot, Faulkner, Morrison, Woolf, Yeats, and others, as chosen by the instructor. 4 lectures. Prerequisite or concurrent: ENGL 304; for English majors only.

**ENGL 310 Corporate Communication (4) GWR**  
Instruction and practice in forms of communication characteristic of business and industry. 4 lectures. Prerequisite: Completion of GE Area A. Fulfills GWR.

**ENGL 317 Technical Editing (4) GWR**  
Instruction and practice in editing skills commonly used in workplace settings. Includes practical instruction in copyediting, sentence level editing, and substantive editing for accuracy and consistency. Editing documents,

illustrations, web pages for consistency and use. Application of grammar and punctuation. 4 lectures. Prerequisite: Completion of GE Area A. Fulfills GWR.

**ENGL 319 Information Design and Production (4)**

Mid-level presentation of the theory and practice involved with the production of technical documents. Focus on history, typography, information design principles, the effective integration of text and graphics, project management, and recent industry trends in software use. 4 lectures. Prerequisite: ENGL 148 or ENGL 149, ENGL 210 and consent of instructor.

**ENGL 326 Literary Criticism (4) GWR**

Theory and practice of current and traditional literary criticism, including writing and revising critical statements based on current models. 4 lectures. Prerequisite: Completion of GE Area A. Fulfills GWR.

**ENGL 330 British Literature in the Age of Belief: to 1485 (4) GE C4 GWR**

The historical development of medieval English literature through selected canonical and non-canonical works of various genres. Medieval authorship and textual practice, the relationship between gender and writing, and the forging of a national poetic identity. Interdisciplinary support material (artwork and music) illustrating key themes. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 331 British Literature in the Age of the Renaissance: 1485-1660 (4) GE C4 GWR**

The literary, historical, political, religious and scientific concerns of the Age of the Renaissance. May include such readings as More's *Utopia*, Spenser's *Faerie Queene*, Shakespeare's *Othello*, Donne's *Songs and Sonnets*, Milton's *Paradise Lost*. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 332 British Literature in the Age of Enlightenment: 1660-1798 (4) GE C4 GWR**

In-depth exploration of the dominant themes and preoccupations of the Age of Enlightenment. Historical and cultural contexts of canonical and non-canonical literature emphasized to illustrate 18<sup>th</sup> century Britons' views of themselves and their changing world. May include such writers as Dryden, Behn, Defoe, Swift, Pope, and Johnson. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. *Crosslisted as ENGL/HNRS 332*. Fulfills GWR. *Effective Fall 2010*.

**ENGL 333 British Literature in the Age of Romanticism: 1798-1832 (4) GE C4 GWR**

In-depth exploration of the literature of the British Romantic period. Cultural, historical, and philosophic contexts will also be examined in both canonical and non-canonical works. May include such writers as Blake, Wordsworth, Keats, and Wollstonecraft. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 334 British Literature in the Age of Industrialism: 1832-1914 (4) GE C4 GWR**

In-depth study of historical, philosophical, and literary reaction to the rise of the modern industrial state. Special focus on the literary response to the following: industry, democracy, class, art, and culture. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 335 British Literature in the Age of Modernism: 1914-Present (4) GE C4 GWR**

In-depth exploration of the dominant concerns and achievements of British literature from Modernism through Postmodernism. Historical and cultural contexts of canonical and non-canonical literature explored to illustrate 20<sup>th</sup> century Britain's reactions to the breakdown of traditional beliefs, the World Wars, the legacy of colonialism, the changing politics and problems of a multicultural nation. May include such writers as Conrad, Joyce, Woolf, Yeats, Heaney, Ishiguro, Walcott. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 338 Introduction to Shakespeare–London Study (4) GE C4**  
Shakespeare's works as texts, productions, and major historical, aesthetic and cultural touchstones. The author's intellectual and social influences on four centuries of theatre and his subsequent impact on literature and other arts in London. Attendance at play performances required. 3 lectures, 1 activity. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors.

**ENGL 339 Introduction to Shakespeare (4) GE C4 GWR**

Shakespeare's works as texts, productions and major historical, aesthetic and cultural touchstones. The author's intellectual and social influences on four centuries of theatre and his subsequent impact on literature and other arts. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 340 The Literary Sources of the American Character: 1600-1865 (4) GE C4 GWR**

The literature of the United States from its sources in the accounts of the early British and Spanish explorers to the works of the American Renaissance. The relationship between mainstream and marginalized voices in the American character. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 341 The Literary Sources of the American Character: 1865-1914 (4) GE C4 GWR**

Analysis of literary Realism and Naturalism in their cultural and historical contexts. May include such writers as Whitman, Dickinson, Twain, Chopin, James, Wharton, Dreiser, Norris, and Crane who are seen to accommodate the sense of danger, doubt, and disorder of the time. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 342 The Literary Sources of the American Character: 1914-1956 (4) GE C4 GWR**

The writers of the modern period and those of the early post-modern age, including writers marked by stylistic innovation and a willingness to challenge traditionally accepted standards. May include such writers as Hemingway, Fitzgerald, Stein, Hughes. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 343 Multiple Voices of Contemporary American Literature: 1956-Present (4) GE C4 GWR**

In-depth study of American fiction, poetry, and drama written since 1956. How contemporary literature examines enduring American themes and breaks new ground with the inclusion of diverse voices. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 345 Women Writers of the Twentieth Century (4) GE C4 USCP GWR**

In-depth exploration of works of 20<sup>th</sup> century women authors within their historical and cultural contexts. Analysis of canonical and non-canonical writing by women of differing classes, races, ethnicities, and sexual preferences. Literary techniques through which texts reflect or challenge such cultural constructs as gender, identity, sexuality, motherhood, etc. The emergence of a female literary tradition. May include such writers as Woolf, Rich, Kingston, Yamamoto, Morrison, Cervantes. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills USCP and GWR.

**ENGL 346 Ethnic American Literature (4) GE C4 USCP GWR**

Investigation of the primary issues, themes, and tropes of literature written in English by African-American, Asian-American, Native American, Hispanic and Jewish writers. Cultural and historical contexts explored to consider effects of marginalization on this literature, and its subsequent relation to the American canon. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills USCP and GWR.

**ENGL 347 African American Literature (4) GE C4 USCP GWR**

The writings of African Americans from the end of the eighteenth century to the present. Individual works and literary trends among African Americans of various periods and contexts: intellectual, political, and cultural. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills USCP and GWR.

**ENGL 349 Gender in Twentieth Century Literature (4) GE C4 USCP GWR**

In-depth study of issues related to male and female identity and the relations between men and women as depicted in twentieth-century fiction, poetry, non-fiction, and/or drama. How gender issues are created and viewed from different perspectives, such as social/economic class, ethnicity, and sexual orientation. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills USCP and GWR.

**ENGL 350 The Modern Novel (4) GE C4 GWR**

Readings in the modern novel in its historical and cultural context. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 351 Modern Poetry (4) GE C4 GWR**

Modern poetry, considered in its historical and cultural context. The rise of experimental styles designed to reflect the disorder of the twentieth century – fragmentation, alienation, dislocation, and the absence of connections. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 352 Modern Drama (4) GE C4 GWR**

Reading and analysis of world drama of the last 150 years, thereby enhancing student awareness of modern culture, history, ethics, politics, and the human condition. Design work, multi-media forms, art, music, and cinema as components or informing elements of the works under consideration. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 353 Drama in London (4) GE C4**

Reading in drama of the Twentieth Century and/or earlier periods, exclusive of Shakespeare, with special emphasis on form and ideas. Attendance at play performances required. 3 lectures, 1 activity. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors.

**ENGL 354 The Bible as Literature and in Literature and the Arts (4) GE C4 GWR**

The most important and representative books of the Bible. Exposure to works based on the Bible in literature, painting, sculpture, architecture, music, and film. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 360 Literature for Adolescents (4)**

Analysis and evaluation of young adult literature appropriate for classroom instruction in grades 6–12 with special attention to the relationship of young adult literature to popular culture and themes relevant to adolescents. Pedagogical approaches also explored. Twenty hours of fieldwork in secondary schools required. 3 lectures, 1 activity. Prerequisite: One of the following: ENGL 230, 231, 240, 251, 252, or 253.

**ENGL 365 Complexities of Literacy in Literature and Non-fiction Text (4)**

Cognitive elements of reading and writing processes – decoding and encoding, construction of meaning, recognizing and using text conventions of different genres. Metacognitive strategies for making sense of text. Twenty hours of fieldwork in secondary schools required. 3 lectures, 1 activity. Prerequisite: Completion of GE Area A and junior standing.

**ENGL 370 World Cinema (4) GE C4 GWR**

Major works of international cinema with emphasis on critical interpretation, on the ways film communicates visually and aurally, and on the historical and cultural contexts in which films are created. 3 lectures, 1 laboratory. Prerequisite: Junior standing; completion of GE Areas A and C1. Recommended: completion of Area C3. Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 371 Film Styles and Genres (4) GE C4 GWR**

Major films within particular cinematic genres or styles, with emphasis on critical interpretation, aesthetic appreciation, and the films' historical and cultural contexts. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 3 lectures, 1 laboratory. Prerequisite: **Junior standing; completion of GE Areas A and C1.** Recommended: **Junior standing; completion of Area C3.** Fulfills GE C4 except for English majors. Fulfills GWR. *Corrected effective Spring 2010.*

**ENGL 372 Film Directors (4) GE C4 GWR**

Films of one or more major film directors, with emphasis on critical interpretation, aesthetic appreciation, and the films' historical and cultural contexts. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 3 lectures, 1 laboratory. Prerequisite: **Junior standing; completion of GE Areas A and C1.** Recommended: **Junior standing; completion of Area C3.** Fulfills GE C4 except for English majors. Fulfills GWR. *Corrected effective Spring 2010.*

**ENGL 380 Literary Themes (4) GE C4 GWR**

Literature selected according to a particular theme. Emphasis on critical interpretation, aesthetic appreciation, and historical and cultural contexts. The



Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. *Crosslisted as ENGL/HNRS 380.* Fulfills GE C4 except for English majors. Fulfills GWR.

**ENGL 381 Diversity in Twentieth-Century American Literature (4)** **GE C4 USCP GWR**

Literature selected according to a particular theme, with a focus on issues of ethnicity and gender. Emphasis on critical interpretation, aesthetic appreciation, and historical and cultural contexts. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills USCP and GWR.

**ENGL 382 LGBT Literature and Media (4)** **GE C4 USCP GWR**

Representations of lesbian, gay, bisexual, transgendered (LGBT) individuals and issues, late 19<sup>th</sup> century to the present. Topics include the closet, homophobia, coming out, AIDS, same-sex marriage, intersections of sexuality, race, class, gender identity. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. Fulfills USCP and GWR.

**ENGL 386 Creative Nonfiction (4)** **GE C4**

Writing creative nonfiction (the memoir, the nature essay, the personal narrative, cultural criticism, literary journalism) by adding composition skills of fictional and poetic techniques. A publication workshop. Total credit limited to 8 units. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and one course from Area C. Fulfills GE C4 except for English majors.

**ENGL 387 Fiction Writing (4)** **GE C4**

How to write and read fiction. Exploring and understanding the elements of fiction writing, employing models by established writers. Total credit limited to 8 units. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and one course from Area C. Fulfills GE C4 except for English majors.

**ENGL 388 Poetry Writing (4)** **GE C4**

How to write and read poetry. Exploring a variety of formal options, employing model poems by established writers and identifying and enhancing what is best in poetry written in class. Total credit limited to 8 units. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and one course from Area C. Fulfills GE C4 except for English majors.

**ENGL 389 Creative Writing: Drama (4)**

Instruction and practice in writing, revising, and evaluating drama. Total credit limited to 8 units. 4 lectures. Prerequisite: Completion of GE Area A and one course from Area C.

**ENGL 390 The Linguistic Structure of Modern English (4)**

Linguistic analysis of the English language, including phonology, morphology, syntax, and style and dialect variation. 4 lectures. Prerequisite: Completion of GE Area A.

**ENGL 391 Topics in Applied Linguistics (4)**

Topics in applied linguistics including sociolinguistics, first and second language acquisition, literacy, bilingualism, and dialectology. Applications to teaching the English language. 4 lectures. Prerequisite: Completion of GE Area A.

**ENGL 392 English Grammar for Writers and Teachers (4)**

Linguistics-based study of standard English word categories, sentence parts and types, punctuation, and the role of sentence structure in text style and coherence; consideration of grammar standards in social context. Preparation for professional writing, editing, and teaching standard grammar. 4 lectures. Prerequisite: Completion of GE Areas A1 and A3.

**ENGL 395 History of the English Language (4)**

Linguistic approach to the history of the English language: evolution of phonology, morphology, lexicon, syntax, and semantics within the changing cultural context of the last 2000 years. 4 lectures. Prerequisite: Completion of GE Area A.

**ENGL 399 Tutor Training (2) (CR/NC)**

Studies of approaches to tutoring one-on-one. Practice in tutoring, with supervision, in the University Writing Lab. Two hours of lecture per week which reviews the special needs of ESL, dialect-different, dyslexic, and remedial students. Overview of writing lab administration and design. Credit/No Credit grading only. 2 lectures. Prerequisite: Completion of GE Area A and ENGL 302.

**ENGL 400 Special Problems for Advanced Undergraduates (1–4)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units. Prerequisite: consent of the department chair.

**ENGL 408 Internship (2–12) CR/NC**

Advanced study and part-time work experience; current innovation, practices, and problems in administration, supervision, and organization. Must be able to do independent work in career field. Weekly reports and evaluation by work supervisor required. Total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Consent of instructor.

**ENGL 411 New Media Arts I (4)**

Advanced-level presentation of new media theory, design and practice. Topics covered include, but are not limited to, interactivity theory, user-centered system design, cognitive psychology, media analysis, and basic web design theory. Total credit limited to 8 units. 4 lectures. Prerequisite: advanced skills in writing and/or graphics, and/or computer programming; upper-division standing, ENGL 148 or ENGL 149 and consent of instructor. *Crosslisted as ENGL/HNRS 411.*

**ENGL 412 New Media Arts II (4)**

Advanced level of work with the primary technologies and design/critique theories currently at use in the professional creation of new media works. Lectures and readings expand upon material presented in ENGL 411. 4 lectures. Prerequisite: ENGL 411 and consent of instructor. *Crosslisted as ENGL/HNRS 412.*

**ENGL 416 New Media Study (4)**

Theoretical, critical, or applied study of new electronic communication media. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 seminars. Prerequisite: HUM 250 or equivalent; upper division standing.

**ENGL 418 Technical Communication Practicum (2–4) (CR/NC)**

Supervised work experience in government, corporate, or volunteer setting, as approved by department chair. Placement may be student or employer initiated or through Cooperative Education. Proposal, progress reports, and final report. Total credit limited to 8 units, with a maximum of 4 units per quarter. Credit/No Credit grading only. Prerequisite: Senior standing and two technical writing courses.

**ENGL 419 Advanced New Media Projects (2) (CR/NC)**

Supervised independent projects creating new media works for academic, professional, or popular audiences. Students are paired with teachers, business people, service organizations, or others who need new media projects designed for specific uses. Total credit limited to 8 units. Credit/No Credit grading only. Prerequisite: ENGL 411 and consent of instructor.

**ENGL 420 Client-Based Technical Communication (4)**

Capstone course for the technical communication program. Students work for one or more commercial client(s) to produce a set of professional print and/or electronic documents. 4 lectures. Prerequisite: ENGL 317, ENGL 319, and consent of instructor.

**ENGL 424 Teaching English in Secondary Schools (5)**

Research-based methods of teaching English in secondary schools, with emphasis on practical approaches to teaching grammar/mechanics and the writing process in a literature-based classroom. Attention to lesson and unit planning and integration of state standards and technology. 5 lectures. Prerequisite: Completion of GE Area A, senior or graduate standing and admission to the teacher education program, or consent of instructor.

**ENGL 430 Chaucer (4)**

Selected readings from *Canterbury Tales* and Chaucer's other major poems. 4 seminars. Prerequisite: ENGL 203 and a 300-level literature course, or consent of instructor.

**ENGL 431 Shakespeare (4)**

Representative comedies, tragedies, and histories. 4 seminars. Prerequisite: ENGL 204 and a 300-level literature course, or consent of instructor.

**ENGL 432 Milton (4)**

*Paradise Lost*, *Paradise Regained*, and *Samson Agonistes*, with some attention to the minor poems. 4 seminars. Prerequisite: ENGL 204 and a 300-level literature course, or consent of instructor.

**ENGL 439 Significant British Writers (4)**

Selected British writers, as individual writers or in groups. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: The MAJOR CORE literature class in the relevant period and a 300-level literature course, or consent of instructor.



**ENGL 449 Significant American Writers (4)**

Selected American writers, as individual writers or in groups. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: The MAJOR CORE literature class in the relevant period and a 300-level literature course, or consent of instructor.

**ENGL 459 Significant World Writers (4)**

Selected world writers as individual writers or in groups. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: ENGL 203 and a 300-level literature course, or consent of instructor.

**ENGL 461 Senior Project (1)**

One-unit adjunct course which must be taken concurrently with a department-approved English 400-level course during the last two quarters of the student's undergraduate career. English majors only.

**ENGL 465 Computer Resources for English Teachers (4)**

Computer as problem-solving, teaching, research, communication, and administrative tool in English education. Lesson planning and integration of technology into the secondary English classroom, including networked communication, the World-Wide Web, educational software and appropriate hardware. Attention to ethical, rhetorical, and phenomenological implications of the use of technology in English education. 3 seminars, 1 laboratory. Prerequisite: Computer literacy.

**ENGL 468 The Rhetoric of the Image (4)**

The complicated and dependent relationship between still and moving images and written texts. How images and print communicate rhetorically with people as readers, viewers, and consumers. 4 lectures. Prerequisite: Completion of GE Area A and junior standing.

**ENGL 469 Women's Rhetoric(s): Definitions, Contexts, Issues (4)**

Theoretical questions about what constitutes women's rhetoric(s), and how women have used and accommodated traditional methods of persuasion to argue for and enact a changed world. 4 lectures. Prerequisite: Completion of GE Area A and junior standing.

**ENGL 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**ENGL 485 Cooperative Education Experience (6) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 6 units; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**ENGL 486 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 8 units; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**ENGL 487 Advanced Creative Writing: Fiction (4)**

Instruction and practice in advanced writing, revising and evaluating of fiction. Total credit limited to 8 units. 4 lectures. Prerequisite: ENGL 387 or consent of instructor.

**ENGL 488 Advanced Creative Writing: Poetry (4)**

Instruction and practice in advanced writing, revising and evaluating of poetry. Total credit limited to 8 units. 4 lectures. Prerequisite: ENGL 388 or consent of instructor.

**ENGL 489 Advanced Creative Writing: Drama (4)**

Instruction and practice in advanced writing, revising and evaluating of drama. Total credit limited to 8 units. 4 lectures. Prerequisite: ENGL 389 or consent of instructor.

**ENGL 495 Topics in Applied Language Study (4)**

Application of linguistics to human communications, human relations, and language policy and planning, or literature. The Schedule of Classes will list

topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: ENGL 290, ENGL 390 or consent of instructor.

**ENGL 497 Theories of Language Learning and Teaching (4)**

Theories of first and second language learning and acquisition in the context of teaching English as a second language/dialect. 4 lectures. Prerequisite: Eight units of linguistics courses or consent of instructor.

**ENGL 498 Approaches to Teaching English as a Second Language/Dialect (4)**

Approaches to teaching English as a second language. Attention to materials development and testing. 4 lectures. Prerequisite: ENGL 497.

**ENGL 499 Practicum in Teaching English as a Second Language/Dialect (2) (CR/NC)**

Practical experience in the English as a second language classroom under supervision of a cooperating teacher. Teaching materials development and curriculum design. Credit/No Credit grading only. 1 seminar and supervised work. Prerequisite: ENGL 497 and ENGL 498.

**ENGL 501 Techniques of Literary Research (4)**

Purposes and methods of literary research in literature. Acquaintance with printed and on-line materials of research and practical experience in collecting material, weighing evidence, reaching conclusions, and writing scholarly articles. Analysis of dissemination of scholarly information. Discussion of ethics of scholarship. 4 seminars. Prerequisite: Graduate standing in English.

**ENGL 502 Seminar in Critical Analysis (4)**

Basic approaches used by critics. Multiple points of view. Application to literary works. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 seminars. Prerequisite: Graduate standing in English.

**ENGL 503 Graduate Introduction to Linguistics (4)**

Introduction to linguistics for graduate students. Phonology, morphology, lexicon, syntax, and variation within language; application of linguistics to real-world issues. 4 seminars. Prerequisite: Graduate standing in English.

**ENGL 504 Seminar in English Linguistics (4)**

Examination of varying theoretical approaches to the structure of English, or applications of linguistic methods in the study of literature, dialectology, language acquisition, literacy, bilingualism, or discourse analysis. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing in English and one of the following: ENGL 290, ENGL 390, or ENGL 503, or consent of instructor.

**ENGL 505 Seminar in Composition Theory (4)**

Special problems in composition. Direct application of composition and rhetorical theory to composition instruction. 4 seminars. Prerequisite: Graduate standing in English, or consent of instructor.

**ENGL 506 Pedagogical Approaches to Composition (4)**

Practical problems in the teaching of English composition. Application and study of practical approaches. Discussion of classroom organization and management. Discussion of research into the nature and resolution of student writing problems. Required of all new teaching assistants in English. 4 seminars. Prerequisite: Graduate standing in English and ENGL 505, or consent of instructor. Concurrent: Teaching of ENGL 134.

**ENGL 510 Seminar in Authors (4)**

Intensive study of major British and American literary figures, singly, doubly or in small groups. Written and oral reports of individual investigation. The Schedule of Classes will list topic selected. Total credit limited to 16 units. 4 seminars. Prerequisite: Graduate standing in English. ENGL 501 strongly advised.

**ENGL 511 Seminar in American Literary Periods (4)**

American periods. Written and oral reports of individual investigation. The Schedule of Classes will list topic selected. Total credit limited to 20 units. 4 seminars. Prerequisite: Graduate standing in English. ENGL 501 strongly advised.

**ENGL 512 Seminar in British Literary Periods (4)**

British periods. Written and oral reports of individual investigation. The Schedule of Classes will list topic selected. Total credit limited to 20 units. 4 seminars. Prerequisite: Graduate standing in English. ENGL 501 strongly advised.

**ENGL 513 Seminar in Special Topics (4)**

Themes and ideas in language and literature not ordinarily covered in the routine graduate course offerings. Written and oral reports of individual investigation. The Schedule of Classes will list topic selected. Total credit limited to 16 units. 4 seminars. Prerequisite: Graduate standing in English. ENGL 501 strongly advised.

**ENGL 515 Apprenticeship in Teaching Literature, Composition, or Linguistics at College Level (2) (CR/NC)**

Supervised experience in planning, teaching, and evaluating a 100-, 200- or 300-level linguistics, composition, or literature class taught by English faculty member. Planning, selecting texts, conferring with students, discussing and constructing assignments, lecturing, leading small group discussions. Credit/No Credit grading only. Total credit limited to 8 units. Prerequisite: Graduate standing in English and **completion of 8 units of ~~successful~~ ENGL 500 level** graduate work. *Clarified effective Spring 2011.*

**ENGL 570 Selected Advanced Topics (4)**

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 4 lectures. Prerequisite: Graduate standing or consent of instructor.

**ENGL 587 Graduate Seminar in Creative Writing: Fiction (4)**

Graduate instruction in writing, revising, and evaluating fiction. Total credit limited to 8 units. 4 seminars. Prerequisite: Graduate standing in English and ENGL 487, or consent of instructor.

**ENGL 588 Graduate Seminar in Creative Writing: Poetry (4)**

Graduate instruction in writing, revising, and evaluating poetry. Total credit limited to 8 units. 4 seminars. Prerequisite: Graduate standing in English and ENGL 488, or consent of instructor.

**ENGL 590 Directed Study (1-4)**

Supervised independent or group study of special problems in selected areas of language, composition, or literature. Total credit limited to 12 units. Prerequisite: Graduate standing in English and the permission of the graduate advisor.

## 2009-11 Cal Poly Catalog

### Honors Program

## HNRS–HONORS

### HNRS 100 Orientation to the University Honors Program (2) (CR/NC)

Introduction to the Honors Program and overview of the University. Topics include the role of higher education, development of leadership skills, career advising, and guest speakers from the Cal Poly community. For University Honors Program students only. Credit/No Credit grading only. 1 lecture, 1 activity.

### HNRS 101 Public Speaking (4) GE A2

Introduction to the principles of public speaking. Practical experience in the development, presentation, and critical analysis of speeches to inform, to persuade, and to actuate. Not open to students with credit in COMS 102. 4 lectures. *Crosslisted as COMS/HNRS 101.* Fulfills GE A2.

### HNRS 112 Race, Culture and Politics in the United States (4) GE D1 USCP

Introductory and interdisciplinary study of the ways that race and ethnicity are created by both historical processes and American institutional formation – specifically social, political, economic, legal and cultural institutions. Special attention paid to the interlocking systems of race, class, gender and sexuality. 4 lectures. *Crosslisted as ES/HNRS 112.* Fulfills GE D1 and USCP.

### HNRS 131 General Physics I (4) GE B3 & B4

Fundamental principles of mechanics. Vectors, particle kinematics. Equilibrium of a rigid body. Work and energy, linear momentum, rotational kinematics and dynamics. Primarily for engineering students, and for students majoring in the physical sciences. Not open to students with credit in PHYS 141. 3 lectures, 1 laboratory. Prerequisite: MATH 141 with grade C- or better and MATH 142 or MATH 182 (or concurrent enrollment). Recommended: high school physics. For ME and AERO students only. *Crosslisted as HNRS/PHYS 131.* Fulfills GE B3 & B4.

### HNRS 132 General Physics II (4) GE B3 & B4

Oscillations, waves in elastic media, sound waves. Temperature, heat and the first law of thermodynamics. Kinetic theory of matter, second law of thermodynamics. Geometrical and physical optics. 3 lectures, 1 laboratory. Prerequisite: PHYS 131, PHYS 141 or HNRS 131. *Crosslisted as HNRS/PHYS 132.* Fulfills GE B3 & B4.

### HNRS 134 General Physics IA (4) GE B3

Fundamental principles of mechanics. Vectors, particle kinematics. Equilibrium of a rigid body. Work and energy, linear momentum, rotational kinematics and dynamics. Primarily for engineering and science students. Not open to students with credit in HNRS/PHYS 131. 4 lectures. Prerequisite: MATH 141 with grade C- or better and MATH 142 or MATH 182 (or concurrent enrollment). Recommended: High school physics. *Crosslisted as HNRS 134/PHYS 141.* Fulfills GE B3.

### HNRS 141, 142, 143 Calculus I, II, III (4) (4) GE B1

Limits, continuity, differentiation, integration. Techniques of integration, applications to physics, transcendental functions. Infinite sequences and series, vector algebra, curves. 4 lectures. 141 prerequisite: Completion of ELM requirement and passing score on appropriate Mathematics Placement Examination, or MATH 118 and high school trigonometry, or and MATH 119 or equivalent. 142 prerequisite: HNRS/MATH 141 with a grade of C- or better or consent of instructor. 143 prerequisite: HNRS/MATH 142. *Cross-listed as HNRS/MATH 141, 142, 143.* Fulfills GE B1. *Corrected 1/26/11. Change effective Spring 2011.*

### HNRS 145 Reasoning, Argumentation, and Writing (4) GE A3

The principles of reasoning in argumentation. Examination of rhetorical principles and responsible rhetorical behavior. Application of these principles to written and oral communications. Effective use of research methods and sources. 4 lectures. Prerequisite: Completion of GE Areas A1 or and A2. *Cross-listed as ENGL/COMS/HNRS 145.* Fulfills GE A3. *Corrected 11/17/10.*

### HNRS 148 Reasoning, Argumentation and Professional Writing (4) GE A3

The principles of reasoning in technical writing. Discussion and application of rhetorical principles, both oral and written, in technical environments. Study of methods, resources and common formats used in corporate or research writing. 4 lectures. Prerequisite: Completion of GE Areas A1 and A2. *Crosslisted as ENGL/HNRS 148.* Fulfills GE A3.

### HNRS 149 Technical Writing for Engineers (4) GE A3

The principles of technical writing. Discussion and application of rhetorical principles in technical environments. Study of methods, resources and common formats used in corporate or research writing. 4 lectures. Prerequisite: Completion of GE Areas A1 and A2. For Engineering students only. *Crosslisted as ENGL/HNRS 149.* Fulfills GE A3.

### HNRS 200 Special Problems for Undergraduates (1–2) (CR/NC)

Individual investigation, research, projects, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Credit/No Credit grading only. Prerequisite: Consent of instructor and Honors Program.

### HNRS 201 Survey of Economics (4) GE D2

Basic principles of microeconomics and macroeconomics. Emphasis on applications to current national and global economic issues. For majors requiring one quarter of economics. Not open to students having previous credit in ECON 222 or equivalent. 4 lectures. *Crosslisted as ECON/HNRS 201.* Fulfills GE D2.

### HNRS 207 Freedom and Equality in American History (4) GE D1 USCP

The multiple and conflicting ways in which various Americans (defined in terms of race, class and gender) have struggled to formulate and promote their own understandings of freedom and equality, from the pre-conquest era to the present. 4 lectures. *Crosslisted as HIST/HNRS 207.* Fulfills GE D1 and USCP.

### HNRS 212 Global Origins of United States Cultures (4) GE D3 USCP

How the global dispersal of Europeans, Asians, and Africans, the hemispheric dispersal of Latin Americans, and the forced internal migration of Native Americans have contributed to American cultural heritage and the struggles for ethnic, class and gender equality, and justice. 4 lectures. *Crosslisted as ES/HNRS 212.* Fulfills GE D3 and USCP.

### HNRS 216 Comparative Social Movements (4) GE D3

History of global social movements from the late nineteenth century to the present. May include, but not limited to: socialism, nationalism, feminism, fascism and communism, pacifism, life reform, gay liberation, indigenous peoples' movements, and environmentalism. Includes a service learning component. 4 lectures. *Crosslisted as HIST/HNRS 216.* Fulfills GE D3. *Effective Spring 2010.*

### HNRS 223 World History, 1800 to Present (4) GE D3

Comparative history of Western and non-Western societies in global perspective. History of cross-cultural exchange, interaction, and conflict in the making of the modern world, with focus on the economic, political, and cultural transformations that facilitated and emerged from imperialism. 4 lectures. *Crosslisted as HIST/HNRS 223.* Formerly HIST/HNRS 215. Fulfills GE D3.

### HNRS 230 Philosophical Classics: Knowledge and Reality (4) GE C2

Critical examination of primary philosophical texts, from the ancient and modern periods, with focus on the nature of reality, and the sources and limits of human knowledge. 4 lectures. Prerequisite: Completion of GE Area A. *Crosslisted as HNRS/PHIL 230.* Fulfills GE C2. *Change effective Spring 2010.*

### HNRS 230 Philosophical Classics: Metaphysics and Epistemology (4) GE C2

Study of several classic works from the history of philosophy on issues in metaphysics and epistemology. At least one will be from the Ancient period, and at least one from the Modern era. No more than one from the twentieth century. 4 lectures. Prerequisite: Completion of GE Area A. *Crosslisted as HNRS/PHIL 230.* Fulfills GE C2.

### HNRS 231 Philosophical Classics: Ethics and Political Philosophy (4) GE C2

Readings from primary philosophical texts, from the ancient and modern periods, with focus on the identification, evaluation and contemporary relevance of the central ethical and political themes and arguments presented in them. 4 lectures. Prerequisite: Completion of GE Area A. *Crosslisted as HNRS/PHIL 231.* Fulfills GE C2.

### HNRS 232 Masterworks of British Literature from the Late 18<sup>th</sup> Century to the Present (4) GE C1

Broadly surveys Romantic, Victorian, Modern, and Contemporary British literature in an historical-cultural context. Investigates works from several genres and a variety of national and cultural voices. May include such writers as Wordsworth, Wollstonecraft, Dickens, G. Eliot, Wilde, Woolf, Yeats, and Gordiner. 4 lectures. Prerequisite: Completion of GE Area A. *Crosslisted as ENGL 231/HNRS 232.* Fulfills GE C1.

**HNRS 241 Calculus IV (4)**

Partial derivatives, multiple integrals, introduction to vector analysis. 4 lectures. Prerequisite: MATH 143. *Crosslisted as HNRS/MATH 241.*

**HNRS 244 Linear Analysis I (4)**

Separable and linear ordinary differential equations with selected applications; numerical and analytical solutions. Linear algebra: vectors in n-space, matrices, linear transformations, eigenvalues, eigenvectors, diagonalization; applications to the study of systems of linear differential equations. 4 lectures. Prerequisite: MATH/HNRS 143 or consent of instructor. *Crosslisted as HNRS/MATH 244.*

**HNRS 251 Great Books I: The Ancient and Classical World—From Myth to Reason (4) GE C1**

Examination of the ancient epics and classical literature of Mesopotamia, Greece, and Rome. Representative readings include "The Epic of Gilgamesh," "The Iliad," "The Odyssey," "Genesis," "Exodus," "Antigone," "The Symposium," "The Aeneid," and Marcus Aurelius's "Meditations." 4 lectures. Prerequisite: Completion of GE Area A. *Crosslisted as ENGL/HNRS 251.* Fulfills GE C1.

**HNRS 270 Selected Topics (1–4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

**HNRS 299 Honors Group Seminar (1) (CR/NC)**

Students in the Honors Program are required to take at least eight courses for honors credit before graduation. Taking an Honors course may not be possible due to scheduling conflicts or unavailability of courses. This course allows students to engage in honors-level work in a standard, non-honors course on a group basis. Credit/No Credit grading only. Total credit limited to 4 units; repeatable in same term. Must achieve a B or better in the related standard course. 1 seminar.

**HNRS 303 Economics of Poverty, Discrimination and Immigration (4) GE D5 USCP**

Economic analysis of the cause, extent and impact of poverty, discrimination and immigration and of the policies designed to address these socioeconomic issues. Emphasis on the experience of African-Americans, Latinos, and women in the United States. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A, D1, and either ECON 221 and ECON 222, or ECON 201. *Crosslisted as ECON/HNRS 303.* Fulfills GE D5 except for Economics majors. Fulfills USCP.

**HNRS 304 Values and Technology (4) GE C4**

Humanistic investigation into the theoretical and practical applications of technology with specific reference to the social effects of technological change. For all majors. Non-technical. 4 lectures. Prerequisite: Completion of GE Area A and one course from Area C. *Crosslisted as HNRS 304/HUM 303.* Fulfills GE C4.

**HNRS 310 Air and Space (4) GE Area F**

Technological innovations that have led to modern aircraft and spacecraft as viewed from an historical perspective. Development of aerodynamics, propulsion systems, light-weight structures, and control systems. How aviation has affected, and been affected by, history. Impact of aviation on society, including civil and military aircraft/spacecraft. Federal regulation of aviation, including air traffic control and airlines. Future developments in air and space technology. 4 lectures. Prerequisite: Junior standing and Completion of GE Area B.. *Crosslisted as AERO/HNRS 310.* Fulfills GE Area F.

**HNRS 311 Computers for Poets (4) GE Area F**

How computers and computer devices work. Introduction to software systems and applications. How computers connect with various media including images, speech and data. How information is encoded and transmitted across networks. Relationship between the computer and human information processing. 4 lectures. Prerequisite: Junior standing and completion of GE Area B. *Crosslisted as CSC 310/HNRS 311.* Fulfills GE Area F.

**HNRS 319 Natural Resource Ecology, Theories and Applications (4) GE B5**

Scope and nature of "ecology" in modern society, including resource terminology and classifications systems; dynamics of natural systems (energy exchange and cycles); man's role as a principle agent of change; environmental impacts; historical perspective including people (ethnicity); and the future environment. 3 lectures, 1 laboratory. Prerequisite: Completion of GE Area B2. *Crosslisted as HNRS/NR 319.* Fulfills GE B5.

**HNRS 320 Values, Media, and Culture (4) GE C4**

Contemporary popular culture and its relationship to the great art and literature of the past. Discussion of television, films, advertising, best sellers, popular magazines, children's stories, comics, and the great tradition of literature. 4

lectures. Prerequisite: Completion of GE Area A and one course from Area C. *Crosslisted as HNRS/HUM 320.* Fulfills GE C4.

**HNRS 321 Undergraduate Research Methods and Practice (4)**

Research methods and tools for sciences and humanities, including formulating a research question, designing a study, using the scientific method to conduct and analyze surveys, and analyzing data. Emphasis on working in interdisciplinary research teams. Total credit limited to 8 units. 2 lectures, 2 activities. Prerequisite: Completion of GE Areas A and B1, and consent of instructor. *Crosslisted as HNRS/UNIV 321.*

**HNRS 322 Leadership and Project Management (2)**

Theory and practice in leadership and project management skills for engineering design teams. Basic issues related to, and tools used for, managing projects and concepts comprising project management. Emphasis on situations requiring resolutions and management decisions by groups representing various elements of an enterprise. 2 lectures. Prerequisite: Junior standing in an engineering program, and one course in engineering design, or consent of instructor. *Crosslisted as HNRS/IME/MATE 322.*

**HNRS 324 The Historical Novel in the United States, 1960s to the Present (4) GE D5**

An introduction to the historical novel as it has developed in the United States since the 1960s. Exploration of how historical novels typically represent the past and the ways in which they change our notion of what counts as "history." 4 lectures. Prerequisite: Junior standing; completion of GE Area A, D1 and any other lower-division Area D course. History majors will not receive GE Area D5 credit. *Crosslisted as HIST/HNRS 324.* Fulfills GE D5.

**HNRS 332 British Literature in the Age of Enlightenment: 1660-1798 (4) GE C4 GWR**

In-depth exploration of the dominant themes and preoccupations of the Age of Enlightenment. Historical and cultural contexts of canonical and non-canonical literature emphasized to illustrate 18<sup>th</sup> century Britons' views of themselves and their changing world. May include such writers as Dryden, Behn, Defoe, Swift, Pope, and Johnson. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for English majors. *Crosslisted as ENGL/HNRS 332.* Fulfills GWR. *Effective Fall 2010.*

**HNRS 375 Technology and the Environment: A Seminar on Contemporary Issues (4)**

Interdisciplinary exploration of significant environmental issues (local, regional, national, or global) where technology is a major cause and/or offers a possible solution. 4 seminars. Prerequisite: Completion of GE Area A and two courses from Areas D1, D2, D3. Honors Program membership or nomination by CRP department head. *Crosslisted as CRP/HNRS 375.*

**HNRS 380 Literary Themes (4) GE C4 GWR**

Literature selected according to a particular theme. Emphasis on critical interpretation, aesthetic appreciation, and historical and cultural contexts. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. English majors will not receive GE C4 credit. *Crosslisted as ENGL/HNRS 380.* Fulfills GE C4 and GWR.

**HNRS 391 Appropriate Technology for the World's People: Development (4) GE D5**

A broad overview of international development and appropriate design for sustainability. Besides traditional classroom work, students work in teams to address problems with technical solutions. Collaboration with mentors from the university, private sector, and nonprofits serves to provide diverse background and project mentorship. 4 lectures. Prerequisite: Junior standing; completion of GE Area A, two courses from GE D1-D4 and consent of instructor. *Crosslisted as HNRS/UNIV 391.* Fulfills GE D5.

**HNRS 392 Appropriate Technology for the World's People: Design (4) GE Area F**

Addresses the needs of international impoverished communities with technological solutions, which are inexpensive, ecologically sustainable, and socially appropriate. Group study of target communities, and design and construction of an appropriate technology prototype. Not open to students with credit in UNIV 492. 3 lectures, 1 laboratory. Prerequisite: Junior standing and completion of GE Area B, or graduate standing. Recommended: UNIV 391, GE Area D2, and GE Area D3. *Crosslisted as HNRS/UNIV 392.* Fulfills GE Area F.

**HNRS 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of Honors Program Director.

**HNRS 411 New Media Arts I (4)**

Advanced-level presentation of new media theory, design and practice. Topics covered include, but are not limited to, interactivity theory, user-centered system design, cognitive psychology, media analysis, and basic web design theory. Total credit limited to 8 units. 4 lectures. Prerequisite: Advanced skills in writing and/or graphics, and/or computer programming; upper-division standing, ENGL 148 or ENGL 149 and consent of instructor. *Crosslisted as ENGL/HNRS 411.*

**HNRS 412 New Media Arts II (4)**

Advanced level of work with the primary technologies and design/critique theories currently at use in the professional creation of new media works. Lectures and readings expand upon material presented in HNRS/ENGL 411. 4 lectures. Prerequisite: HNRS/ENGL 411 and consent of instructor. *Crosslisted as ENGL/HNRS 412.*

**HNRS 424 Design of Museum Displays on Science, Engineering, and Technology (4)**

The design and creation of educational museum displays that highlight science, engineering, and technology. Projects done by multidisciplinary teams and for clients in the community. Emphasis on design, teamwork, service learning and project management. 3 lectures, 1 laboratory. Prerequisite: GE Area B or Area F. *Crosslisted as HNRS/UNIV 424.*

**HNRS 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**HNRS 471 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

**HNRS 475 Sustainable Forest and Environmental Practices (15)**

Typical modules related to sustainable resource management: ecosystem sampling and inventory methods, photo interpretation, hydrologic resources, road condition, project impact analysis, best management practices. Topics covered vary from term to term depending on the priority for learning modules. Residency at Swanton Pacific and extended field trips required. 10 lectures, 5 activities. Prerequisite: Completion of Area B and consent of instructor. *Crosslisted as HNRS/NR 475.*

**HNRS 490 President's Seminar: Science, Society and the University (1-4) (CR/NC)**

Development of higher education in the United States; the role of science and research in the University; and the response of higher education to changing economic, political and social demands. Credit/No Credit grading only. 1-4 seminars. Prerequisite: Senior standing, GPA of at least 3.0, or consent of instructor. *Crosslisted as HNRS/HUM 490.*

**HNRS 499 Honors Group Seminar (1) (CR/NC)**

Students in the Honors Program are required to take at least eight courses for honors credit before graduation. Taking an Honors course may not be possible due to scheduling conflicts or unavailability of courses. This course allows students to engage in honors-level work in a standard, non-honors course on a group basis. Credit/No Credit grading only. Total credit limited to 4 units, repeatable in same term. Must achieve a B or better in the related standard course. 1 seminar.



## 2009-11 Cal Poly Catalog

### Communication Studies Department

## COMS–COMMUNICATION STUDIES

### COMS 101 Public Speaking (4) GE A2

Introduction to the principles of public speaking. Practical experience in the development, presentation, and critical analysis of speeches to inform, to persuade, and to actuate. Not open to students with credit in COMS 102. 4 lectures. *Crosslisted as COMS/HNRS 101.* Fulfills GE A2.

### COMS 102 Principles of Oral Communication (4) GE A2

Introduction to the fundamentals and principles which underlie effective oral communication. Practical experience in various types of speaking situations: informative speaking, persuasive speaking, and panel discussion. Not open to students with credit in COMS 101. 4 lectures. Fulfills GE A2.

### COMS 126 Argument and Advocacy (4) GE A3

The nature of critical thinking as applied in written and oral argument. Analysis of inductive and deductive reasoning. Analysis of reasoning, argument, forms of support and fallacies of argument and language. Instruction in and practical experience in writing sound persuasive arguments and engaging in oral argumentation assignments. 4 lectures. Prerequisite: Completion of GE Area A1 or A2. Fulfills GE A3.

### COMS 145 Reasoning, Argumentation, and Writing (4) GE A3

The principles of reasoning in argumentation. Examination of rhetorical principles and responsible rhetorical behavior. Application of these principles to written and oral communications. Effective use of research methods and sources. 4 lectures. Prerequisite: Completion of GE Area A1 or A2. *Crosslisted as COMS/ENGL/HNRS 145.* Fulfills GE A3.

### COMS 201 Advanced Public Speaking (4)

Further consideration of the principles of public address. Advanced practice in manuscript, extemporaneous, and impromptu speaking. 4 lectures. Prerequisite: COMS 101 or COMS 102.

### COMS 208 Performance of Literature (4) GE C3

Poetry, prose, nonfiction and dramatic literature performed to communicate the levels of meaning within each work to the audience. **Communication Studies majors will not receive GE-C3 credit.** 4 lectures. Prerequisite: Completion of GE Areas A and C1. Fulfills GE C3. *Change effective Summer 2009.*

### COMS 212 Interpersonal Communication (4)

Introduction to the interaction process in two-person (dyadic) communication settings. Emphasis on the functions of varying messages in the initiation, development, maintenance and termination of personal relationships. 4 lectures. Prerequisite: COMS 101 or COMS 102.

### COMS 213 Organizational Communication (4)

Introduction to communication within the organization and between the organization and its environment. Effects of networks, superior/subordinate message patterns, team building, climate, message flow patterns and distortion on organizational effectiveness. 4 lectures. Prerequisite: COMS 101 or COMS 102.

### COMS 217 Small Group Communication (4)

Basic principles and techniques of small group communication. Survey of the importance of discussion in contemporary society, including study of and practice in informal group discussion, panel discussion, symposium, and forum. 4 lectures. Prerequisite: COMS 101 or COMS 102.

### COMS 226 Applied Argumentation (4)

Intermediate level course in the theory and practice of everyday argument. Select theories of argumentation, and practical experience arguing in a wide variety of contexts. 4 lectures. Prerequisite: Completion of GE Area A3.

### COMS 250 Forensic Activity (2)

Introduction to competitive debate activities. Research, analysis, and debating about contemporary issues. Any student who wishes to receive academic credit for participation in such activities during the quarter should enroll. Total credit limited to 6 units. 2 laboratories. Prerequisite: COMS 101 or COMS 102 or equivalent experience.

### COMS 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### COMS 301 Business and Professional Communication (4)

Communication skills and functions for all levels of organizational employees. Interviewing, oral briefings, motivational and conference speaking. 4 lectures. Prerequisite: COMS 101 or COMS 102.

### COMS 308 Group Performance of Literature (4) GE C4

Examination and experience in the various modes of group performance of literature: Readers Theatre, Chamber Theatre, Story Theatre. Scripting; directing; performing and critiquing of group performance of literature. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A, C3 and junior standing. Fulfills GE C4 except for Communication Studies majors.

### COMS 311 Communication Theory (4)

Survey of human communication theories including interpersonal, small group, organizational, persuasion, nonverbal, intercultural, and media. Philosophical foundations for understanding communication from a social science perspective. 4 lectures. Prerequisite: Completion of GE Area A.

### COMS 312 Communication Research Methods (4)

Exploration of communication research strategies and methodologies. Basic methods of designing research in empirical communication studies. 4 lectures. Prerequisite: COMS 311 and STAT 217, junior standing. For majors only.

### COMS 315 Intergroup Communication (4)

Survey of theory and research concerning language and communication between various social groups (e.g., age, sex, race, sexual orientation), with an emphasis on understanding the role verbal, nonverbal, and mass communication plays in identity formation and differentiating group members. 4 lectures. Prerequisite: Completion of GE Area A.

### COMS 317 Technology and Human Communication (4)

Impact of technological change upon human communication. Past, present, and future technological developments that have affected how humans communicate. Emphasis on new communication technologies. 4 lectures. Prerequisite: Completion of GE Area B, and junior standing.

### COMS 322 Persuasion (4)

Theory of persuasion with particular emphasis upon social psychological principles of influence. Analysis of various forms of persuasion, social influence and propaganda. 4 lectures. Prerequisite: Completion of GE Area A.

### COMS 330 Classical Rhetorical Theory (4)

Early development of rhetorical theory in Greco-Roman civilization. Analysis of the canons of rhetoric. Rhetorical thought of Sophists, Isocrates, Plato, Aristotle, Cicero and Quintilian. 4 lectures. Prerequisite: Completion of GE Area A requirements and junior standing.

### COMS 331 Contemporary Rhetorical Theory (4)

Rhetoric's role in contemporary culture. Issues: political advocacy; science, technology and mass persuasion; ethics and rhetoric. Representative theorists: Burke, Weaver, Richards, Toulmin and McLuhan. 4 lectures. Prerequisite: Completion of GE Area A and junior standing.

### COMS 332 Rhetorical Criticism (4)

Theory and method used in the analysis and evaluation of rhetorical discourse. Study of critical essays. Practice in interpreting and evaluating persuasive discourse. 4 lectures. Prerequisite: Junior standing, COMS 330.

### COMS 350 Advanced Forensic Activity (2)

Advanced participation in intercollegiate speech activities. Intercollegiate tournament competition, judging speech competition and other communication-related public service on campus and in the community. Total credit limited to 6 units. 2 laboratories. Prerequisite: COMS 250.

### COMS 385 Media Criticism (4)

Theory and method used in analyzing media from critical, rhetorical, and cultural perspectives. Practice in interpreting and evaluating news, advertising, prime-time television, the Internet, and other mass-mediated texts, with special attention to relationships among media, identity, and political action. 4 lectures. Prerequisite: Completion of GE Area A, and junior standing.

### COMS 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Consent of instructor, junior standing.

### COMS 413 Advanced Organizational Communication (4)

Describing and measuring the organization's human message system. Planning and implementing communication training and development for the organization. New functions, careers and opportunities for the communication professional. 4 lectures. Prerequisites: Junior standing, COMS 301.



**COMS 416 Intercultural Communication (4)****USCP**

Examination and clarification of cultural aspects of communication within and among ethnic groups. 4 lectures. Prerequisite: Completion of GE Area A. Fulfills USCP.

**COMS 418 Health Communication (4)**

Communication in health contexts. Topics include interpersonal communication (e.g., health professional/patient), group and organizational communication (e.g., health-related groups), and mass communication (e.g., persuasive health campaigns). Open to all majors and valuable to laypersons who are consumers of health care, and pre-health professionals. 4 lectures. Prerequisite: Completion of GE Area A, and junior standing.

**COMS 419 Media Effects (4)**

Effects of media on the individual. Influence of mediated message producers, production technologies, and message content. Empirical approaches to data collection using experimental and survey techniques. 4 lectures. Prerequisite: Completion of GE Area A and junior standing.

**COMS 420 Nonverbal Communication (4)**

Influence of kinesic, proxemic, artifactual, olfactory, paralinguistic and environmental factors in human communication. Theory, research and practice in nonverbal communication. 4 lectures. Prerequisite: Completion of GE Area A.

**COMS 421 Gender and Communication (4)**

Examination of gender in a variety of communication contexts. Concepts presented will help students understand the theory and practice of communication with members of the same and opposite sex. 4 lectures. Prerequisite: Completion of GE Area A and junior standing.

**COMS 424 Classroom Communication (4)**

Exploration of classroom communication development. Student-teacher-parent interaction. Communication style, environmental stimuli, dialectal differences and bilingualism, measurement of communication competence. 4 lectures. Prerequisite: Junior standing, Completion of GE Area A.

**COMS 435 American Political Rhetoric (4)**

Role of oratory in American political and social history since Lincoln. Historical and rhetorical analyses of important political speeches delivered by presidents, activists, demagogues, and leaders of social movements. 4 lectures. Prerequisite: Junior standing.

**COMS 450 Internship: Communication Studies (2–4) (CR/NC)**

Supervised practicum and application of principles and theories of communication in organizational settings. Total credit limited to 8 units. Credit/No Credit grading only. Prerequisite: Junior standing, 2.5 GPA, and consent of instructor.

**COMS 460 Undergraduate Seminar (1)**

Discussion and design of individual projects, oral reports on material in current professional writings. 1 seminar. Prerequisite: Completion of COMS 311, COMS 312, COMS 330 and COMS 332, and junior standing. For majors only.

**COMS 461 Senior Project (3)**

Completion of approved project under faculty supervision. Project results are presented in a formal written report. Minimum 90 hours total time. Prerequisite: COMS 460. For majors only.

**COMS 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Junior standing, Completion of GE Area A.

**COMS 485 Cooperative Education Experience (6) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 4 units; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: 2.5 GPA and consent of instructor.

**2009-11 Cal Poly Catalog****Construction Management Department****BS CONSTRUCTION MANAGEMENT****Flowchart**

□ 60 units upper division

□ GWR

□ 2.0 GPA

□ USCP

\* = Required in Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

CM 102 Introduction to Construction Management	2
CM 115 Fundamentals of Construction Mgmt .....	6
CM 213 Heavy Civil Construction Management.....	6
CM 221 Concrete and Formwork Technology .....	3
CM 311 Residential Construction Management .....	6
CM 313 Commercial Construction Management .....	6
CM 331 Construction Accounting.....	3
CM 332 Evaluation of Cost Alternatives.....	3
CM 411 Specialty Contracting Construction Mgmt	6
CM 413 Jobsite Construction Management.....	6
CM 415 Interdisciplinary Project Management.....	5
CM 433 Design-Build Seminar <i>or</i> CM 480	
Preconstruction Integration & Planning (9/24/13)	2
CM 443 Management of the Construction Firm .....	4
CM 463 Senior Project: Professional Practice for	
Constructors <i>or</i> CM 461 (2) & CM 462 (1)	
(3/12/14) .....	3
Advisor approved technical electives .....	6
CM courses (no more than 6 units CM 485	
and/or CM 495); CAED courses; BUS 215, 342,	
346, 387, 391; IT 371; other courses may be	
approved by advisor and department head.	

**67****SUPPORT COURSES**

ARCE 211 and ARCE 212, <i>or</i> ME 211 and CE 204	
(5/29/09) .....	3,3
ARCE 226 Structural Systems for Architects .....	3
ARCE 315 Small Scale Buildings .....	4
ARCE 316 Large Scale Buildings .....	4
ARCE 421 Soil Mechanics.....	3
ARCH 106 Materials of Construction .....	2
BRAE 239 Engineering Surveying.....	4
BUS 207 Legal Responsibilities of Business .....	4
BUS 212 Financial Acctg for Nonbusiness Majors	4
BUS 300–400 level advisor approved elective <i>or</i>	
ECON 303 (11/27/13) .....	4
ECON 221 Microeconomics .....	4
ECON 222 Macroeconomics (D2)* .....	4
EDES 101 Intro to Architecture and Env Design .....	2
ENGL 310 Corporate Communication <i>or</i> ENGL	
318 Advanced Professional Writing .....	4
GEOL 201 Physical Geology .....	3

MATH 141 Calculus I (B1)* .....	4
MATH 182 Calculus for Arch. and Construction	
Mgmt. (MATH 142 Calculus II substitutes).....	4
PHYS 141 General Physics IA.....	4
PHYS 132/CHEM 124/CHEM 127 (B3 & B4)* .....	4
STAT 251 Statistical Inference for Mgmt I (B1)* ...	4

**75****GENERAL EDUCATION (GE)**

72 units required, 16 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (4 units)**

B1 Mathematics/Statistics * 8 units in Support .....	0
B2 Life Science .....	4
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy * 4 units in Support .....	0
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division)**

(4 units) .....	4
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**56****FREE ELECTIVES.....****0****198**

## 2009-11 Cal Poly Catalog

### Computer Engineering Program

#### CPE-COMPUTER ENGINEERING

##### **CPE 100 Computer Engineering Orientation (1) (CR/NC)**

Introduction to the computer engineering discipline. Success skills and curricular information. Career paths and opportunities. Professional aspects of engineering and computer science. Interaction with upper division students, alumni, faculty and staff. Introduction to computer software and hardware. Credit/No Credit grading only. 1 lecture.

##### **CPE 101 Fundamentals of Computer Science I (4)**

Basic principles of algorithmic problem solving and programming using methods of top-down design, stepwise refinement and procedural abstraction. Basic control structures, data types, and input/output. Introduction to the software development process: design, implementation, testing and documentation. The syntax and semantics of a modern programming language. Credit not available for students who have taken CSC/CPE 108. 3 lectures, 1 laboratory. Prerequisite: MATH 118 (or equivalent) with a grade of C- or better, and basic computer literacy (CSC 100 or CSC 232 or equivalent). *Crosslisted as CPE/CSC 101.*

##### **CPE 102 Fundamentals of Computer Science II (4)**

Basic design, implementation, testing, and documentation of object-oriented software. Introduction to classes, interfaces, inheritance, algorithms (sort, search, recursion), abstract data types, data structures (lists, stacks, queues), file I/O, and exceptions. Credit not available for students who have taken CSC/CPE 108. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 101 with a C- grade or better and either MATH 141 or MATH 221 with a C- grade or better. Corequisite: CSC 141. *Crosslisted as CPE/CSC 102.*

##### **CPE 103 Fundamentals of Computer Science III (4)**

Introduction to data structures and analysis of algorithms. Abstract data types. Specification and implementation of advanced data structures. Theoretical and empirical analysis and proofs of properties of recursive and iterative algorithms. Software performance evaluation and testing techniques. 3 lectures, 1 laboratory. Prerequisite: CPE 102 with a C- grade or better and CSC 141 with a C- grade or better. *Crosslisted as CPE/CSC 103.*

##### **CPE 105 Fundamentals of Computer Science I Supplemental Instruction (1) (CR/NC)**

Facilitated study and discussion of fundamental concepts of computer science and familiarization with programming environments. Credit/No Credit grading only. 1 laboratory. Prerequisite: Concurrent enrollment in CPE/CSC 101. *Crosslisted as CPE/CSC 105. New course, effective Winter 2011.*

##### **CPE 108 Accelerated Introduction to Computer Science (4)**

Accelerated introduction to basic principles of algorithmic and object-oriented problem solving and programming. Introduction to programming language concepts including control structures, data types, classes, and inheritance. Program design principles. Use and implementation of algorithms (searching, sorting, recursion) and data structures (lists, stacks, and queues). Intended for students with experience in algorithmic problem solving and using basic control structures and data types in a modern programming language (CSC/CPE 101), but who are not ready for CSC/CPE 102. Credit not available for students who have taken CSC/CPE 102. 3 lectures, 1 laboratory. Prerequisite: Math 118 (or equivalent) with a grade of C- or better, significant experience in computer programming, and consent of instructor. Corequisite: CSC 141. *Crosslisted as CPE/CSC 108.*

##### **CPE 123 Introduction to Computing (4)**

Use of a supportive software development environment to design, develop, and test applications in a selected topic domain that demonstrates the potential of careers in computing. An introduction to computing and to the selected topic domain. The Schedule of Classes will list topic selected. No programming experience required. Not for students with credit in CPE/CSC 103 ~~401~~. 3 lectures, 1 laboratory. Prerequisite: Basic computer literacy. *Crosslisted as CPE/CSC 123. New course, effective Fall 2010. Change effective Fall 2010.*

##### **CPE 129 Digital Design (3)**

Number systems, Boolean algebra, Boolean functions, and minimization. Analysis and design of combinational logic circuits. Feedback circuits. Analysis and design of sequential logic circuits. Applying Hardware Description Language (HDL) to synthesize digital logic circuits in Programmable Logic Devices (PLDs). **Not open to students with credit in CPE/EE 133.** 3 lectures. Prerequisite: An orientation course in student's major (EE 111/151 for EE

students, CPE 100 for CPE students), CPE/CSC 101. Concurrent: CPE/EE 169. *Crosslisted as CPE/EE 129. Change effective Winter 2011.*

##### **CPE 133 Digital Design (4)**

Number systems, Boolean algebra, Boolean functions, and function minimization. Analysis and design of combinational and sequential logic circuits. Hardware Description Language (HDL) concepts and applications digital design and synthesis in Programmable Logic Devices (PLDs). Not open to students with credit in CPE/EE 129. 3 lectures, 1 laboratory. Prerequisite: CPE/CSC 101. *Crosslisted as CPE/EE 133. New course, effective Winter 2011.*

##### **CPE 169 Digital Design Laboratory (1)**

Experiments to analyze and design combinational and sequential logic circuits with discrete ICs and PLDs. Introduction to laboratory equipment such as the logic state analyzer for testing circuits. Introduction to a hardware description language for logic simulation and design. **Not open to students with credit in CPE/EE 133.** 1 laboratory. Prerequisite: An orientation course in student's major (EE 111/151 for EE students, CPE 100 for CPE students), CPE/CSC 101. Concurrent: CPE/EE 129. *Crosslisted as CPE/EE 169. Change effective Winter 2011.*

##### **CPE 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

##### **CPE 209 Problem Solving with Computers (1) (CR/NC)**

Reinforcement of computer science fundamentals. Review of important algorithms, language features, design, syntax, and testing techniques. Repeated application of techniques to solve problems in a constrained amount of time. Primarily intended to support students preparing for the Association for Computing Machinery's International Collegiate Programming Contest. Credit/No Credit grading only. Total credit limited to 15 units. 1 laboratory. Prerequisite: CSC/CPE 101 or CSC/CPE 108 with a grade of C- or better, or consent of instructor. *Crosslisted as CPE/CSC 209.*

##### **CPE 225 Introduction to Computer Organization (4)**

Introduction to computer systems. Simple instruction set architecture and the computer hardware needed to implement that architecture. Machine and assembly language programming. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 102. *Crosslisted as CPE/CSC 225.*

##### **CPE 229 Computer Design and Assembly Language Programming (3)**

Design and implementation of digital computer circuits via CAD tools for programmable logic devices (PLDs). Computer design including datapath components and control unit. Assembly language programming. Instruction set architecture, hardware/software interface, performance evaluation of computer processors. **Not open to students with credit in CPE/EE 233.** 3 lectures. Prerequisite: CPE/EE 129&169 or CPE/EE 133 with a C- grade or better. Concurrent: CPE/EE 269. *Crosslisted as CPE/EE 229. Change effective Spring 2010. Change effective Winter 2011.*

##### **CPE 233 Computer Design and Assembly Language Programming (4)**

Design and implementation of digital computer circuits via CAD tools for programmable logic devices (PLDs). Basic computer design with its datapath components and control unit. Introduction to assembly language programming of an off-the-shelf RISC-based microcontroller. Not open to students with credit in CPE/EE 229. 3 lectures, 1 laboratory. Prerequisite: CPE/EE 129 and CPE/EE 169, or CPE/EE 133. *Crosslisted as CPE/EE 233. New course, effective Winter 2011.*

##### **CPE 235 Fundamentals of Computer Science for Scientists and Engineers I (4)**

Introduction to the fundamentals of computer programming with an emphasis on mathematical, scientific and engineering applications: principles of algorithmic problem solving and procedural programming using a modern programming language, data types, elementary data structures, input/output and control structures. Not a substitute for CSC/CPE 101 for CSC/CPE majors or minors. 3 lectures, 1 laboratory. Prerequisite: MATH 141 or MATH 161 with a grade of C- or better, or consent of instructor. *Crosslisted as CPE/CSC 235.*

##### **CPE 236 Fundamentals of Computer Science for Scientists and Engineers II (4)**

Further study of computer program development with an emphasis on mathematical, scientific and engineering applications. Introduction to more complicated data types and structures. Practice of more complicated techniques of procedural programming. Introduction to the principles of object-oriented programming using a modern programming language. Detailed discussion of lists and classic list algorithms, algorithm analysis, multidimensional arrays,

records, dynamic data structures, file input/output, classes. Not a substitute for CSC/CPE 102 for CSC/CPE majors or minors. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 235 with a grade of C- or better, or consent of instructor. *Crosslisted as CPE/CSC 236.*

#### **CPE 237 Introduction to Computer Science with Applications I (4)**

Introduction to the fundamentals of computer science using a modern programming language. Includes principles of algorithmic problem solving, data types, elementary data structures, input/output, control structures, classes and methods. Not a substitute for CSC/CPE 101 for CSC/CPE majors or minors. 3 lectures, 1 laboratory. Prerequisite: MATH 221 or STAT 252 with a grade of C- or better, or consent of instructor. *Crosslisted as CPE/CSC 237.*

#### **CPE 238 Introduction to Computer Science with Applications II (4)**

Continuation of CPE 237. Intermediate study of computer program development using a modern object oriented (OO) programming language. Further study of OO principles including inheritance and interfaces. Introduction to implementation of Graphical User Interfaces, multi-media, streams, database connection, and scripting. Not a substitute for CPE/CSC 102 or for CSC/CPE majors or minors. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 237 with a grade of C- or better. *Crosslisted as CPE/CSC 238.*

#### **CPE 269 Computer Design and Assembly Language Programming Laboratory (1)**

Experiments to design and test digital computer circuits and systems with programmable logic devices (PLDs). Design projects to implement a basic computer with data path components and control. Assembly language programming projects for an off-the-shelf RISC-based microcontroller. **Not open to students with credit in CPE/EE 233.** 1 laboratory. Prerequisite: CPE/EE 129&169 or CPE/EE 133 **with a C- grade or better.** Concurrent: CPE/EE 229. *Crosslisted as CPE/EE 269. Change effective Spring 2010. Change effective Winter 2011.*

#### **CPE 270 Computer Graphics Applications (4)**

Use of common graphics applications packages. Business graphics, figure editing, animation and image editing, photorealistic image generation, scientific visualization and multimedia. 2 lectures, 2 activities. *Crosslisted as CPE/CSC 270.*

#### **CPE 290 Selected Topics (1-4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

#### **CPE 300 Professional Responsibilities (4)**

The responsibilities of the computer science professional. The ethics of science and the IEEE/ACM Software Engineering Code of Ethics. Quality tradeoffs, software system safety, intellectual property, history of computing and the social implications of computers in the modern world. Applications to ethical dilemmas in computing. Technical presentation methods and practice. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357 and junior standing. *Crosslisted as CPE/CSC 300.*

#### **CPE 305 Individual Software Design and Development (4)**

Practical software development skills needed for construction of mid-sized production-quality software modules, using the CSC upper division programming language. Topics include inheritance, exceptions, and memory and disk-based dynamic data structures. Students must complete an individual programming project of mid-level complexity. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357. *Crosslisted as CPE/CSC 305.*

#### **CPE 307 Introduction to Software Engineering (4)**

Requirements, specification, design, implementation, testing and verification of large software systems. Study and use of the software process and software engineering methodologies; working in project teams. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103 with a grade of C- or better, and CSC/CPE 357. Not open to students with credit in CSC/CPE 308. *Crosslisted as CPE/CSC 307.*

#### **CPE 308 Software Engineering I (4)**

Principles for engineering requirements analysis and design of large complex software systems. Software process models. Methods of project planning, tracking, documentation, communication, and quality assurance. Analysis of engineering tradeoffs. Group laboratory project. Technical oral and written presentations. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357. *Crosslisted as CPE/CSC 308.*

#### **CPE 309 Software Engineering II (4)**

Continuation of the software lifecycle. Methods and tools for the implementation, integration, testing and maintenance of large software systems. Software development and test environments. Software quality assurance. Group

laboratory project. Technical presentation methods and practice. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 308. *Crosslisted as CPE/CSC 309.*

#### **CPE 315 Computer Architecture (4)**

In-depth study of the instruction set architecture and hardware design of a specific CPU. Introduction to pipelines, input/output and multi-processors. Computer abstractions and performance measurement. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103 and either CPE/EE 229 or CSC 225. *Crosslisted as CPE/CSC 315.*

#### **CPE 316 Micro Controllers and Embedded Applications (4)**

Introduction to micro controllers and their applications as embedded devices. Hardware/software tradeoffs, micro controller selection, use of on-chip peripherals, interrupt driven real-time operation, A/D conversion, serial and parallel communications, watch-dog timers, low power operation and assembly language programming techniques. 3 lectures, 1 laboratory. Prerequisite: CPE/CSC 315 or CPE/EE 329. *Crosslisted as CPE/CSC 316.*

#### **CPE 328 Discrete Time Signals and Systems (3)**

Discrete-time systems and analysis, with emphasis on linear time-invariant (LTI) systems. Sampling theorem. Classification of discrete-time systems. Convolution and its application to LTI systems. The z transform, discrete-time Fourier transform, and discrete Fourier transform. Introduction to digital filters. 3 lectures. Prerequisite: EE 228 **with a C- grade or better.** Concurrent: EE/CPE 368. *Crosslisted as CPE/EE 328. Change effective Spring 2010.*

#### **CPE 329 Programmable Logic and Microprocessor-Based Systems Design (4)**

Design, implementation and testing of programmable logic microprocessor-based systems. Hardware/software tradeoffs (such as timing analysis and power considerations), system economics of programmable logic and microprocessor-based system design. Interfacing hardware components (such as ADCs/DACs, sensors, transducers). 3 lectures, 1 laboratory. **Not open to students with credit in CPE/EE 336.** Prerequisite: EE 307&347, **with a C- grade or better.** CPE/EE 229&269 or CPE/EE 233. **with a C- grade or better.** *Crosslisted as CPE/EE 329. Change effective Spring 2010. Change effective Spring 2011.*

#### **CPE 336 Microprocessor System Design (4)**

Introduction to microcontrollers and integrated microprocessor systems. **Emphasis on the Intel 8051 and Motorola 68HC12 families and derivatives.** Hardware/software trade-offs, system economics, and functional configurations. Interface design, real-time clocks, interrupts, A/D conversion, serial and parallel communications, watch-dog timers, low power operation, **event-based inter-peripheral communication**, and assembly and higher-level language programming techniques. Architecture and design of sampled data and **digital control low-power systems.** **Case studies of representative applications.** 3 lectures, 1 laboratory. **Not open to students with credit in CPE/EE 329.** Prerequisite: CPE/EE 229&269 or CPE/EE 233. **CPE 129&169 with a C- grade or better.** *Crosslisted as CPE/EE 336. Change effective Spring 2010. Change effective Spring 2011.*

#### **CPE 349 Design and Analysis of Algorithms (4)**

Intermediate and advanced algorithms and their analysis. Mathematical, geometrical, and graph algorithms. NP-complete problems. Additional topics will be chosen from pattern matching, file compression, cryptology, dynamic and linear programming, and exhaustive search. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103, with a grade of C- or better, and MATH 142 and either STAT 312 or STAT 321. *Crosslisted as CPE/CSC 349.*

#### **CPE 350 Capstone I (4)**

Definition and specification of a system to be constructed in CPE 450; requirements elicitation techniques, research and data gathering methods; project planning, time and budget estimating; project team organization. Ethics and professionalism. 3 lectures, 1 laboratory. Prerequisite: CPE 329, may be concurrent.

#### **CPE 357 Systems Programming (4)**

C programming language from a system programming perspective. Standard C language including operators, I/O functions, and data types in the context of system functions. Unix commands, shell scripting, file system, editors. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103 with a grade of C- or better, and either CSC 225 or CPE/EE 229. *Crosslisted as CPE/CSC 357.*

#### **CPE 365 Introduction to Database Systems (4)**

Basic principles of database management systems (DBMS) and of DBMS application development. DBMS objectives, systems architecture, database models with emphasis on Entity-Relationship and Relational models, data definition and manipulation languages, the Structured Query Language (SQL),



database design, application development tools. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103. *Crosslisted as CPE/CSC 365.*

#### **CPE 366 Database Modeling, Design and Implementation (4)**

The database modeling problem. Database modeling levels: external, conceptual, logical and physical. Database models: entity-relationship, relational, object-oriented, semantic, and object-relational. Normal forms. Distributed database design. Functional analysis of database applications and transaction specification, design, and implementation. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 365. *Crosslisted as CPE/CSC 366.*

#### **CPE 368 Signals and Systems Laboratory (1)**

Laboratory work pertaining to linear systems, including Fourier analysis, time and frequency responses, and system transfer function. 1 laboratory. Prerequisite: EE 228 ~~with a C- grade or better~~. Concurrent: EE/CPE 328. *Crosslisted as CPE/EE 368. Change effective Spring 2010.*

#### **CPE 369 Distributed Computing I (4)**

Introduction to distributed computing paradigms and protocols: interprocess communications, group communications, the client-server model, distributed objects, and Internet protocols. Emphasis on distributed software above the operating system and network layers. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357. *Crosslisted as CPE/CSC 369.*

#### **CPE 400 Special Problems for Advanced Undergraduates (1-4)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Consent of instructor.

#### **CPE 402 Software Requirements Engineering (4)**

Software requirements elicitation, analysis and documentation. Team process infrastructure and resource estimation to support appropriate levels of quality. Software architectural design. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 307 or CSC/CPE 309; CSC/CPE 305. *Crosslisted as CPE/CSC 402.*

#### **CPE 405 Software Construction (4)**

Design and construction of sizeable software products. Technical management of software development teams. Software development process models, software design, documentation, quality assurance during development, software unit and integration testing; CASE tools, development environments, test tools, configuration management. 3 lectures, 1 laboratory. Prerequisite: CPE/CSC 402. *Crosslisted as CPE/CSC 405.*

#### **CPE 406 Software Deployment (4)**

Deployment of a sizeable software product by a student team. Software maintenance and deployment economic issues. Management of deployed software: version control, defect tracking and technical support. 3 lectures, 1 laboratory. Prerequisite: CPE/CSC 405. *Crosslisted as CPE/CSC 406.*

#### **CPE 409 Current Topics in Software Engineering (4)**

Selected topics in software engineering. Topics may include program generation, quality assurance, formal methods, software metrics, design methods, testing, or software development processes. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 309 or CSC/CPE 307. *Crosslisted as CPE/CSC 409.*

#### **CPE 415 Microcomputer Systems (4)**

Recent advances in microcomputer architectures. RISC, parallel processing advances, and component communication. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 315.

#### **CPE 416 Autonomous Mobile Robotics (4)**

Theory and application of concepts relevant to autonomous mobile robots. Sensor and actuator interfacing, programming mobile robots, mobile robot configurations, software architectures and algorithms. 3 lectures, 1 laboratory. Prerequisite: CPE/EE 329 or both CSC/CPE 315 and CSC/CPE 357 or consent of instructor. *Crosslisted as CPE/CSC 416.*

#### **CPE 427 Digital Computer Subsystems (4)**

Design of components and subsystems in digital computers. Use of modern techniques and devices (CPLDs and FPGAs) in implementation. Consideration given to cost/speed tradeoffs. Implementation of a basic digital computer using pre-designed subsystems. 3 lectures, 1 laboratory. Prerequisite: CPE 329 ~~with a C- grade or better~~. *Crosslisted as CPE/EE 427. Change effective Spring 2010.*

#### **CPE 428 Computer Vision (4)**

Introduction to the concepts of 2D and 3D computer vision: low-level image processing methods such as filtering and edge detection; feature extraction; segmentation and clustering; stereo vision; appearance-based and model-based algorithms. 3 lectures, 1 laboratory. Prerequisite: EE 328 or CPE/CSC 357 or ME 305 or consent of instructor. *Crosslisted as CPE/EE 428.*

#### **CPE 430 Programming Languages I (4)**

Construction of the front end of a compiler including lexical analysis, syntactic analysis, type checking, and formal semantics. Introduction to regular languages, finite automata, and context-free grammars. 3 lectures, 1 laboratory. Prerequisite: CSC 349 and CSC/CPE 357. *Crosslisted as CPE/CSC 430.*

#### **CPE 431 Programming Languages II (4)**

Language principles and design issues: bindings, conversion, parameter passing, and dynamic semantics. Language implementation: intermediate code representation, memory management, code optimization, and code generation. Functional programming languages. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 430. *Crosslisted as CPE/CSC 431.*

#### **CPE 432 Digital Control Systems (3)**

Theory and applications of digital computers in linear control systems. Discrete time methods are used in analysis and design studies. Digital control systems are synthesized. 3 lectures. Prerequisite: EE 302&342 ~~with a C- grade or better~~. Prior background in discrete time systems, e.g., EE 328, EE368 recommended. Concurrent: CPE 472. *Crosslisted as CPE/EE 432. Change effective Spring 2010.*

#### **CPE 435 Introduction to Object Oriented Design Using Graphical User Interfaces (4)**

Principles of object-oriented design, with emphasis on use of these principles in the design of graphical interfaces. Comparison and contrasting of two major object-oriented languages and their corresponding GUI class libraries. Language-independent object-oriented design methods, and application of these methods in the construction of a GUI-based project. 3 lectures, 1 laboratory. Prerequisite: CPE 103, with a grade of C- or better, or equivalent and CPE 305. *Crosslisted as CPE/CSC 435.*

#### **CPE 437 Dynamic Web Development (4)**

Project-based study of web-based three-tiered applications, including current best practices and tools for design, implementation and testing of browser interface, serverside business logic, object-relational mapping, databases, and web services. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357 (C- or better), CSC/CPE 365 or consent of instructor. *Crosslisted as CPE/CSC 437.*

#### **CPE 438 Digital Computer Systems (3)**

Design of computer ALU's, microprogram controllers, memory systems, and I/O controllers. Use of LSI components in CPU design. Microprogram and nanoprogram development. 3 lectures. Prerequisite: CPE 427 or consent of instructor. *Crosslisted as CPE/EE 438.*

#### **CPE 439 Computer Peripheral Interfacing (4)**

Systems-level design and implementation of common computer peripheral devices with emphasis placed on controller and interface aspects. Use of standard and softcore microcontroller platforms with communications to discrete peripherals with I2C, SPI, CAN, and other common bus interfaces. 3 lectures, 1 laboratory. Prerequisite: CPE/EE 329 ~~with a C- grade or better~~, or consent of instructor. *Crosslisted as CPE/EE 439. Change effective Spring 2010.*

#### **CPE 441 Computer-Aided Design of VLSI Devices (4)**

Design of VLSI circuits, design of subsystems using static CMOS, transmission gates, and other methods. Variety of CAD tools for design, verification, test, and simulation. Several design projects. 3 lectures, 1 laboratory. Prerequisite: EE 307&347 ~~with a C- grade or better~~, EE 308&348 ~~with a C- grade or better~~ or consent of instructor. *Crosslisted as CPE 441/EE 431. Changes effective Spring 2010.*

#### **CPE 448 Bioinformatics Algorithms (4)**

Introduction to the use of computers to solve problems in molecular biology. The algorithms, languages, and databases important in determining and analyzing nucleic and protein sequences and their structure. 3 lectures, 1 laboratory. Prerequisite: Consent of instructor or the following: CSC/CPE 103, with a grade of C- or better, or BIO 447 and senior standing. *Crosslisted as CPE/CSC 448.*

#### **CPE 449 Current Topics in Algorithms (4)**

Selected aspects of the verification, analysis and design of algorithms. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: CSC 349. *Crosslisted as CPE/CSC 449.*

#### **CPE 450 Capstone II (4)**

Team-based design, construction and deployment of an embedded system that includes a custom-built computer. Technical management of product development teams. Technical documentation, configuration management, quality assurance, integration and systems testing. Professionalism. 3 lectures, 1 laboratory. Prerequisite: CPE 350.

**CPE 453 Introduction to Operating Systems (4)**

Introduction to sequential and multiprogramming operating systems; kernel calls, interrupt service mechanisms, scheduling, files and protection mechanisms, conventional machine attributes that apply to operating system implementation, virtual memory management, and I/O control systems. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357 and either CSC/CPE 225 or CPE/EE 229. *Crosslisted as CPE/CSC 453.*

**CPE 454 Implementation of Operating Systems (4)**

Design and implementation of multiprogramming kernels, systems programming methodology, interprocess communications, synchronization, device drivers and network access methods. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 453. *Crosslisted as CPE/CSC 454.*

**CPE 456 Introduction to Computer Security (4)**

Survey of topics in computer system and network security, including protection, access control, distributed access control, operating system security, applied cryptography, network security, firewalls, secure coding practices, and case studies from real-world systems. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 453 and either CSC/CPE 300 or CPE 350. *Crosslisted as CPE/CSC 456.*

**CPE 458 Current Topics in Computer Systems (4)**

Selected aspects of design, implementation and analysis of networks, advanced operating and distributed systems. Topics may include process management, virtual memory, process communication, context switching, file system designs, persistent objects, process and data migration, load balancing, security and networks. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 453. *Crosslisted as CPE/CSC 458.*

**CPE 461, 462 Senior Project I, II (3) (2)**

Selection and completion of an individual or team project in laboratory environment. Project results are presented in a formal report. CPE 461: 3 laboratories; prerequisite: CPE 350. CPE 462: 2 laboratories; prerequisite: CPE 450.

**CPE 464 Introduction to Computer Networks (4)**

Computer network architectures; communications protocol standards; services provided by the network; historical and current examples presented. 3 lectures, 1 laboratory. Prerequisite: STAT 312 or STAT 321 or STAT 350 and CSC/CPE 357. *Crosslisted as CPE/CSC 464.*

**CPE 465 Advanced Computer Networks (4)**

Advanced topics in computer networks; greater detail of protocol standards and services provided by the network; focus on current industry and research topics. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 464 and CSC/CPE 453. *Crosslisted as CPE/CSC 465.*

**CPE 466 Knowledge Discovery from Data (4)**

Overview of modern knowledge discovery from data (KDD) methods and technologies. Topics in On-line Analytic Transaction Processing (OLAP), data mining (association rules mining, classification, clustering), information retrieval. Emphasis on use of KDD techniques in modern software applications. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 365 and one of STAT 312, STAT 321 or STAT 350. *Crosslisted as CPE/CSC 466.*

**CPE 468 Database Management Systems Implementation (4)**

Data structures and algorithms used in the implementation of database systems. Implementation of data and transaction managers: access methods interfaces, concurrency control and recovery, query processors and optimizers. Introduction to implementation of distributed database systems. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 365. *Crosslisted as CPE/CSC 468.*

**CPE 469 Distributed Computing II (4)**

Continued exploration of topics in distributed computing in greater depth, with emphasis on design patterns and team projects. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 369. *Crosslisted as CPE/CSC 469.*

**CPE 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**CPE 471 Introduction to Computer Graphics (4)**

Graphics software development and use of APIs for 3D graphics. The graphics pipeline, modeling, geometric and viewing transforms, lighting and shading, rendering, interaction techniques and graphics hardware. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357. *Crosslisted as CPE/CSC 471.*

**CPE 472 Digital Control Systems Laboratory (1)**

Design and programming of microprocessor-based digital controls for electro-mechanical plants. Topics include digital control laws, translation of transfer functions into algorithms, assembly language programming, real-time software design, sample rate selection, finite word-length considerations. 1 laboratory. Concurrent: CPE 432. *Crosslisted as CPE/EE 472.*

**CPE 473 Advanced Rendering Techniques (4)**

Illumination models, reflectance, absorption, emittance, Gouraud shading, Phong shading, raytracing polyhedra and other modeling primitives, coherence, acceleration methods, radiosity, form factors, advanced algorithms. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 471. *Crosslisted as CPE/CSC 473.*

**CPE 474 Computer Animation (4)**

Basic and advanced algorithms for generating sequences of synthetic images. Interpolation in time and space, procedural and keyframe animation, particle systems, dynamics and inverse kinematics, morphing and video. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 471. *Crosslisted as CPE/CSC 474.*

**CPE 476 Real-Time 3D Computer Graphics Software (4)**

Basic and advanced algorithms for real-time, interactive, 3D graphics software. Modeling (polygon mesh, height field, scene graph), real-time rendering and shading (visibility processing, LOD, texture and light maps), collision detection (bounding volumes, complexity management), interactive controls, multi-player game technology, game engine architecture. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 471. *Crosslisted as CPE/CSC 476.*

**CPE 478 Current Topics in Computer Graphics (4)**

Selected aspects of the design, implementation and analysis of computer graphics. Topics may include rendering, modeling, visualization, animation, virtual reality, computer vision, multimedia, and perception issues. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 471. *Crosslisted as CPE/CSC 478.*

**CPE 480 Artificial Intelligence (4)**

Programs and techniques that characterize artificial intelligence. Programming in a high level language. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103 with a grade of C- or better. *Crosslisted as CPE/CSC 480.*

**CPE 481 Knowledge Based Systems (4)**

In-depth treatment of knowledge representation, utilization and acquisition in a programming environment. Emphasis on the use of domain-specific knowledge to obtain expert performance in programs. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 480. *Crosslisted as CPE/CSC 481.*

**CPE 482 Advanced Topics in Systems for Computer Engineering (4)**

Selected aspects of design, implementation, verification and analysis of advanced computer systems. Topics may include computer systems, embedded systems, robotics, mechatronics, haptics, human computer interfaces, digital control, digital signal processing, wireless computing, real time operating systems, and networks. The Schedule of Classes will list topic selected. Total credit limited to 8 units, repeatable in same term. 3 lectures, 1 laboratory. Prerequisite or concurrent: CPE 350, or consent of instructor.

**CPE 483 Current Topics in Human-Computer Interaction (4)**

Selected aspects of the field of human-computer interaction. Topics may include dynamic information visualization, universal access, social impact of technology usage, educational technology, human cognition and performance studies, and extended usability evaluation techniques. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 484. *Crosslisted as CPE/CSC 483.*

**CPE 484 User-Centered Interface Design and Development (4)**

Introduction to the importance of user-centered principles in the design of good interfaces and effective human-computer interaction. Topics include: study of human characteristics affected by interface design, effective requirements data collection and analysis, user-centered approaches to software engineering, and evaluation of interface and interaction quality. 3 lectures, 1 laboratory. Prerequisite: Junior standing and CSC/CPE 307 or CSC/CPE 308. *Crosslisted as CPE/CSC 484.*

**CPE 485 Autonomous Robot Navigation (4)**

Overview of existing autonomous mobile robot systems, basic kinematic modeling, control structures, sensing and sensor modeling, localization, and motion planning algorithms. Implementation of autonomous navigation capabilities. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 480 or consent of instructor. *Crosslisted as CPE/CSC 485.*

**CPE 488 Microelectronics and Electronics Packaging (4)**

Materials, processes, and reliability of microelectronics and electronics packaging, surface mount assembly and printed circuit board fabrication.



Overview of semiconductor manufacturing and optoelectronics packaging. 3 lectures, 1 laboratory. Prerequisite: MATE 210 and PHYS 133 or consent of instructor. *Crosslisted as CPE 488/IME 458/MATE 458.*

**CPE 489 Current Topics in Artificial Intelligence (4)**

Selected aspects of the design, implementation and analysis of advanced systems and concepts in the area of artificial intelligence. Topics may include knowledge representation, reasoning, learning, or planning, and specific techniques like intelligent agents, genetic algorithms, semantic web, or robotics. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 480. *Crosslisted as CPE/CSC 489.*

**CPE 493 Cooperative Education Experience (2) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 6 units. Prerequisite: Sophomore standing and consent of instructor.

**CPE 494 Cooperative Education Experience (6) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 18 units. Prerequisite: Sophomore standing and consent of instructor.

**CPE 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units. Prerequisite: Sophomore standing and consent of instructor.

**CPE 520 Computer Architecture (4)**

Comparative study and design of multiprocessor, dataflow, RISC, high level language and other new computer architectures. VLSI processor design techniques. 3 seminars, 1 laboratory. Prerequisite: CPE 315 and graduate standing, or consent of instructor. *Crosslisted as CPE/CSC 520.*

**CPE 521 Computer Systems (4)**

Organization of modern general purpose, high speed digital computer systems. Design of arithmetic units, control units, memories and memory subsystems. Cost, power and speed trade-offs in the design of such systems. 3 seminars, 1 laboratory. Prerequisite: EE/CPE 329 ~~with a C- grade or better~~, or equivalent, and graduate standing or consent of instructor. *Crosslisted as CPE/EE 521. Change effective Spring 2010.*

**CPE 522 Advanced Real-Time Embedded Systems Design (4)**

Theory, design and implementation of real-time operating system-based embedded systems. Scheduling algorithms, operating system resources, peripheral device interfacing and embedded system architecture. Resource management issues in a resource-limited (microcontroller-based) environment. 3 seminars, 1 laboratory. Prerequisite: Advanced C programming skills, CPE/EE 329 ~~with a C- grade or better~~ or equivalent, or consent of instructor. *Crosslisted as CPE/EE 522. Change effective Spring 2010.*

**CPE 523 Digital Systems Design (4)**

Full-custom design and analysis of digital circuits using full CMOS, pass-transistor and dynamic circuit topologies. Transistor sizing for minimizing power consumption, delay and other design criteria. 3 seminars, 1 laboratory. Prerequisite: EE/CPE 329 ~~with a C- grade or better~~ or equivalent, and graduate standing or consent of instructor. *Crosslisted as CPE/EE 523. Change effective Spring 2010.*

**CPE 556 Computer Security (4)**

Exploration of advanced topics in computer security with an emphasis on research topics. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 456 and graduate standing, or consent of instructor. *Crosslisted as CPE/CSC 556.*

**CPE 564 Computer Networks: Research Topics (4)**

Exploration of advanced topics in emerging computer networking technologies; focus on leading edge computer network research topics. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 464 and graduate standing, or consent of instructor. *Crosslisted as CPE/CSC 564.*

**CPE 569 Distributed Computing (4)**

Principles and practices in distributed computing; interprocess communications, group communications, client-server model, distributed objects, message queue system, distributed services, mobile agents, object space, Internet protocols. Distributed algorithms: consensus protocols, global state protocols. Fault tolerance: classification of faults, replication. Not open to students with credit in CSC/ CPE 369 or CSC/CPE 469. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357 and graduate standing, or consent of instructor. *Crosslisted as CPE/CSC 569.*

**CPE 580 Artificial Intelligence (4)**

Current research in the field of artificial intelligence with emphasis on cooperative agents, distributed agents, and decision making in complex, concurrent environments. AI programming in a distributed environment. 3 lectures, 1 laboratory. Prerequisite: CPE 481. *Crosslisted as CPE/CSC 580.*

**CPE 581 Computer Support for Knowledge Management (4)**

Use methods and techniques that computer-based systems can provide to make the management of knowledge and information in digital form easier for the user. Emphasis on support for knowledge-intensive activities performed by users. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 481. *Crosslisted as CPE/CSC 581.*

## 2009-11 Cal Poly Catalog

### Computer Science Department

#### CSC—COMPUTER SCIENCE

##### CSC 100 Computer Science Orientation (2)

Introduction to the computer science discipline for majors. Computer problem solving and the use of computers. Success skills for computer science majors. Career paths and opportunities. Interaction with upper division students and faculty. 2 seminars. Prerequisite: Computer science major or minor or software engineering major.

##### CSC 101 Fundamentals of Computer Science I (4)

Basic principles of algorithmic problem solving and programming using methods of top-down design, stepwise refinement and procedural abstraction. Basic control structures, data types, and input/output. Introduction to the software development process: design, implementation, testing and documentation. The syntax and semantics of a modern programming language. Credit not available for students who have taken CSC/CPE 108. 3 lectures, 1 laboratory. Prerequisite: MATH 118 (or equivalent) with a grade of C- or better, and basic computer literacy (CSC 100 or CSC 232 or equivalent). *Crosslisted as CPE/CSC 101.*

##### CSC 102 Fundamentals of Computer Science II (4)

Basic design, implementation, testing, and documentation of object-oriented software. Introduction to classes, interfaces, inheritance, algorithms (sort, search, recursion), abstract data types, data structures (lists, stacks, queues), file I/O, and exceptions. Credit not available for students who have taken CSC/CPE 108. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 101 with a C- grade or better and either MATH 141 or MATH 221 with a C- grade or better. **Corequisite: CSC 141.** *Crosslisted as CPE/CSC 102. Change effective Winter 2011.*

##### CSC 103 Fundamentals of Computer Science III (4)

Introduction to data structures and analysis of algorithms. Abstract data types. Specification and implementation of advanced data structures. Theoretical and empirical analysis and proofs of properties of recursive and iterative algorithms. Software performance evaluation and testing techniques. 3 lectures, 1 laboratory. Prerequisite: CPE 102 with a C- grade or better and CSC 141 with a C- grade or better. *Crosslisted as CPE/CSC 103.*

##### CSC 105 Fundamentals of Computer Science I Supplemental Instruction (1) (CR/NC)

Facilitated study and discussion of fundamental concepts of computer science and familiarization with programming environments. Credit/No Credit grading only. 1 laboratory. Prerequisite: Concurrent enrollment in CPE/CSC 101. *Crosslisted as CPE/CSC 105. New course, effective Winter 2011.*

##### CSC 108 Accelerated Introduction to Computer Science (4)

Accelerated introduction to basic principles of algorithmic and object-oriented problem solving and programming. Introduction to programming language concepts including control structures, data types, classes, and inheritance. Program design principles. Use and implementation of algorithms (searching, sorting, recursion) and data structures (lists, stacks, and queues). Intended for students with experience in algorithmic problem solving and using basic control structures and data types in a modern programming language (CSC/CPE 101), but who are not ready for CSC/CPE 102. Credit not available for students who have taken CSC/CPE 102. 3 lectures, 1 laboratory. Prerequisite: Math 118 (or equivalent) with a grade of C- or better, significant experience in computer programming, and consent of instructor. Corequisite: CSC 141. *Crosslisted as CPE/CSC 108.*

##### CSC 110 Computers and Computer Applications: Windows (3)

The computer as a problem-solving tool. A working introduction to microcomputers and fundamental computer concepts. Use of applications software. Credit not allowed for CSC or Software Engineering majors. 2 lectures, 1 activity. Prerequisite: Passing score on ELM examination, or an ELM exemption, or credit in MATH 104.

##### CSC 113 Computers and Computer Applications: Macintosh (3)

The computer as a problem-solving tool. A working introduction to microcomputers and fundamental computer concepts. Use of applications software. Credit not allowed for CSC or Software Engineering majors. 2 lectures, 1 activity. Prerequisite: Passing score on ELM examination, or an ELM exemption, or credit in MATH 104.

##### CSC 119 Information Retrieval and Management (4)

Use of applications software, including database software, to create and manage information. Credit not allowed for CSC or Software Engineering majors. 4 lectures. Prerequisite: Passing score on ELM examination, or an ELM exemption, or credit in MATH 104.

##### CSC 123 Introduction to Computing (4)

Use of a supportive software development environment to design, develop, and test applications in a selected topic domain that demonstrates the potential of careers in computing. An introduction to computing and to the selected topic domain. The Schedule of Classes will list topic selected. No programming experience required. Not for students with credit in CPE/CSC 103 ~~101~~. 3 lectures, 1 laboratory. Prerequisite: Basic computer literacy. *Crosslisted as CPE/CSC 123. New course, effective Fall 2010. Change effective Fall 2010.*

##### CSC 141 Discrete Structures I (4)

Introduction to structures of computer science: logic, sets, relations, functions, graphs and trees. Propositional and predicate logic. Applications of predicate logic to preconditions, postconditions, and proof techniques. Introduction to complexity of algorithms. 4 lectures. **Corequisite: CSC/CPE 102.** Prerequisite: MATH 118 and MATH 119, or high school equivalent, **and CSC/CPE 101 or equivalent.** **Recommended: prior programming experience.** *Change effective Winter 2011.*

##### CSC 142 Discrete Structures II (4)

Advanced structures of computer science: sequences, strings, graphs, networks. Recursion and recurrence relations. Introduction to combinatorics. Proof techniques. Complexity of algorithms. Advanced application to verification of algorithms. 4 lectures. Prerequisite: CSC/CPE 102 and CSC 141.

##### CSC 171 Introduction to Interactive Entertainment (4)

Use of click-and-drag software application to create an entertaining or informative, socially responsible application, such as a game. Team collaboration to design, develop, and test applications. Focus on design, teamwork, and using an iterative development process. An enjoyable introduction to both computer science and interactive entertainment. No computer science experience required. 3 lectures, 1 laboratory.

##### CSC 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

##### CSC 209 Problem Solving with Computers (1) (CR/NC)

Reinforcement of computer science fundamentals. Review of important algorithms, language features, design, syntax, and testing techniques. Repeated application of techniques to solve problems in a constrained amount of time. Primarily intended to support students preparing for the Association for Computing Machinery's International Collegiate Programming Contest. Credit/No Credit grading only. Total credit limited to 15 units. 1 laboratory. Prerequisite: CSC/CPE 101 or CSC/CPE 108 with a grade of C- or better, or consent of instructor. *Crosslisted as CPE/CSC 209.*

##### CSC 225 Introduction to Computer Organization (4)

Introduction to computer systems. Simple instruction set architecture and the computer hardware needed to implement that architecture. Machine and assembly language programming. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 102. *Crosslisted as CPE/CSC 225.*

##### CSC 231 Programming for Engineering Students (2)

Programming techniques and procedures with applications to engineering problems. Introduction to numerical methods and simulation. Credit not allowed for CSC, Software Engineering or CPE majors. 2 activities. Prerequisite: MATH 142; PHYS 121 or PHYS 131 or PHYS 141.

##### CSC 232 Computer Programming for Scientists and Engineers (3)

Computer programming, with an emphasis on procedural programming, taught using a language hosted by applications commonly used in science and engineering. Credit not allowed for CSC, CPE or Software Engineering majors. 2 lectures, 1 activity. Prerequisite: MATH 118 or equivalent.

##### CSC 234 C and Unix (3)

The C programming language and the UNIX programming environment. Operators, standard I/O functions, strings, pointers and arrays, data types and storage classes. Unix shell programming and basic I/O system calls. Credit not allowed for CSC, Software Engineering or CPE majors. 3 lectures. Prerequisite: MATH 142.

**CSC 235 Fundamentals of Computer Science for Scientists and Engineers I (4)**

Introduction to the fundamentals of computer programming with an emphasis on mathematical, scientific and engineering applications: principles of algorithmic problem solving and procedural programming using a modern programming language, data types, elementary data structures, input/output and control structures. Not a substitute for CSC/CPE 101 for CSC/CPE majors or minors. 3 lectures, 1 laboratory. Prerequisite: MATH 141 or MATH 161 with a grade of C- or better, or consent of instructor. *Crosslisted as CPE/CSC 235.*

**CSC 236 Fundamentals of Computer Science for Scientists and Engineers II (4)**

Further study of computer program development with an emphasis on mathematical, scientific and engineering applications. Introduction to more complicated data types and structures. Practice of more complicated techniques of procedural programming. Introduction to the principles of object-oriented programming using a modern programming language. Detailed discussion of lists and classic list algorithms, algorithm analysis, multidimensional arrays, records, dynamic data structures, file input/output, classes. Not a substitute for CSC/CPE 102 for CSC/CPE majors or minors. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 235 with a grade of C- or better, or consent of instructor. *Crosslisted as CPE/CSC 236.*

**CSC 237 Introduction to Computer Science with Applications I (4)**

Introduction to the fundamentals of computer science using a modern programming language. Includes principles of algorithmic problem solving, data types, elementary data structures, input/output, control structures, classes and methods. Not a substitute for CSC/CPE 101 for CSC/CPE majors or minors. 3 lectures, 1 laboratory. Prerequisite: MATH 221 or STAT 252 with a grade of C- or better, or consent of instructor. *Crosslisted as CPE/CSC 237.*

**CSC 238 Introduction to Computer Science with Applications II (4)**

Continuation of CSC 237. Intermediate study of computer program development using a modern object oriented (OO) programming language. Further study of OO principles including inheritance and interfaces. Introduction to implementation of Graphical User Interfaces, multi-media, streams, database connection, and scripting. Not a substitute for CSC 102 or for CSC/CPE majors or minors. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 237 with a grade of C- or better. *Crosslisted as CPE/CSC 238.*

**CSC 239 Selected Programming Languages (4)**

A programming language selected from languages of current interest. Intended for students who want to learn another programming language. The Schedule of Classes will list topic selected. 3 lectures, 1 laboratory. Prerequisite: Knowledge of a programming language.

**CSC 270 Computer Graphics Applications (4)**

Use of common graphics applications packages. Business graphics, figure editing, animation and image editing, photorealistic image generation, scientific visualization and multimedia. 2 lectures, 2 activities. *Crosslisted as CPE/CSC 270.*

**CSC 290 Selected Topics (1-4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

**CSC 300 Professional Responsibilities (4)**

The responsibilities of the computer science professional. The ethics of science and the IEEE/ACM Software Engineering Code of Ethics. Quality tradeoffs, software system safety, intellectual property, history of computing and the social implications of computers in the modern world. Applications to ethical dilemmas in computing. Technical presentation methods and practice. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357 and junior standing. *Crosslisted as CPE/CSC 300.*

**CSC 302 Computers and Society (4)****GE Area F**

Social, ethical, political and technological implications and effects of computers in the modern world. Examination of the benefits and side-effects of computer applications and automation. Case study review and analysis. 4 lectures. Prerequisite: Junior standing and completion of GE Area B. Fulfills GE Area F.

**CSC 303 Teaching Computer Science (2)**

Practical coverage of educational techniques appropriate for tutoring in CSC/CPE undergraduate courses, including Socratic methods for tutoring of technical topics, design of test questions and grading rubrics, and lecture presentation. Intended for CSC/CPE/SE students interested in tutoring, grading, or a career in teaching computer science. 1 lecture, 1 laboratory. Prerequisite: CSC/CPE 103, with a grade of C- or better, or equivalent. Not available for technical elective credit.

**CSC 305 Individual Software Design and Development (4)**

Practical software development skills needed for construction of mid-sized production-quality software modules, using the CSC upper division programming language. Topics include inheritance, exceptions, and memory and disk-based dynamic data structures. Students must complete an individual programming project of mid-level complexity. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357. *Crosslisted as CPE/CSC 305.*

**CSC 307 Introduction to Software Engineering (4)**

Requirements, specification, design, implementation, testing and verification of large software systems. Study and use of the software process and software engineering methodologies; working in project teams. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103 with a grade of C- or better, and CSC/CPE 357. Not open to students with credit in CSC/CPE 308. *Crosslisted as CPE/CSC 307.*

**CSC 308 Software Engineering I (4)**

Principles for engineering requirements analysis and design of large complex software systems. Software process models. Methods of project planning, tracking, documentation, communication, and quality assurance. Analysis of engineering tradeoffs. Group laboratory project. Technical oral and written presentations. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357. *Crosslisted as CPE/CSC 308.*

**CSC 309 Software Engineering II (4)**

Continuation of the software lifecycle. Methods and tools for the implementation, integration, testing and maintenance of large software systems. Software development and test environments. Software quality assurance. Group laboratory project. Technical presentation methods and practice. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 308. *Crosslisted as CPE/CSC 309.*

**CSC 310 Computers for Poets (4)****GE Area F**

How computers and computer devices work. Introduction to software systems and applications. How computers connect with various media including images, speech and data. How information is encoded and transmitted across networks. Relationship between the computer and human information processing. 4 lectures. Prerequisite: Junior standing and completion of GE Area B. *Crosslisted as CSC 310/HNRS 311.* Fulfills GE Area F.

**CSC 315 Computer Architecture (4)**

In-depth study of the instruction set architecture and hardware design of a specific CPU. Introduction to pipelines, input/output and multi-processors. Computer abstractions and performance measurement. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103 and either CPE/EE 229 or CSC 225. *Crosslisted as CPE/CSC 315.*

**CSC 316 Micro Controllers and Embedded Applications (4)**

Introduction to micro controllers and their applications as embedded devices. Hardware/software tradeoffs, micro controller selection, use of on-chip peripherals, interrupt driven real-time operation, A/D conversion, serial and parallel communications, watch-dog timers, low power operation and assembly language programming techniques. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 315 or CPE/EE 329. *Crosslisted as CPE/CSC 316.*

**CSC 334 Advanced Topics in Unix (4)**

Advanced topics in Unix, system calls, library functions, shell scripts, and selected Unix tools. 4 lectures. Prerequisite: CSC/CPE 103, with a grade of C- or better, or CSC 234.

**CSC 341 Numerical Engineering Analysis (4)****GE B6**

An intensive survey of numerical analysis techniques used for solving engineering problems. Topics include solution of nonlinear equations, solution of linear systems, interpolation, numerical quadrature, ordinary differential equations and boundary value problems. Not open to students who have completed CSC 342. 4 lectures. Prerequisite: MATH 244 and one of the following courses: CSC 101, CSC 231, CSC 232, CSC 234, CSC 235, or consent of instructor. Fulfills GE B6.

**CSC 342 Numerical Analysis I (3)**

Computer solutions of nonlinear equations and systems of linear equations. Polynomial interpolation. Numerical quadrature. Introduction to the solution of ordinary differential equations. 3 lectures. Prerequisite: MATH 143 and knowledge of a high level programming language, or ability to use one of the following systems: Maple, MatLab, Mathematica, or Mathcad.

**CSC 343 Numerical Analysis II (3)**

Solution of systems of differential equations, predictor-corrector methods, stiff equations. Approximation methods: cubic splines, B-splines, Bezier curves, least squares, methods for solving boundary value problems. 3 lectures. Prerequisite: CSC 342 or equivalent.

**CSC 349 Design and Analysis of Algorithms (4)**

Intermediate and advanced algorithms and their analysis. Mathematical, geometrical, and graph algorithms. NP-complete problems. Additional topics will be chosen from pattern matching, file compression, cryptography, dynamic and linear programming, and exhaustive search. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103, with a grade of C- or better, and MATH 142 and either STAT 312 or STAT 321. *Crosslisted as CPE/CSC 349.*

**CSC 357 Systems Programming (4)**

C programming language from a system programming perspective. Standard C language including operators, I/O functions, and data types in the context of system functions. Unix commands, shell scripting, file system, editors. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103 with a grade of C- or better, and either CSC 225 or CPE/EE 229. *Crosslisted as CPE/CSC 357.*

**CSC 358 Computer System Administration (2)**

Fundamental concepts of Unix system administration. Use of shell scripts and utilities. Techniques of networks and data communications. Methods of system maintenance and accounting. 2 seminars. Prerequisite: CSC/CPE 103 or permission of instructor.

**CSC 361 File Structures (4)**

External storage devices. Character, record, and block I/O. Blocking and buffering. File structures: sequential, indexed sequential, B trees, hashing, multi-key and linked. Primary and secondary indexing. Design and implementation of record and object storage managers. Data compression. Multi-media file formats. 4 lectures. Prerequisite: CSC/CPE 103, with a grade of C- or better.

**CSC 365 Introduction to Database Systems (4)**

Basic principles of database management systems (DBMS) and of DBMS application development. DBMS objectives, systems architecture, database models with emphasis on Entity-Relationship and Relational models, data definition and manipulation languages, the Structured Query Language (SQL), database design, application development tools. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103. *Crosslisted as CPE/CSC 365.*

**CSC 366 Database Modeling, Design and Implementation (4)**

The database modeling problem. Database modeling levels: external, conceptual, logical and physical. Database models: entity-relationship, relational, object-oriented, semantic, and object-relational. Normal forms. Distributed database design. Functional analysis of database applications and transaction specification, design, and implementation. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 365. *Crosslisted as CPE/CSC 366.*

**CSC 369 Distributed Computing I (4)**

Introduction to distributed computing paradigms and protocols: interprocess communications, group communications, the client-server model, distributed objects, and Internet protocols. Emphasis on distributed software above the operating system and network layers. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357. *Crosslisted as CPE/CSC 369.*

**CSC 400 Special Problems for Advanced Undergraduates (1-2) (1-4)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units; ~~with a maximum of 2 units per quarter.~~ Prerequisite: Consent of instructor. *Correction, effective Summer 2009.*

**CSC 402 Software Requirements Engineering (4)**

Software requirements elicitation, analysis and documentation. Team process infrastructure and resource estimation to support appropriate levels of quality. Software architectural design. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 307 or CSC/CPE 309; CSC/CPE 305. *Crosslisted as CPE/CSC 402.*

**CSC 405 Software Construction (4)**

Design and construction of sizeable software products. Technical management of software development teams. Software development process models, software design, documentation, quality assurance during development, software unit and integration testing; CASE tools, development environments, test tools, configuration management. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 402. *Crosslisted as CPE/CSC 405.*

**CSC 406 Software Deployment (4)**

Deployment of a sizeable software product by a student team. Software maintenance and deployment economic issues. Management of deployed software: version control, defect tracking and technical support. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 405. *Crosslisted as CPE/CSC 406.*

**CSC 409 Current Topics in Software Engineering (4)**

Selected topics in software engineering. Topics may include program generation, quality assurance, formal methods, software metrics, design methods, testing, or software development processes. The Schedule of Classes will list topic

selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 309 or CSC/CPE 307. *Crosslisted as CPE/CSC 409.*

**CSC 416 Autonomous Mobile Robotics (4)**

Theory and application of concepts relevant to autonomous mobile robots. Sensor and actuator interfacing, programming mobile robots, mobile robot configurations, software architectures and algorithms. 3 lectures, 1 laboratory. Prerequisite: CPE/EE 329 or both CSC/CPE 315 and CSC/CPE 357 or consent of instructor. *Crosslisted as CPE/CSC 416.*

**CSC 430 Programming Languages I (4)**

Construction of the front end of a compiler including lexical analysis, syntactic analysis, type checking, and formal semantics. Introduction to regular languages, finite automata, and context-free grammars. 3 lectures, 1 laboratory. Prerequisite: CSC 349 and CSC/CPE 357. *Crosslisted as CPE/CSC 430.*

**CSC 431 Programming Languages II (4)**

Language principles and design issues: bindings, conversion, parameter passing, and dynamic semantics. Language implementation: intermediate code representation, memory management, code optimization, and code generation. Functional programming languages. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 430. *Crosslisted as CPE/CSC 431.*

**CSC 435 Introduction to Object Oriented Design Using Graphical User Interfaces (4)**

Principles of object-oriented design, with emphasis on use of these principles in the design of graphical interfaces. Comparison and contrasting of two major object-oriented languages and their corresponding GUI class libraries. Language-independent object-oriented design methods, and application of these methods in the construction of a GUI-based project. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103, with a grade of C- or better, or equivalent and CSC/CPE 305. *Crosslisted as CPE/CSC 435.*

**CSC 437 Dynamic Web Development (4)**

Project-based study of web-based three-tiered applications, including current best practices and tools for design, implementation and testing of browser interface, serverside business logic, object-relational mapping, databases, and web services. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357 (with a grade of C- or better) and CSC/CPE 365 or consent of instructor. *Crosslisted as CPE/CSC 437.*

**CSC 445 Theory of Computation I (4)**

Theory of formal languages and automata. Turing machines. Chomsky hierarchy. Theory of decidability and computability. 4 lectures. Prerequisite: CSC 141 and ~~CSC/CPE 430~~ CSC 349 or consent of instructor. *Change effective Summer 2010.*

**CSC 448 Bioinformatics Algorithms (4)**

Using computers to solve problems in molecular biology. The algorithms, languages, and databases important in determining and analyzing nucleic and protein sequences and their structure. 3 lectures, 1 laboratory. Prerequisite: Consent of instructor or the following: CSC/CPE 103, with a grade of C- or better, or BIO 447 and senior standing. *Crosslisted as CPE/CSC 448.*

**CSC 449 Current Topics in Algorithms (4)**

Selected aspects of the verification, analysis and design of algorithms. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: CSC 349. *Crosslisted as CPE/CSC 449.*

**CSC 453 Introduction to Operating Systems (4)**

Introduction to sequential and multiprogramming operating systems; kernel calls, interrupt service mechanisms, scheduling, files and protection mechanisms, conventional machine attributes that apply to operating system implementation, virtual memory management, and I/O control systems. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357 and either CSC/CPE 225 or CPE/EE 229. *Crosslisted as CPE/CSC 453.*

**CSC 454 Implementation of Operating Systems (4)**

Design and implementation of multiprogramming kernels, systems programming methodology, interprocess communications, synchronization, device drivers and network access methods. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 453. *Crosslisted as CPE/CSC 454.*

**CSC 456 Introduction to Computer Security (4)**

Computer system and network security, including protection, access control, distributed access control, operating system security, applied cryptography, network security, firewalls, secure coding practices, and case studies from real-world systems. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 453 and either CSC/CPE 300 or CPE 350. *Crosslisted as CPE/CSC 456.*

**CSC 458 Current Topics in Computer Systems (4)**

Selected aspects of design, implementation and analysis of networks, advanced operating and distributed systems. Topics may include process management, virtual memory, process communication, context switching, file system designs, persistent objects, process and data migration, load balancing, security and networks. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 453. *Crosslisted as CPE/CSC 458.*

**CSC 464 Introduction to Computer Networks (4)**

Computer network architectures; communications protocol standards; services provided by the network; historical and current examples presented. 3 lectures, 1 laboratory. Prerequisite: STAT 312 or STAT 321 or STAT 350 and CSC/CPE 357. *Crosslisted as CPE/CSC 464.*

**CSC 465 Advanced Computer Networks (4)**

Advanced topics in computer networks; greater detail of protocol standards and services provided by the network; focus on current industry and research topics. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 464 and CSC/CPE 453. *Crosslisted as CPE/CSC 465.*

**CSC 466 Knowledge Discovery from Data (4)**

Overview of modern knowledge discovery from data (KDD) methods and technologies. Topics in On-line Analytic Transaction Processing (OLAP), data mining (association rules mining, classification, clustering), information retrieval. Emphasis on use of KDD techniques in modern software applications. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 365 and one of STAT 312, STAT 321 or STAT 350. *Crosslisted as CPE/CSC 466.*

**CSC 468 Database Management Systems Implementation (4)**

Data structures and algorithms used in the implementation of database systems. Implementation of data and transaction managers: access methods interfaces, concurrency control and recovery, query processors and optimizers. Introduction to implementation of distributed database systems. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 365. *Crosslisted as CPE/CSC 468.*

**CSC 469 Distributed Computing II (4)**

Continued exploration of topics in distributed computing in greater depth, with emphasis on design patterns and team projects. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 369. *Crosslisted as CPE/CSC 469.*

**CSC 471 Introduction to Computer Graphics (4)**

Graphics software development and use of APIs for 3D graphics. The graphics pipeline, modeling, geometric and viewing transforms, lighting and shading, rendering, interaction techniques and graphics hardware. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357. *Crosslisted as CPE/CSC 471.*

**CSC 473 Advanced Rendering Techniques (4)**

Illumination models, reflectance, absorption, emittance, Gouraud shading, Phong shading, raytracing polyhedra and other modeling primitives, coherence, acceleration methods, radiosity, form factors, advanced algorithms. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 471. *Crosslisted as CPE/CSC 473.*

**CSC 474 Computer Animation (4)**

Basic and advanced algorithms for generating sequences of synthetic images. Interpolation in time and space, procedural and keyframe animation, particle systems, dynamics and inverse kinematics, morphing and video. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 471. *Crosslisted as CPE/CSC 474.*

**CSC 476 Real-Time 3D Computer Graphics Software (4)**

Basic and advanced algorithms for real-time, interactive, 3D graphics software. Modeling (polygon mesh, height field, scene graph), real-time rendering and shading (visibility processing, LOD, texture and light maps), collision detection (bounding volumes, complexity management), interactive controls, multi-player game technology, game engine architecture. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 471. *Crosslisted as CPE/CSC 476.*

**CSC 478 Current Topics in Computer Graphics (4)**

Selected aspects of the design, implementation and analysis of computer graphics. Topics may include rendering, modeling, visualization, animation, virtual reality, computer vision, multimedia, and perception issues. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 471. *Crosslisted as CPE/CSC 478.*

**CSC 479 Computer Graphics Seminar (2)**

Current topics in computer graphics. Total credit limited to 4 units. 2 seminars. Prerequisite: CSC/CPE 471.

**CSC 480 Artificial Intelligence (4)**

Programs and techniques that characterize artificial intelligence. Programming in a high level language. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103, with a grade of C- or better. *Crosslisted as CPE/CSC 480.*

**CSC 481 Knowledge Based Systems (4)**

In-depth treatment of knowledge representation, utilization and acquisition in a programming environment. Emphasis on the use of domain-specific knowledge to obtain expert performance in programs. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 480. *Crosslisted as CPE/CSC 481.*

**CSC 483 Current Topics in Human-Computer Interaction (4)**

Selected aspects of the field of human-computer interaction. Topics may include dynamic information visualization, universal access, social impact of technology usage, educational technology, human cognition and performance studies, and extended usability evaluation techniques. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 484. *Crosslisted as CPE/CSC 483.*

**CSC 484 User-Centered Interface Design and Development (4)**

Introduction to the importance of user-centered principles in the design of good interfaces and effective human-computer interaction. Topics include: human characteristics affected by interface design, effective requirements data collection and analysis, user-centered approaches to software engineering, and evaluation of interface and interaction quality. 3 lectures, 1 laboratory. Prerequisite: Junior standing and CSC/CPE 307 or CSC/CPE 308. *Crosslisted as CPE/CSC 484.*

**CSC 485 Autonomous Robot Navigation (4)**

Overview of existing autonomous mobile robot systems, basic kinematic modeling, control structures, sensing and sensor modeling, localization, and motion planning algorithms. Implementation of autonomous navigation capabilities. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 480 or consent of instructor. *Crosslisted as CPE/CSC 485.*

**CSC 486 Human-Computer Interaction Theory and Design (4)**

Application of the theories of human-computer interaction to the task of user-centered design. Survey of techniques for studying and involving users in different aspects of the design process, and demonstration of where and when applicable. Combining of theoretical understanding with practical experience to design solutions to problems facing interactive systems designers. 4 seminars. Prerequisite: CSC/CPE 484.

**CSC 489 Current Topics in Artificial Intelligence (4)**

Selected aspects of the design, implementation and analysis of advanced systems and concepts in the area of artificial intelligence. Topics may include knowledge representation, reasoning, learning, or planning, and specific techniques like intelligent agents, genetic algorithms, semantic web, or robotics. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 480. *Crosslisted as CPE/CSC 489.*

**CSC 490 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**CSC 491 Senior Project Design Laboratory I (2)**

Selection and completion of a project by individuals or team which is typical of problems which graduates must solve in their fields of employment. Project may include students from other disciplines. Formulation of outline, literature review, and project schedule. 2 laboratories. Prerequisite: CSC/CPE 307 or CSC/CPE 309 and consent of instructor.

**CSC 492 Senior Project Design Laboratory II (3)**

Selection and completion of a project by individuals or team which is typical of problems which graduates must solve in their fields of employment. Project may include students from other disciplines. Project results are presented in a formal report. 3 laboratories. Prerequisite: CSC 491 and consent of instructor.

**CSC 493 Cooperative Education Experience (2) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 6 units. Prerequisite: Sophomore standing and consent of instructor.

**CSC 494 Cooperative Education Experience (6) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation



by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 18 units. Prerequisite: Sophomore standing and consent of instructor.

**CSC 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units. Prerequisite: Sophomore standing and consent of instructor.

**CSC 500 Directed Study (2-3) (CR/NC)**

Individual directed study of advanced topics. Total credit limited to 4 units. Credit/No Credit grading only. Prerequisite: Fully classified graduate standing and consent of instructor.

**CSC 508 Software Engineering I (4)**

In-depth study of requirements engineering, software project management, formal specifications and object-oriented analysis. 4 seminars. Prerequisite: CSC/CPE 307 or CSC/CPE 308 and graduate standing, or consent of instructor.

**CSC 509 Software Engineering II (4)**

In-depth study of software modeling and design. Formal design methodologies. Design patterns. Detailed case studies of existing projects. Tools and methods for designing large software systems. 4 seminars. Prerequisite: CSC 508 and graduate standing, or consent of instructor.

**CSC 520 Computer Architecture (4)**

Comparative study and design of multiprocessor, dataflow, RISC, high level language and other new computer architectures. VLSI processor design techniques. 3 seminars, 1 laboratory. Prerequisite: CSC/CPE 315 and graduate standing, or consent of instructor. *Crosslisted as CPE/CSC 520.*

**CSC 530 Languages and Translators (4)**

Advanced programming language and translator concepts. Language concepts to be covered will be selected from current state-of-the-art languages and current issues in language design. Compiler concepts will include retargetable code generation, use of translator-writing systems, and error recovery. 4 seminars. Prerequisite: CSC 430 and graduate standing, or consent of instructor.

**CSC 540 Theory of Computation II (4)**

Advanced topics in theoretical computer science from such areas as automata theory, cellular automata theory, computational complexity, and program verification. 4 seminars. Prerequisite: CSC 445 and graduate standing, or consent of instructor.

**CSC 541 Numerical Methods (4)**

Introduction to advanced methods used in numerical analysis. Finite element methods for one and two-dimensional problems. Study of transforms including the Fast Fourier Transform and the Fast Hartley Transform. Review of the software supporting these methods. 4 seminars. Prerequisite: CSC 342 and graduate standing, or consent of instructor.

**CSC 550 Operating Systems (4)**

Concepts of computer architecture and operating systems. Design features of advanced computers, general time-sharing systems and schemes for dynamic memory allocation, scheduling and protection. Dynamic linkage between sub-routines. Intercommunication between input/output and processors. 4 seminars. Prerequisite: CSC/CPE 453 and graduate standing, or consent of instructor.

**CSC 556 Computer Security (4)**

Exploration of advanced topics in computer security with an emphasis on research topics. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 456 and graduate standing, or consent of instructor. *Crosslisted as CPE/CSC 556.*

**CSC 560 Database Systems (4)**

Current topics in database systems: distributed databases and transactions, nested and long-running transactions, distributed concurrency control, semantic and object-oriented data models, database systems for non-traditional applications: engineering design databases, active, logic, temporal, multi-media, and real-time databases. 4 seminars. Prerequisite: CSC/CPE 468 365 and graduate standing, or consent of instructor. *Change effective Fall 2010.*

**CSC 564 Computer Networks: Research Topics (4)**

Exploration of advanced topics in emerging computer networking technologies; focus on leading edge computer network research topics. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 464 and graduate standing, or consent of instructor. *Crosslisted as CPE/CSC 564.*

**CSC 568 Distributed Systems (4)**

Advanced topics in distributed systems with emphasis on recent and emerging distributed computing paradigms, fault tolerance, and distributed algorithms. 4 seminars. Prerequisite: CSC/CPE 369 or CSC/CPE 569 and graduate standing, or consent of instructor.

**CSC 569 Distributed Computing (4)**

Principles and practices in distributed computing: interprocess communications, group communications, client-server model, distributed objects, message queue system, distributed services, mobile agents, object space, Internet protocols. Distributed algorithms: consensus protocols, global state protocols. Fault tolerance: classification of faults, replication. Not open to students with credit in CSC/CPE 369 or CSC/CPE 469. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 357 and graduate standing, or consent of instructor. *Crosslisted as CPE/CSC 569.*

**CSC 570 Current Topics in Computer Science (2-4)**

Directed group study of selected topics for graduate students. Topics will normally consist of continuations of those in CSC 520, 530, 540, 550, 560 and 580, and other topics as needed. The Schedule of Classes will list title selected. Total credit limited to 12 units. 2 to 4 seminars. Prerequisite: Graduate standing and evidence of satisfactory preparation in computer science.

**CSC 572 Computer Graphics (4)**

Advanced topics in computer graphics with emphasis on leading edge computer graphics technologies and advanced topics in graphics fundamentals. 3 lectures, 1 laboratory. Prerequisite: Successful completion of CSC/CPE 471 and graduate standing, or consent of instructor.

**CSC 580 Artificial Intelligence (4)**

Current research in the field of artificial intelligence with emphasis on cooperative agents, distributed agents, and decision making in complex, concurrent environments. AI programming in a distributed environment. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 481 and graduate standing, or consent of instructor. *Crosslisted as CPE/CSC 580.*

**CSC 581 Computer Support for Knowledge Management (4)**

Methods and techniques that computer-based systems can provide to make the management of knowledge and information in digital form easier for the user. Emphasis on support for knowledge-intensive activities performed by users. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 481. *Crosslisted as CPE/CSC 581.*

**CSC 590 Thesis Seminar (1)**

Preparation for conducting research in the field of computer science, through discussions, selected readings, and student presentations. 1 seminar. Prerequisite: Graduate standing or consent of instructor.

**CSC 593 Cooperative Education Experience (2) (CR/NC)**

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**CSC 594 Cooperative Education Experience (6) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**CSC 595 Cooperative Education Experience (12) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**CSC 596 Thesis I (2)**

Individual research or activity under faculty supervision, beginning work on the master's thesis. Prerequisite: Graduate standing and consent of instructor. Corequisite or prerequisite: CSC 590.

**CSC 597 Thesis II (3)**

Individual research or activity under faculty supervision, continuing work on the master's thesis. Prerequisite: CSC ~~597-596~~ and consent of instructor. *Corrected effective Summer 2009.*



**CSC 599 Thesis III (3)**

Individual research or activity under faculty supervision leading to an acceptable thesis. Prerequisite: CSC ~~598-597~~, selection of thesis committee, graduate standing, and consent of instructor. *Corrected effective Summer 2009.*

## 2009-11 Cal Poly Catalog

### Electrical Engineering Department

## EE—ELECTRICAL ENGINEERING

**Note: the phrase, “with a C- grade or better” was removed from EE course descriptions effective Spring 2010. See [Updates](#) for list of affected EE courses.**

### EE 111 Introduction to Electrical Engineering (1)

A general overview of the field of electrical engineering. Preparation for successful completion of the Electrical Engineering (EE) program at Cal Poly. 1 lecture. Concurrent: EE 151. Not required for students with transfer credit for EE 211 or EE 241.

### EE 112 Electric Circuit Analysis I (2)

Introduction to basic circuit analysis. Resistive circuits, voltage and current sources, network theorems. 2 lectures. Prerequisite: MATH 142 or equivalent. **Concurrent or prerequisite: PHYS 133.** Suggested: EE 111/151. *Change effective Fall 2009.*

### EE 129 Digital Design (3)

Number systems, Boolean algebra, Boolean functions, and minimization. Analysis and design of combinational logic circuits. Feedback circuits. Analysis and design of sequential logic circuits. Applying Hardware Description Language (HDL) to synthesize digital logic circuits in Programmable Logic Devices (PLDs). **Not open to students with credit in CPE/EE 133.** 3 lectures. Prerequisite: An orientation course in student's major (EE 111&151 for EE students, CPE 100 for CPE students), CPE/CSC 101. Concurrent: CPE/EE 169. *Crosslisted as CPE/EE 129. Change effective Winter 2011.*

### EE 133 Digital Design (4)

Number systems, Boolean algebra, Boolean functions, and function minimization. Analysis and design of combinational and sequential logic circuits. Hardware Description Language (HDL) concepts and applications digital design and synthesis in Programmable Logic Devices (PLDs). Not open to students with credit in CPE/EE 129. 3 lectures, 1 laboratory. Prerequisite: CPE/CSC 101. *Crosslisted as CPE/EE 133. New course, effective Winter 2011.*

### EE 151 Introduction to Electrical Engineering Laboratory (1)

A variety of hands-on experiments and demonstrations in electrical engineering, providing background and motivation for successful completion of the Electrical Engineering (EE) program at Cal Poly. 1 laboratory. Concurrent: EE 111. Not open to students with credit for EE 241.

### EE 169 Digital Design Laboratory (1)

Experiments to analyze and design combinational and sequential logic circuits with discrete ICs and PLDs. Introduction to laboratory equipment such as the logic state analyzer for testing circuits. Introduction to a hardware description language for logic simulation and design. **Not open to students with credit in CPE/EE 133.** 1 laboratory. Prerequisite: An orientation course in student's major (EE 111&151 for EE students, CPE 100 for CPE students), CPE/CSC 101. Concurrent: CPE/EE 129. *Crosslisted as CPE/EE 169. Change effective Winter 2011.*

### EE 200 Special Problems for Undergraduates (1–2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

### EE 201 Electric Circuit Theory (3)

Application of fundamental circuit laws and theorems to the analysis of DC, and steady-state single-phase and three-phase circuits. Not for electrical engineering majors. 3 lectures. Prerequisite: MATH 244, PHYS 133.

### EE 211 Electric Circuit Analysis II (3)

Continuation of basic circuit analysis. Op-amp circuits. Energy storage elements, RC and RL circuits, and AC steady state analysis. 3 lectures. Prerequisite: EE 112, **PHYS 133.** Prerequisite or Concurrent: **PHYS 133,** MATH 244. Concurrent: EE 241. *(Change effective Fall 2009)*

### EE 212 Electric Circuit Analysis III (3)

AC power, 3-phase circuits. Mutual inductance, series and parallel resonance and two-port networks. Frequency response, including Bode plots. 3 lectures. Prerequisite: MATH 244, EE 211. Concurrent: EE 242.

### EE 228 Continuous-Time Signals and Systems (4)

Continuous-time systems analysis, with emphasis on linear time-invariant (LTI) systems. Classification of continuous-time systems. Convolution and its application to LTI systems. The Laplace transform, Fourier transform, and Fourier series, and their application to the analysis of LTI systems. 4 lectures. Prerequisite: EE 212&242. Recommended: MATH 241.

### EE 229 Computer Design and Assembly Language Programming (3)

Design and implementation of digital computer circuits via CAD tools for programmable logic devices (PLDs). Computer design including datapath components and control unit. Assembly language programming. Instruction set architecture, hardware/software interface, performance evaluation of computer processors. **Not open to students with credit in CPE/EE 233.** 3 lectures. Prerequisite: EE/CPE 129&169 or **CPE/EE 133.** Concurrent: EE/CPE 269. *Crosslisted as CPE/EE 229. Change effective Winter 2011.*

### EE 233 Computer Design and Assembly Language Programming (4)

Design and implementation of digital computer circuits via CAD tools for programmable logic devices (PLDs). Basic computer design with its datapath components and control unit. Introduction to assembly language programming of an off-the-shelf RISC-based microcontroller. Note open to students with credit in CPE/EE 229. 3 lectures, 1 laboratory. Prerequisite: CPE/EE 129 and CPE/EE 169, or CPE/EE 133. *Crosslisted as CPE/EE 233. New course, effective Winter 2011.*

### EE 241 Electric Circuit Analysis Laboratory II (1)

Use of electrical and electronic test equipment. Experimental verification of circuit analysis concepts including Kirchhoff's Laws, Thevenin's Theorem, maximum power transfer and superposition. 1 laboratory. Prerequisite: EE 112, **PHYS 133,** EE 151 for EE students and CPE 169 for CPE students. Prerequisite or concurrent: MATH 244, **PHYS 133.** Concurrent: EE 211. *Change effective Fall 2009.*

### EE 242 Electric Circuit Analysis Laboratory III (1)

Observation of transient and steady-state phenomena, phase-shift circuits, resonance. Use of phasor diagrams. 1 laboratory. Prerequisite: MATH 244, EE 241 or consent of department chair. Concurrent: EE 212.

### EE 251 Electric Circuits Laboratory (1)

Techniques of measurement of DC and steady-state AC circuit parameters. Equivalent circuits, nonlinear elements, resonance. 1 laboratory. Concurrent: EE 201.

### EE 255 Energy Conversion Electromagnetics (3)

Fundamentals of electro-mechanical energy conversion. Magnetic circuits and electromagnetic devices. Theory of operation and operating characteristics of transformers, DC machines, and AC induction and synchronous machines. 3 lectures. Prerequisite: EE 212&242, or EE 201&251. Concurrent: EE 295.

### EE 269 Computer Design and Assembly Language Programming Laboratory (1)

Experiments to design and test digital computer circuits and systems with programmable logic devices (PLDs). Design projects to implement a basic computer with data path components and control. Assembly language programming projects for an off-the-shelf RISC-based microcontroller. **Not open to students with credit in CPE/EE 233.** 1 laboratory. Prerequisite: CPE/EE 129&169 or **CPE/EE 133.** Concurrent: **CPE/EE 229.** *Crosslisted as CPE/EE 269. Change effective Winter 2011.*

### EE 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### EE 295 Energy Conversion Electromagnetics Laboratory (1)

Single-phase and three-phase transformers. Starting of rotating machines, evaluation of characteristics of rotating machines. 1 laboratory. Prerequisite: EE 212&242 or EE 201&251. Concurrent: EE 255.

### EE 302 Classical Control Systems (3)

Introduction to feedback control systems. System modeling. Transfer functions. Graphical system representation. System time response, stability. Root Locus. Frequency response. Compensation. 3 lectures. Prerequisite: EE 228, EE 255&295. Concurrent: EE 342. Suggested: EE 368.

### EE 306 Semiconductor Device Electronics (3)

Internal operation, semiconductor physics, terminal characteristics, models and application of diodes (LEDs, solar cells, and photo-diodes) and transistors (field-

effect and bipolar). 3 lectures. Prerequisite: CHEM 124, EE 212&242, IME 156 or IME 157 or IME 458, PHYS 211. Concurrent: EE 346.

### EE 307 Digital Electronics and Integrated Circuits (3)

Analysis, design, application and interfacing of integrated logic circuits, including NMOS, CMOS, TTL, ECL, and other logic families. 3 lectures. Prerequisite: EE/CPE 129&169 or EE/CPE 133, EE 306&346. Concurrent: EE 347, EE/CPE 229 or EE/CPE 233 (may be taken previously). *Change effective Spring 2011.*

### EE 308 Analog Electronics and Integrated Circuits (3)

Analysis and design of integrated circuits for use in analog applications. Gain, frequency response, and feedback of linear small-signal amplifiers. 3 lectures. Prerequisite: EE 302&342, EE 307&347. Concurrent: EE 348.

### EE 314 Introduction to Communication Systems (3)

Analog modulation, including: double-sideband modulation, amplitude modulation, single-sideband modulation, frequency modulation, phase modulation. Performances of such systems in the presence of white Gaussian noise. Implementations of transmitters and receivers. 3 lectures. Prerequisite: STAT 350.

### EE 321 Electronics (3)

Semiconductor devices and circuits. Instrumentation amplifiers, power control rectifiers, feedback, pulse circuits, digital logic circuits. Not for Electrical Engineering majors. 3 lectures. Prerequisite: EE 201 or BRAE 216 for BRAE majors. ~~Concurrent: EE 361.~~ *Change effective Spring 2011.*

### EE 328 Discrete Time Signals and Systems (3)

Discrete-time systems and analysis, with emphasis on linear time-invariant (LTI) systems. Sampling theorem. Classification of discrete-time systems. Convolution and its application to LTI systems. The z transform, discrete-time Fourier transform, and discrete Fourier transform. Introduction to digital filters. 3 lectures. Prerequisite: EE 228. Concurrent: EE/CPE 368. *Crosslisted as CPE/EE 328.*

### EE 329 Programmable Logic and Microprocessor-Based Systems Design (4)

Design, implementation and testing of programmable logic microprocessor-based systems. Hardware/software tradeoffs (such as timing analysis and power considerations), system economics of programmable logic and microprocessor-based system design. Interfacing hardware components (such as ADCs/DACs, sensors, transducers). 3 lectures, 1 laboratory. ~~Not open to students with credit in CPE/EE 336.~~ Prerequisite: EE 307&347, EE 229&269 or CPE/EE 233. *Crosslisted as CPE/EE 329. Change effective Spring 2011.*

### EE 335 Electromagnetic Fields and Transmission (4)

Maxwell's equations. Plane wave propagation in free space. Static electric and magnetic fields. Distributed-circuit concepts and transmission line parameters. Reflections and standing waves. The Smith chart and its applications. Transmission line measurements and impedance matching techniques. 4 lectures. Prerequisite: MATH 241, EE 212&242. Concurrent: EE 375.

### EE 336 Microprocessor System Design (4)

Introduction to microcontrollers and integrated microprocessor systems. ~~Emphasis on the Intel 8051 and Motorola 68HC12 families and derivatives.~~ Hardware/software trade-offs, system economics, and functional configurations. Interface design, real-time clocks, interrupts, A/D conversion, serial and parallel communications, watch-dog timers, low power operation, ~~event-based inter-peripheral communication~~, and assembly and higher-level language programming techniques. Architecture and design of sampled data and ~~digital control low-power~~ systems. ~~Case studies of representative applications.~~ 3 lectures, 1 laboratory. ~~Not open to students with credit in CPE/EE 329.~~ Prerequisite: CPE/EE 229&269 or CPE/EE 233. ~~EE 129&169.~~ *Crosslisted as CPE/EE 336. Change effective Spring 2011.*

### EE 342 Classical Control Systems Laboratory (1)

Laboratory work pertaining to classical control systems, including servo control, transient and frequency responses, stability, and computer-aided analysis of control systems. 1 laboratory. Prerequisite: EE 228, EE 255&295. Concurrent: EE 302. Suggested: EE 368.

### EE 346 Semiconductor Device Electronics Laboratory (1)

Experimental determination of device characteristics and models. 1 laboratory. Prerequisite: CHEM 124, EE 212&242, IME 156 or IME 157 or IME 458, PHYS 211. Concurrent: EE 306. Suggested: ENGL 134.

### EE 347 Digital Electronics and Integrated Circuits Laboratory (1)

Computer simulation and experimental investigation of the characteristics, applications and interfacing of different logic families. 1 laboratory. Prerequisite: EE/CPE 129&169 or EE/CPE 133, EE 306&346. Concurrent: EE 307, EE/CPE 229 or EE/CPE 233 (may be taken previously). *Change effective Spring 2011.*

### EE 348 Analog Electronics and Integrated Circuits Laboratory (1)

Design, simulation, construction and testing of solid state amplifiers and sub-circuits to meet stated specifications. 1 laboratory. Prerequisite: EE 302&342, EE 307&347. Concurrent: EE 308.

### EE 361 Electronics Laboratory (1)

Instrumentation amplifiers, feedback, rectifiers and power control, pulse and digital logic circuits. 1 laboratory. Prerequisite: EE 251 or BRAE 2216 for BRAE majors. Concurrent: EE 321.

### EE 368 Signals and Systems Laboratory (1)

Laboratory work pertaining to linear systems, including Fourier analysis, time and frequency responses, and system transfer function. 1 laboratory. Prerequisite: EE 228. Concurrent: EE/CPE 328. *Crosslisted as CPE/EE 368.*

### EE 375 Electromagnetic Fields and Transmission Laboratory (1)

Transmission line and passive component measurements at microwave frequencies. Response to pulse excitation using time domain techniques and sinusoidal excitation using frequency domain techniques. Application of the Smith Chart and network analyzers in transmission line characterization and impedance matching techniques. 1 laboratory. Concurrent: EE 335.

### EE 400 Special Problems for Advanced Undergraduates (1-5)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 5 units. Prerequisite: Consent of department chair.

### EE 402 Electromagnetic Waves (4)

Maxwell's equations and plane wave propagation in materials. Reflection and transmission of normal and oblique incidence plane waves at planar boundaries between different media. Wave guides. Antennas. 4 lectures. Prerequisite: EE 335.

### EE 403 Fiber Optic Communication (3)

Propagation of light in optical fibers, attenuation and bandwidth. LED and Laser Diode sources for use with optical fibers. Optical sources, detectors, and receivers. Design of optical communication systems with applications in telecommunications and local area networks (LANs). 3 lectures. Prerequisite: EE 335 or PHYS 323. Concurrent: EE 443.

### EE 405 High-frequency Amplifier Design (3)

Design of modern electronic amplifiers and amplifier systems with advanced techniques. UHF and microwave small signal amplifier design utilizing microstrip transmission lines, S parameters of GaAs FET, and bipolar transistors. Low noise, broadband, and power amplifier designs. Oscillator designs. 3 lectures. Prerequisite: EE 308&348, EE 335. Concurrent: EE 445.

### EE 406 Power Systems Analysis I (4)

Introduction to electric power systems. Representation of power systems and its components including transmission lines, synchronous machines, transformers and loads. One line diagrams and per unit calculations. symmetrical faults. Load flow analysis. 4 lectures. Prerequisite: EE 335, EE 255&295.

### EE 407 Power Systems Analysis II (4)

Symmetrical components, unbalanced faults, power system stability, system protection, relays and relay systems, power system instrumentation and measurement techniques, economic operation. 4 lectures. Prerequisite: EE 406.

### EE 409 Electronic Design (3)

Design of electronic systems and subsystems using analog and digital integrated circuits. Design principles and techniques. Analysis and design of feedback amplifiers; operational amplifier applications. Design of analog/digital and digital/analog converters. Power supply design. Emphasis on IC implementation. 3 lectures. Prerequisite: EE 308&348, EE 328&368, EE 329. Concurrent: EE 449.

### EE 410 Power Electronics I (4)

Introduction to power electronics and power semiconductor devices. Analysis, performance characterization, and design of power electronics converters such as: rectifiers, DC choppers, AC voltage controllers, and single-phase inverters. Operation of DC motor drives. Use of commercially available software. 3 lectures, 1 laboratory. Prerequisite: EE 308&348, or EE 321 and consent of instructor.

**EE 411 Power Electronics II (4)**

Switching losses. Analysis, performance characterization, and design of snubber circuits and resonant converters. Operation of DC transmission lines, flexible AC transmission system (FACTS) controllers, three-phase inverters, and AC motor drives. Use of commercially available software. 3 lectures, 1 laboratory. Prerequisite: EE 410.

**EE 412 Advanced Analog Circuits (3)**

Application of linear integrated circuits to data acquisition problems: transducer interfacing, linear and nonlinear preprocessing, phase-locked loops, and high performance quantization and recovery (A/D, D/A conversion). 3 lectures. Prerequisite: EE 409&449, EE 314. Concurrent: EE 452.

**EE 413 Advanced Electronic Design (4)**

Advanced design of electronic circuits and subsystems. Sustainability. Design as a process. Implementation of specific design projects. Teamwork. Automated test using GPIB instruments. 3 lectures, 1 laboratory. Prerequisite: CSC 101, EE 409&449.

**EE 415 Communication Systems Design (3)**

Design of modern electronic communication and telemetry systems. Emphasis: practical implementation and comparative evaluation of various modulation systems. 3 lectures. Prerequisite: EE 409&449, EE 314.

**EE 416 Digital Communication Systems (3)**

Baseband (PCM, PAM, DM) signals and transmission. Bandpass (PSK, FSK, ASK) modulation and demodulation techniques. Digital communication signals in the presence of noise and detection of signals in Gaussian noise. Other topics such as: quantization, multiplexing and multiple access, spread spectrum techniques, coding, synchronization. 3 lectures. Prerequisite: EE 314, EE 328.

**EE 417 Alternating Current Machines (4)**

Alternating current machines. Generalized, operational and dynamic analysis. Steady-state and transient operation of synchronous machines and linear induction machines. 3 lectures, 1 laboratory. Prerequisite: EE 255&295.

**EE 418 Photonic Engineering (3)**

Modern optical design with emphasis on the use of computers to design simple optical systems and to evaluate existing optical designs. Paraxial and exact ray tracing through thin and thick lenses, mirrors, and prisms. Radiometry and photometry. Electro-optic, acousto-optic, and magneto-optic modulators and their applications. Thermal detectors, semiconductor detectors, and charge coupled device (CCD) arrays. 3 lectures. Prerequisite: EE 335 or PHYS 323. Concurrent: EE 458.

**EE 419 Digital Signal Processing (3)**

Review of Z-transform, convolution and discrete Fourier Transform. Digital filter design. Fast Fourier Transform. Theory and applications of digital signal processors. 3 lectures. Prerequisite: CSC 101, EE 328&368. Concurrent: EE 459.

**EE 420 Sustainable Electric Energy Conversion (4)**

Electrical engineering aspects of photovoltaic and wind power generation and usage, and electrochemical energy conversion. Power control, processing, and quality for grid-connected and stand-alone systems. Distribution and storage of electric energy. Hydrogen and synthetic fuels. Distributed generation. 3 lectures, 1 laboratory. Prerequisite: CHEM 124 and EE 255&295 or consent of instructor.

**EE 421 Solid-state Microelectronics (3)**

Physical basis of solid-state microelectronics. Passive and active integrated circuit components in Bipolar, MOS, thin and thick film systems. Diffusion, oxidation, ion implantation and other fabrication techniques. Microcircuit layout and design: system development, reliability and economic considerations. Future trends. 3 lectures. Prerequisite: EE 307.

**EE 422 Polymer Electronics Laboratory (1)**

Experimental procedures in polymer electronics. Investigation of the characteristics of a polymer electronic device. 1 laboratory. Prerequisite: EE 347 or MATE 340 or CHEM 319 or PHYS 340. *Crosslisted as EE/PHYS 422.*

**EE 424 Introduction to Remote Sensing (4)**

Radiation characteristics, sensor technology and platforms, satellite systems, system design tradeoffs, collection and transmission of radio-metric data, GPS, thermal remote sensing, active radar and microwave remote sensing, interpretation and exploitation of remotely sensed data for various applications. 3 lectures, 1 laboratory. Prerequisite: MATH 244, senior or graduate standing in engineering, or consent of instructor.

**EE 425 Analog Filter Design (3)**

Approximation Theory. All pole filters. Frequency transformations. Elements of passive synthesis. Time delay filters. Theory and design of active filters. Sensitivity analysis. 3 lectures. Prerequisite: EE 409&449. Concurrent: EE 455.

**EE 427 Digital Computer Subsystems (4)**

Design of components and subsystems in digital computers. Use of modern techniques and devices (CPLDs and FPGAs) in implementation. Consideration given to cost/speed tradeoffs. Implementation of a basic digital computer using pre-designed subsystems. 3 lectures, 1 laboratory. Prerequisite: EE 329. *Crosslisted as CPE/EE 427.*

**EE 428 Computer Vision (4)**

Introduction to the concepts of 2D and 3D computer vision: low-level image processing methods such as filtering and edge detection; feature extraction; segmentation and clustering; stereo vision; appearance-based and model-based algorithms. 3 lectures, 1 laboratory. Prerequisite: EE 328 or CPE/CSC 357 or ME 305 or consent of instructor. *Crosslisted as CPE/EE 428.*

**EE 431 Computer-Aided Design of VLSI Devices (4)**

Design of VLSI circuits, design of subsystems using static CMOS, transmission gates, and other methods. Variety of CAD tools for design, verification, test, and simulation. Several design projects. 3 lectures, 1 laboratory. Prerequisite: EE 307&347, EE 308&348 or consent of instructor. *Crosslisted as CPE 441/EE 431.*

**EE 432 Digital Control Systems (3)**

Theory and applications of digital computers in linear control systems. Discrete time methods are used in analysis and design studies. Digital control systems are synthesized. 3 lectures. Prerequisite: EE 302&342. Prior background in discrete time systems, e.g., EE 328, EE 368 recommended. Concurrent: EE 472. *Crosslisted as CPE/EE 432.*

**EE 433 Introduction to Magnetic Design (4)**

Design of magnetic components. Fundamentals of magnetics, magnetic cores, design of power transformer, three-phase transformer, dc inductor, ac inductors, dc-dc converter transformer design, actuators. Use of commercially available software. 3 lectures, 1 laboratory. Prerequisite: EE 255&295 or consent of instructor.

**EE 438 Digital Computer Systems (3)**

Design of computer ALUs, microprogram controllers, memory systems, and I/O controllers. Use of LSI components in CPU design. Microprogram and nanoprogram development. 3 lectures. Prerequisite: EE 427 or consent of instructor. *Crosslisted as CPE/EE 438.*

**EE 439 Computer Peripheral Interfacing (4)**

Systems-level design and implementation of common computer peripheral devices with emphasis placed on controller and interface aspects. Use of standard and softcore microcontroller platforms with communications to discrete peripherals with I2C, SPI, CAN, and other common bus interfaces. 3 lectures, 1 laboratory. Prerequisite: EE/CPE 329, or consent of instructor. *Crosslisted as CPE/EE 439.*

**EE 440 Wireless Communications (3)**

Wireless microwave system design and analysis. RF transmission lines, microwave networks, receiver design, modulation techniques, and mixer characterization and realizations. Noise and distortion, RF oscillators and frequency synthesizers, filter design. Radiating systems and electromagnetic wave propagation, microwave amplifier design. 3 lectures. Prerequisite: EE 335, EE 314. Concurrent: EE 480.

**EE 443 Fiber Optics Laboratory (1)**

Experimental investigation of the properties of optical fibers, sources, and detectors. Measurement of fiber physical characteristics, attenuation, losses, and bandwidth. Evaluation of an analog and digital fiber optic data link. 1 laboratory. Concurrent: EE 403.

**EE 444 Power Systems Laboratory (1)**

Protective relaying, coordination, and relay calibration. Power control using transformers, parallel operation of generators, and computer simulation of power systems. 1 laboratory. Prerequisite: EE 406.

**EE 445 High Frequency Amplifier Design Laboratory (1)**

Experimental investigation employing advanced techniques. Design of high-frequency electronic amplifiers utilizing S-parameters of bipolar transistors, network analyzers, and computer simulation techniques. 1 laboratory. Prerequisite: EE 308&348, EE 335. Concurrent or prerequisite: EE 405.

**EE 449 Electronic Design Laboratory (1)**

Design of electronic systems and subsystems using integrated circuits. 1 laboratory. Prerequisite: EE 308&348, EE 328&368, EE 329. Concurrent: EE 409.

**EE 452 Advanced Analog Circuits Laboratory (1)**

Advanced laboratory study of LC and VCO oscillators, phase detectors, phase-locked loop circuits, transducer interface circuits, noise sources and signal-to-noise determination, ADC and DAC for data conversion. Formal experiments and computer SPICE simulation. 1 laboratory. Prerequisite: EE 314, EE 409&449. Concurrent: EE 412.

**EE 455 Analog Filter Design Laboratory (1)**

Advanced laboratory study of sensitivity and stability of active networks prescribed for realization of transfer functions by active network synthesis techniques. Formal experiments and individual project work. 1 laboratory. Prerequisite: EE 409&449. Concurrent: EE 425.

**EE 456 Communication Systems Laboratory (1)**

Methods of analog modulation and demodulation. Emphasis on spectral analysis, bandwidth requirements and other practical considerations of modulation and demodulation. 1 laboratory. Prerequisite: EE 328&368, EE 314.

**EE 458 Photonic Engineering Laboratory (1)**

Experimental investigation of the techniques used in processing optical signals. Formal experiments on electro-optic modulation, acousto-optic modulation. Construction of an RF spectrum analyzer. Analog processing of optical signals, and charge-coupled array devices. 1 laboratory. Concurrent: EE 418.

**EE 459 Digital Signal Processing Laboratory (1)**

Experiments in digital filter design and digital signal processing emphasizing various areas of applications (communications, audio signals, speech processing). Formal experiments and individual project work. 1 laboratory. Prerequisite: CSC 101, EE 328&368. Concurrent: EE 419.

**EE 460 Senior Project Preparation (2)**

Introduction to teamwork and team-oriented project execution. Project planning, scheduling and analysis. Usage of tools for project management including Gantt and PERT Charts. Project development, cost and time estimation using top-down and bottom-up approaches. Ethics and ethical issues as they pertain to the conduct of engineering. Development of senior project proposal. 2 lectures. Prerequisite: EE 314, EE 335. Prerequisite or concurrent: EE 409&449.

**EE 461, 462 Senior Project I, II (3) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 150 hours total time. Prerequisite: EE 409&449, EE 460.

**EE 463, 464 Senior Project Design Laboratory I, II (3) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. EE 463: 3 laboratories; prerequisite: EE 409&449, EE 460. EE 464: 2 laboratories; prerequisite: EE 463. Note: although EE 463, 464 substitute for EE 461, 462, students may not use repeat credit for the purpose of increasing GPA.

**EE 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Consent of instructor.

**EE 471 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Consent of instructor.

**EE 472 Digital Control Systems Laboratory (1)**

Design and programming of microprocessor-based digital controls for electro-mechanical plants. Topics include digital control laws, translation of transfer functions into algorithms, assembly language programming, real-time software design, sample rate selection, finite word-length considerations. 1 laboratory. Concurrent: EE 432. *Crosslisted as CPE/EE 472.*

**EE 480 Wireless Communications Laboratory (1)**

Wireless microwave system design and analysis. RF transmission lines, microwave networks, receiver design, modulation techniques, and mixer characterization and realizations. Noise and distortion, RF oscillators and frequency synthesizers, filter design. Radiating systems and electromagnetic wave propagation, microwave amplifier design. 1 laboratory. Prerequisite: EE 335, EE 314. Concurrent: EE 440.

**EE 494 Cooperative Education Experience (6-12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units. Prerequisite: Sophomore standing and consent of instructor.

**EE 495 Cooperative Education Experience (6-12)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 4 units; total credit limited to 12 units. Prerequisite: **Two consecutive quarters of EE 494 immediately preceding EE 495.** Sophomore standing and consent of instructor. *Change effective Summer 2010.*

**EE 500 Individual Study (1-3)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of department chair, graduate advisor, and supervising faculty member. Total credit limit at discretion of graduate advisor, not to exceed 9 units.

**EE 502 Microwave Engineering (4)**

Application of Maxwell's equations and boundary value problems to waveguide structures. Striplines and microstrip lines. S-parameters. Microwave equivalent circuit theorem. Passive microwave devices. Charge and field interactions in oscillators and amplifiers. Transferred electron devices, avalanche transit-time devices, and microwave transistors. Circuits associated with oscillators and reflection type amplifiers. 4 seminars. Prerequisite: EE 402 or equivalent.

**EE 511 Electric Machines Theory (4)**

Advanced topics in electric machines theory. Introduction to Park's transformation. Analysis of electric machines using Kron's generalized concept. Vector control of induction machines. 4 seminars. Prerequisite: EE 255 or equivalent, and graduate standing or consent of instructor.

**EE 513 Control Systems Theory (4)**

State representation of dynamic systems. Mathematical models of physical devices, controllability and observability. Design of closed-loop systems. Optimal control theory. 4 seminars. Prerequisite: EE 302 or equivalent, and graduate standing or consent of instructor.

**EE 514 Advanced Topics in Automatic Control (4)**

Summary course covering five selected graduate-level topics in automatic control theory and practice; implementation issues in digital control, nonlinear control theory and design, LQ and time optimal control, variable structure control, and fuzzy logic/model-free control. 4 seminars. Prerequisite: EE 513 or equivalent, EE 328 or similar course on discrete-time linear systems.

**EE 515 Discrete Time Filters (4)**

Advanced topics in filter design and implementation. Emphasis placed on current applications and on the processing of real signals. Topics may include signal analysis via spectral estimation, short time Fourier transforms, and spectrograms. Effects of coefficient quantization, and limits of practical filters. State space realization. Optimal and adaptive filters for signal prediction, system identification, and noise cancellation. Techniques implemented in programming assignments. 4 seminars. Prerequisite: EE 314 or equivalent, and graduate standing or consent of instructor.

**EE 517 Information Theory (4)**

Introduction to information theory and coding. Self and mutual information. Discrete and continuous information sources and transmission channels. Additive white Gaussian noise channel. Channel capacity. The Source- and Channel-Coding Theorems. Data compression. Huffman code. Block codes, including Hamming and linear codes. Parity and syndrome decoding. Convolutional codes. 4 seminars. Prerequisite: EE 314 or equivalent, EE 525, and graduate standing or consent of instructor.



**EE 518 Power System Protection (4)**

Unsymmetrical faults. Protection fundamentals. Instrument transformers. Power system grounding. Generator protection, transformer protection, busbar protection, line and motor protection. 4 seminars. Prerequisite: EE 406 or equivalent, and graduate standing or consent of instructor.

**EE 519 Advanced Analysis of Power Systems (4)**

Advanced power system stability analysis, numerical methods in power system analysis. 4 seminars. Prerequisite: EE 406 or equivalent, and graduate standing or consent of instructor.

**EE 520 Solar-Photovoltaic Systems Design (4)**

Solar radiation and insolation variability. Solar cell theory. Photovoltaic module and array design. Interfacing PV generators with various kinds of loads. Power processing circuits and systems. Energy storage options. Stand-alone and grid-connected systems. Economic and policy issues. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**EE 521 Computer Systems (4)**

Organization of modern general purpose, high speed digital computer systems. Design of arithmetic units, control units, memories and memory subsystems. Cost, power and speed trade-offs in the design of such systems. 3 seminars, 1 laboratory. Prerequisite: EE/CPE 329, or equivalent, and graduate standing or consent of instructor. *Crosslisted as CPE/EE 521.*

**EE 522 Advanced Real-Time Embedded Systems Design (4)**

Theory, design and implementation of real-time operating system-based embedded systems. Scheduling algorithms, operating system resources, peripheral device interfacing and embedded system architecture. Resource management issues in a resource-limited (microcontroller-based) environment. 3 seminars, 1 laboratory. Prerequisite: Advanced C programming skills, EE/CPE 329 or equivalent, or consent of instructor. *Crosslisted as CPE/EE 522.*

**EE 523 Digital Systems Design (4)**

Full-custom design and analysis of digital circuits using full CMOS, pass-transistor and dynamic circuit topologies. Transistor sizing for minimizing power consumption, delay and other design criteria. 3 seminars, 1 laboratory. Prerequisite: EE/CPE 329 or equivalent, and graduate standing or consent of instructor. *Crosslisted as CPE/EE 523.*

**EE 524 Solid State Electronics (3)**

Physical theory of solid-state devices. Properties of metal-semiconductor junctions and p-n junctions. Derivation of properties of diodes, transistors, and four-layer devices from basic physical and mathematical considerations. 3 seminars. Prerequisite: PHYS 412 or equivalent, and graduate standing or consent of instructor.

**EE 525 Stochastic Processes for Engineers (4)**

Probability and stochastic processes used in random signal analysis. Response of linear systems to random inputs. Auto-correlation and power spectral densities. Applications in signal processing using the discrete Kalman filter. 4 seminars. Prerequisite: STAT 350 or equivalent, and graduate standing or consent of instructor.

**EE 526 Digital Communications (4)**

M-ary signals. Vector space representation of signals. Optimum receiver principles. Common signal sets. Signal space dimensionality versus time-bandwidth product. 4 seminars. Prerequisite: EE 314 or equivalent, EE 525, and graduate standing or consent of instructor.

**EE 527 Advanced Topics in Power Electronics (4)**

Selected advanced topics in power electronics such as dc-dc converters, phase-controlled rectifiers, switched-mode inverters, ac and dc drives, HVDC transmission, or utility applications of power electronics. 4 seminars. Prerequisite: EE 410 or equivalent, and graduate standing or consent of instructor.

**EE 528 Digital Image Processing (4)**

Processing and interpretation of images by computer. Emphasis on current applications with real images used in programming assignments. Topics may include histogram equalization, 2-D convolution, correlation, frequency-domain processing, median filtering, compression, Hough transform, segmentation and region growing, morphological operations, texture description, shape description, Bayes classifier. 4 seminars. Prerequisite: EE 314 or equivalent, EE 525, and graduate standing or consent of instructor.

**EE 529 Advanced Topics in Microwave Device Electronics (3)**

Emphasis on device and circuit principles of active microwave solid-state devices, their noise aspects and systems applications. 3 seminars. Prerequisite: EE 402 or equivalent, PHYS 412 or equivalent, and graduate standing or consent of instructor.

**EE 530 Fourier Optics (4)**

Approach to the design and analysis of optical systems using linear communication theory, including Fourier analysis. Analysis of two-dimensional signals and systems, foundations of scalar diffraction theory. Fresnel and Fraunhofer diffraction. Wave-optics analysis of coherent optical systems, frequency analysis of optical imaging systems, holography. 4 seminars. Prerequisite: EE 402 or equivalent, EE 314 or equivalent, and graduate standing or consent of instructor.

**EE 533 Antennas (4)**

Principles of antenna theory. Antenna parameters, radiation integrals. Duality and reciprocity theorems. Wire antennas. Antenna arrays. Traveling wave antennas. Broadband and frequency independent antennas. Aperture and reflector antennas. Microstrip antennas. Antenna design. 4 seminars. Prerequisite: EE 402 or equivalent.

**EE 541 Advanced Microwave Laboratory (2)**

Experimental measurement in waveguide and microstrip circuits employing the advanced Network Analyzer. Design of both passive and active microwave circuits using microstrip. Graphical and analytical design techniques as well as the use of computer-aided design codes. 2 laboratories. Prerequisite: EE 402 or equivalent. Concurrent or prerequisite: EE 502, and graduate standing or consent of instructor.

**EE 544 Solid-state Electronics Laboratory (1)**

Experimental procedures in solid-state electronics. Investigation and improvement of the characteristics of a solid-state electronic device. 1 laboratory. Prerequisite: Graduate standing or consent of instructor. Concurrent: EE 524, and graduate standing or consent of instructor.

**EE 563 Graduate Seminar (1) (CR/NC)**

Current developments in the fields of electrical and electronic engineering. Participation by students, faculty and guest lecturers. Open to graduate students with a background in electrical or electronic engineering. Credit/No Credit grading only. Total credit limited to 3 units. 1 seminar.

**EE 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to graduate students and selected seniors with electrical and electronic engineering background. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 seminars. Prerequisite: Graduate standing or consent of instructor.

**EE 571 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Graduate standing or consent of instructor.

**EE 594 Cooperative Education Experience (6-12) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Total credit limited to 24 units. Prerequisite: Graduate standing and consent of instructor.

**EE 595 Cooperative Education Experience (6-12)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor required. Total credit limited to 12 units. Prerequisite: Graduate standing and consent of instructor.

**EE 599 Design Project (Thesis) (1-9)**

Each individual or group will select, with faculty guidance and approval, a topic for independent research or investigation resulting in a thesis or project to be used to satisfy the requirement for the degree. An appropriate experimental or analytical thesis or project may be accepted. Prerequisite: Graduate standing and consent of instructor.



**2009-11 Cal Poly Catalog****Horticulture and Crop Science Department****BS CROP SCIENCE**

☐ 60 units upper division ☐ GWR

☐ 2.0 GPA ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major, support or concentration courses may be taken as credit/no credit.

**MAJOR COURSES**

HCS 110 Orientation to Horticulture/Crop Science	2
HCS 120 Principles of Hortic. & Crop Science .....	4
CRSC 132 California Field Crops .....	4
VGSC 190 California Vegetable Production.....	4
CRSC 202/CRSC 203/VGSC 202 Enterprise Proj	2
FRSC 230 California Fruit Growing .....	4
HCS 231 Commercial Seed Production .....	4
CRSC 244 Precision Farming.....	4
HCS 304 Plant Breeding .....	4
PPSC 311 Agricultural Entomology.....	4
PPSC 321 Weed Biology and Management .....	4
HCS 410 Crop Physiology <i>or</i>	
BIO 435 Plant Physiology .....	4
CRSC 411 Experimental Techniques and Analysis	4
HCS 461, 462 Senior Project I, II .....	2,2
<sup>2</sup> HCS 463 Undergraduate Seminar.....	1
CRSC/FRSC/HCS/PPSC/VGSC 300-400 level	
electives .....	8
	<b>61</b>

**SUPPORT COURSES**

BIO 303 Survey of Genetics.....	4
BOT 121 General Botany (B2 & B4)* .....	4
BOT 323 Plant Pathology.....	4
BRAE 340 Irrigation Water Mgmt (Area F)* .....	4
CHEM 111 Survey of Chemistry (B3&B4)* .....	5
CHEM 312 Survey of Organic Chemistry .....	5
MATH 118 Pre-Calculus Algebra (B1)* .....	4
(MATH 116 & 117 substitute)	
STAT 218 Applied Statistics/Life Sciences (B1)*	4
SS 121 Introductory Soil Science.....	4
<sup>1</sup> Approved electives. ....	25

Select 25 units from the following. At least 12 units must be 300-400 level:

AG 360, 315;  
 AGB 301, 310, 312, 321, 336, 401;  
 CRSC 123, 333, 402, 445;  
 FRSC 133, 342;  
 HCS 327, 340, 421, 200<sup>†</sup>, 339<sup>†</sup>, 400<sup>†</sup>;  
 HCS/BOT 450;  
 PPSC 327, 405, 421, 431, 441;  
 PPSC/EHS 427;  
 SS 321, 322;  
 VGSC 402, 423

**63****GENERAL EDUCATION (GE)**

72 units required, 20 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (no additional units req'd)**

B1 Mathematics/Statistics * 8 units in Support .....	0
B2 Life Science * 4 units in Support.....	0
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division)**

* 4 units in Support .....	0
	<b>52</b>

**FREE ELECTIVES .....****4****180**

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>2</sup> May substitute 1 unit of any upper-division free elective. (12/11/14)

<sup>†</sup> HCS 200 and 400 up to 2 units each; HCS 339 up to 4 units.

## 2009-11 Cal Poly Catalog

### City and Regional Planning Department

## CRP—CITY AND REGIONAL PLANNING

### CRP 101 Introduction to the Profession of City and Regional Planning (1) (CR/NC)

Introduction to what professional planners do in the public and private sectors and how they help manage growth and change. Credit/No Credit grading only. 1 lecture.

### CRP 201 Basic Graphic Skills (4)

Basic techniques used in graphic communication for representation of the real world on two-dimensional planes. Use of scale, drawing conventions, orthographic and isometric projections, perspective drawings. Basic design and site analysis skills. Sketching, delineation and rendering including the use of black and white and color techniques. 4 laboratories.

### CRP 202 Urban Design Studio I (4)

Exploring elements and principles of environmental design. Understanding the form and character of the designed urban environment. Introduction to problem analysis and problem solving in environmental design. Implications of design decisions and solutions on urban context. Assignments of object, project and system scale in an urban context. 4 laboratories. Prerequisite: CRP 201, CRP 211 or consent of instructor.

### CRP 203 Urban Design Studio II (4)

Applications of basic design fundamentals and skills to the design of environments through design exercises applied to planning. Problem analysis and problem solving skills as applied to environmental design issues. 4 laboratories. Prerequisite: CRP 202.

### CRP 211 Cities: Form, Culture and Evolution (4)

Historical overview of the evolution of cities – how the form and function of cities evolved among different societies from antiquity to contemporary times. Includes early cities in Mesopotamia, Central America; Greece and Rome; Renaissance, Baroque; and North and South America. 4 lectures.

### CRP 212 Introduction to Urban Planning (4)

Understanding the issues of contemporary urban growth and change. Development of theories of urban planning and design. Introduction to zoning, planning regulations and codes, and professional practice. Relationship of environmental design disciplines, citizen groups, and individuals to urban planning. 4 lectures.

### CRP 213 Population, Housing and Economic Applications (4)

Collection, organization, and presentation of information and data related to population, housing and employment. Analytical applications to estimate population over time, housing demand by type and income and employment by standard classification. Application of urban economic theory related to jobs and housing. 3 lectures, 1 laboratory. Prerequisite: CRP 212, or consent of instructor.

### CRP 214 Land Use and Transportation Studies (4)

How cities and regions work. Relationship between human activities and patterns of land use and circulation. Spatial analysis and location theories. Methods for conducting studies to describe, analyze, and map land uses. Regional-scale transportation analysis, traffic impact studies, and multimodal transportation plans. ~~4 lectures~~ 3 lectures, 1 activity. Prerequisite: CRP 212, or consent of instructor. *Change effective Spring 2011.*

### CRP 215 Planning for and with Multiple Publics (4) USCP

How the social/spatial relationships among racial/ethnic and gender groups are expressed in terms of human settlement patterns, civic involvement and everyday negotiations. Ways in which segregation and marginalization are expressed in western and non-western contexts. 4 lectures. Prerequisite: Completion of GE Area D1. *Crosslisted as CRP/ES 215.* Fulfills USCP.

### CRP 216 Computer Applications for Planning (2)

Introduction to the use of computer applications for planners. Includes spreadsheets, statistical applications, database, geographic information systems, and graphics. 1 lecture, 1 laboratory.

### CRP 240 Additional Planning Laboratory (1–2)

Total credit limited to 4 units, with a maximum of 2 units per quarter. 1 or 2 laboratories.

### CRP 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### CRP 310 Community Development and Civic Life (4)

Examination of role of citizen in the planning, design and development of communities. Development of informed, responsible participation in civic life by a diverse citizenry committed to democratic principles. Focus on land use, transportation, and environmental issues. 4 lectures. Prerequisite: Completion of GE Areas A, D1 and D3.

### CRP 314 Planning Theory (3)

Theories of planning. Role of planner in society, purpose of planning, administrative framework in which planning takes place. Alternative approaches to planning, values, ethics in planning. 3 lectures. Prerequisite: CRP 212.

### CRP 315 Fiscal and Project Feasibility (4)

Analysis of the revenue streams and costs involved in project development. Impact analysis of costs and revenues on private and public sectors included. Construction of pro-formas for various project types. 3 lectures, 1 laboratory. Prerequisite: Completion of GE Area D2. *Crosslisted as CM/CRP 315.*

### CRP 334 Cities in a Global World (4)

GE D5

Examination of the changes in the social and spatial organization of urban settlements in the twenty-first century caused by the urbanization and globalization processes. Comparative analysis of the traditional and contemporary cities in the Pacific Rim, South America and Eastern Europe. 4 lectures. Prerequisite: Junior standing; completion of Area A and two courses from D1, D2, D3, D4. Fulfills GE D5 except for City and Regional Planning majors.

### CRP 336 Introduction to Environmental Planning (4)

Theories, institutional frameworks, and technologies used in environmental planning for human settlements. Comparative study of practices at international, national, bioregional and state/local levels. Impact assessment technologies used in impact analysis for plan administration. Application of environmental mitigation to community planning. 4 lectures. Prerequisite: CRP 212.

### CRP 338 Digital Cities (4)

GE Area F

Explores changes in urban form and urban experience associated with advances in digital technology. Implications for the design of places and the distribution of economic and social benefit. Lecture-discussions and opportunities to explore technology initiatives in community building. 4 lectures. Prerequisite: Junior standing; completion of Area B. Fulfills GE Area F.

### CRP 341 Community Design Laboratory (4)

Built environment of the suburb. Urban theories and design methods related to suburban development. Technical aspects of subdivision site planning. 4 laboratories. Prerequisite: CRP 203, or consent of instructor.

### CRP 342 Environmental Planning Methods (4)

Case studies and applications of theory and methods to regional and environmental systems. Interrelationships between natural, economic, and social and political systems. Application of California Environmental Quality Act and environmental impact assessment methods. Environmental equity and sustainable bioregions. 2 lectures, 2 laboratories. Prerequisite: CRP 336 or consent of instructor.

### CRP 351 Introduction to Emergency Management in California (3)

Emergency management emphasizing the Standardized Emergency Management System (SEMS) and Emergency Operations Center (EOC) operations. Earthquake hazard used as the case to explore potential wide geographic impacts, multiple secondary hazards, and multidisciplinary problem-solving methods in natural disasters faced by local governments and communities. 2 lectures, 1 activity. Prerequisite: NR 202 or completion of GE Area B3 or consent of instructor. *Crosslisted as CRP/DMHS/NR 351.*

### CRP 375 Technology and the Environment: A Seminar on Contemporary Issues (4)

Interdisciplinary exploration of significant environmental issues (local, regional, national, or global) where technology is a major cause and/or offers a possible solution. 4 seminars. Prerequisite: Completion of GE Area A and two courses from Areas D1, D2, D3. Honors Program membership or nomination by CRP department head. *Crosslisted as CRP/HNRS 375.*

### CRP 400 Special Problems for Advanced Undergraduates (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

**CRP 401 Disaster Recovery (3)**

Strategies and procedures for public sector management of recovery from disasters. Understanding the role of, and relationship between, federal, state and local agencies to provide assistance to individuals and communities in the post-disaster environment. Issues in the recovery process. 2 lectures, 1 activity. Prerequisite: CRP/DMHS/NR 351. *Crosslisted as CRP/DMHS/NR 401.*

**CRP 402 Contemporary Urban Design in the Americas (4)**

Study of contemporary urban design in North, Central and South America through the detailed examination of major cities and country case studies. Analysis of the cultural, social and political factors influencing the practice of urban design and its major trends in different countries. 4 lectures. Prerequisite: ENGL 134 or graduate standing.

**CRP 404 Environmental Law (3)**

Analysis and critique of the law governing use and protection of natural resources with focus on the legal institutions entrusted with the public duty of protecting the environment. 3 lectures. Prerequisite: Senior standing, or graduate standing, or consent of instructor. *Crosslisted as CRP/NR 404.*

**CRP 408 Water Resource Law and Policy (3)**

Detailed examinations of the various legal systems of water use, regulation and management in California and the United States. Discussion of the key concepts and principles of state, federal and interstate water quantity and quality control; focusing on issues and problems, why conflicts occur and how solutions evolve. 3 lectures. Prerequisite: NR 306 ~~302~~ or instructor approval, senior standing or graduate standing. *Crosslisted as CRP/NR 408. Corrected 7/19/10.*

**CRP 409 Planning Internship (2-4) (CR/NC)**

Work experience as a supervised employee in a planning-related agency or private firm. Prior contract specifying the product of internship required between student, agency and faculty. Thirty hours work experience per unit of credit. Total credit limited to 4 units. Credit/No Credit grading. Prerequisite: Consent of instructor.

**CRP 410, 411 Community Planning Laboratory I, II (5) (3)**

Application of planning theory to the community, its components, and to the city and its region. Relationships of city spaces and structures. Emphasis on developing basic planning studies and plan-making. Field trips. Individual, team, and interdisciplinary approaches utilizing digital methods for analysis and presentation. 5 laboratories. **CRP 410** prerequisite: CRP 336, CRP 341 or consent of instructor. **CRP 411** prerequisite: CRP 342, CRP 410, or consent of instructor.

**CRP 412 Plan Implementation (4)**

Theory and practice of plan implementation. Regulation and nonregulatory approaches to plan implementation, including development regulation, economic development, growth management, habitat conservation planning, capital improvement planning, redevelopment programs, and transportation system management. The California Specific Plan will serve as the course model. 4 lectures. Prerequisite: CRP 212 or consent of instructor.

**CRP 420 Land Use Law (4)**

Public controls protecting natural environmental systems. Land use and environmental controls. Review of control mechanisms. State and federal legislation. Legal implications of controls, public planning and policy issues. 4 lectures. Prerequisite: CRP 212 and upper division standing, or consent of instructor.

**CRP 424 Reflections of Planning in Cinema (3)**

Analysis of the depiction of planning and related themes in film. Critical reflection through these depictions on the effects of planning practices, institutions, and idiosyncrasies on society. Dialectical discussion of planning history, theory, and practice with themes that emerge from particular films. 2 lectures, 1 activity. Prerequisite: CRP 212 (or CRP 501 for graduate students), or equivalent. *Correction effective Fall 2009.*

**CRP 427 Local Economic Development Planning (3)**

Processes, skills and approaches for planning local economic development. Analysis of theoretical principles and assumptions underlying local economic development programs. Practical applications of alternative strategies and techniques for implementing economic development. 3 seminars. Prerequisite: Senior standing, or graduate standing, or consent of instructor.

**CRP 430 Public Sector Planning Practice (3)**

Relationships of planning agencies to other governmental bodies, public agencies and citizen groups. The public planning agency and the private practitioner. Public and personnel relations. Current topics in public sector planning practice. 3 lectures. Prerequisite: CRP 212.

**CRP 435 Transportation Theory (3)**

Circulation and transportation elements of the General Plan. Transportation planning theory, methods and tools related to systematic analysis of city and regional transportation problems including environmental impact assessment. Application of techniques for assessing transportation systems, gravity models, route selections, land use models and relationship to transportation. 3 seminars. Prerequisite: CRP 212, senior standing, or graduate standing, or consent of instructor.

**CRP 436 Collaborative Planning (4)**

Focus on processes and skills of citizen participation and consensus building. Application of mediation and negotiation techniques. Use of collaboration in forming visions of the future and reaching agreements among multiple interests. Use of group process skills to establish effective communication and agreements. Organizing and operating public meetings. 3 lectures, 1 laboratory. Prerequisite: CRP 212 or graduate standing or consent of instructor.

**CRP 438 Pollution Prevention and Control (4)**

Interdisciplinary exploration of policy and planning associated with pollution prevention and control, including institutional, legal, economic, political, social, and technology-related aspects. Includes hands-on activity in small groups. 4 lectures. Prerequisite: Senior standing, or graduate standing, or consent of instructor.

**CRP 442 Housing and Planning (3)**

Understanding housing issues, policies and programs from a planning perspective. Analysis of the economic underpinnings of land markets and housing markets, housing plans, finance, public programs, affordable housing. 3 seminars. Prerequisite: Upper division standing or graduate standing.

**CRP 444 Infrastructure and Planning Management (4)**

Basic infrastructure systems necessary to support urban development. Basic components of systems and how they are planned, financed and managed. 4 seminars. Prerequisite: Senior standing or graduate standing.

**CRP 445 Planning and Urban Ecology (4)**

Introduction to urban ecology as an organizing framework for addressing environmental problems. Provides the opportunity to explore an urban ecological research question through quantitative stream assessment and qualitative social survey data collection and analysis. 3 lectures, 1 laboratory. Prerequisite: Upper division or graduate standing.

**CRP 446 Development Review and Entitlement (4)**

Application of zoning regulations, subdivision ordinances, design standards, building codes, exactions, fees, and related requirements within the development review process leading to land use entitlement. Land development is evaluated from permit application submittal to condition compliance during the plan check, construction, and operational phases of a project. 4 lectures. Prerequisite: Upper division standing or graduate standing.

**CRP 447 Design Regulations (4)**

Practical application of fundamental zoning, subdivision, design/development standards, and building codes in the design review process, either in the form of a proposed development project or preparation of ordinances, codes, standards, and/or guidelines to apply to a project. 4 lectures. Prerequisite: Senior standing, or graduate standing, or consent of instructor. *Crosslisted as ARCH/CRP 447.*

**CRP 452 Community Design Methods (4)**

Introduction to community design as an interdisciplinary subject. Focus on the active involvement of end-users in the creation and management of built environments. Principles and techniques of participatory design and planning, including charrettes, design games and participatory technologies. Demonstration of participatory techniques through case studies and application. 3 lectures, 1 laboratory. Prerequisite: CRP 201 and CRP 202, Upper division or graduate standing.

**CRP 453 Planning and Design Laboratory (4)**

Selected advanced laboratory applications, including urban and regional design. 4 laboratories. Prerequisite: CRP 341, CRP 342.

**CRP 457 Planning Information Systems (3)**

GIS applications using computer-based systems in gathering, managing and analyzing information pertinent to planning. Development of skills in systematic data acquisition, processing and maintenance with applied planning problems within the convenient medium of GIS and general information systems. 2 seminars, 1 laboratory. Prerequisite: Upper-division standing and completion of a basic GIS course (NR 318, GEOG 310, or LA 318), and consent of instructor.

**CRP 458 Local Hazard Mitigation Planning and Design (4)**

Creation of safer, more resilient cities through systematic application of urban disaster risk reduction and regeneration planning principles and methods.

Integration of insights from the design, resource management, and urban administration professions for minimizing disaster losses and improving recovery activities. 4 lectures. Consent of instructor. Prerequisite: GE Areas D2, D3 and F or consent of instructor.

**CRP 461, 462 Senior Project I, II (2) (2)**

Research and problem analysis in planning. Selection and completion of a project under faculty supervision. Projects typical of problems addressed in planning practice. Project results presented in a formal report. To be completed in two quarters. Minimum 120 hours time. **CRP 461** prerequisite: CRP 341, CRP 342. **CRP 462** prerequisite: CRP 410. *Change effective Fall 2009.*

**CRP 463 Senior Project Professional Practice (4)**

Practical applications of city and regional planning theory and practice solving problems related to the built environment. Assembly of project documents and reports that meet the senior project requirement. 4 seminars. Prerequisite: CRP 410 and senior standing.

**CRP 466 Enhanced Exercise Design in Disaster Management (3)**

Increasing the competencies of public and private emergency managers in the design, development, evaluation and follow-up of emergency management exercises. Performance based education and skills training for emergency management personnel. 2 lectures, 1 activity. Prerequisite: CRP/DMHS/NR 351. *Crosslisted as CRP/DMHS/NR 466.*

**CRP 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**CRP 471 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Consent of instructor.

**CRP 472 Planning Colloquium (1) (CR/NC)**

Lecture and discussion by faculty members and invited guests on controversial or topical planning related subject matter at campus and/or off-campus locations. Topics to be announced in advance by CRP Department. Total credit limited to 3 units. Credit/No Credit grading only. 1 seminar. Prerequisite: Upper division standing or graduate standing.

**CRP 483 Special Studies in City and Regional Planning (1-12)**

Study of special issues and problems through field research and other forms of investigation and involvement in an off-campus setting. Requirements determined prior to individual project through contractual arrangement between the student and the department. Departmental Off-Campus Study Program guidelines apply. The Schedule of Classes will list topic selected. Prerequisite: Upper division or graduate standing.

**CRP 500 Individual Study (2-3)**

Independent research, studies, or surveys of selected subjects. Total credit limited to 9 units. Prerequisite: Graduate standing with minimum of 12 core units.

**CRP 501 Foundations of Cities and Planning (4)**

Origins and evolutionary stages of settlement patterns and the use of land and natural environment. Changing spatial structure in the development of cities and regions. Beginnings and the historical development of the planning profession. 4 lectures. Prerequisite: Graduate standing.

**CRP 505 Principles of Regional Planning (4)**

History, development and major philosophical approaches of regions and regional planning, both in urban-centered and resource-based regions. Effects of relaxing natural, economic and infrastructure limiting factors on growth and development of regions. Normative hierarchical emphasis of contemporary regional planning compared to emerging paradigms that alter the regional/local planning relationship. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**CRP 509 Professional Development (1-3) (CR/NC)**

Professional development course, including environmental assessment workshop, applied research workshop, internship seminar, and other events. Total credit limited to 3 units. Credit/No Credit grading only. 1-3 activities. Prerequisite: Graduate standing. *New course, effective Winter 2011.*

**CRP 510 Planning Theory (4)**

Theory of planning. Development of contemporary planning thought from varying sources and perspectives. Political and social context of planning. Alternative professional roles, and planning processes. Values and ethical issues in planning. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**CRP 512 Introduction to Visual Communication and GIS (4) (CR/NC)**

Introduction to geographic information systems (GIS) as a tool for analyzing and managing spatial information pertinent to planning. Introduction to various drawing media and delineation techniques for planners, including three-dimensional visualization and graphic skills. Integration of visual and digital media in presentations. Credit/No Credit grading only. 4 laboratories. Prerequisite: Graduate standing.

**CRP 513 Planning Research Methods (4)**

Application of research design to planning issues. Comparison of case study, comparative and problem-solving methods. Primary and secondary data sources, including field survey techniques. 3 seminars and supervised work. Prerequisite: Graduate standing, STAT 221 or equivalent, or consent of instructor.

**CRP 514 Computer Applications for M.C.R.P. (2)**

Microcomputer applications used by planners. Focus on planners' adaptations of spreadsheets, statistical applications, data base systems, graphic presentation.. 2 laboratories. Prerequisite: Graduate standing.

**CRP 515 Planning Presentation and Communication Techniques (3)**

Basic techniques used in effective planning presentations. Introduction to various drawing media and delineation techniques for planners, three-dimensional visualization, graphic skills. Integration of visual and electronic media in presentations. 3 laboratories. Prerequisite: Graduate standing.

**CRP 516 Methods of Data Analysis (4)**

Problem recognition, data selection, analysis and synthesis with applications of system design, statistical techniques and symbolic modeling to urban design and regional growth and development policies. 3 seminars, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**CRP 518 Public Policy Analysis (4)**

Analysis of the social, economic, environmental, political contexts of public policy decisions. Public policy issues and use of concepts and tools related to monitoring and assessment. 4 lectures. Prerequisite: CRP 501 or POLS 360 or consent of instructor.

**CRP 520 Feasibility Studies in Planning (4)**

Fundamental analysis for assessing feasibility of public and private development projects. Principles and techniques for analyzing markets and assessing cash flow for individual projects. Economic, fiscal and tax impacts as factors determining public participation in private projects. 4 seminars. Prerequisite: CRP 501 or consent of instructor.

**CRP 525 Plan Implementation (4)**

Theory and practice of plan implementation. Regulatory and non-regulatory frameworks for plan implementation. Growth management, development regulation, capital improvement programs, redevelopment. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**CRP 530 Planning Agency Management (3)**

Preparation for mid-level and higher positions in public planning agencies and private firms. Applications of organization theory to planning agencies and firms. Work programs, staff development, budgets, contracting, proposal preparation, conflict management. Relationships with other agencies and firms, clients, public and media. 3 seminars. Prerequisite: CRP 501, CRP 510 or consent of instructor.

**CRP 535 Land Use and Planning Law (4)**

The role of law in the planning and regulation of land use. Constitutional constraints on land use regulation. Legal and policy issues for environmental protection and public administration. Relevant legislation and case law. 4 lectures. Prerequisite: Graduate standing, or consent of instructor.

**CRP 545 Principles of Environmental Planning (4)**

Environmental planning as a field of inquiry and action. Review and application of policies and techniques used in environmental planning, especially within the land use planning context. Application of California Environmental Quality Act and environmental impact assessment methods. 3 seminars, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**CRP 548 Principles of Urban Development and Design (4)**

Introduction to the philosophy and theory particular to urban development and design. Exploration of evaluation criteria and critical analysis of the human environment related to physical design requirements. Spatial and form

relationships, scale, human activities, concept formation, visual organization of the city, landscaping and architecture. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**CRP 552 Community and Regional Planning Studio I (4)**

Application of planning theory and methods to community and regional planning projects. Structured for research, analysis, synthesis, and implementation practice. Interrelationships of natural and built environments, transportation systems, and economic and social conditions at various planning scales. Includes field trips and individual, team and interdisciplinary approaches. 2 seminars, 2 laboratories. Prerequisite: CRP 501, CRP 525, or consent of instructor.

**CRP 553 Project Planning Laboratory (4)**

Project-scale planning problems. Arranging structures, circulation systems, utilities and plant material on natural and urban sites to support human activity while minimizing disruption to natural systems. Includes planned unit developments, waterfronts, hillsides, campuses and commercial centers. Field trips. 4 laboratories. Prerequisite: CRP 512 or consent of instructor.

**CRP 554 Community and Regional Planning Studio II (4)**

Application of planning theory and methods to community and regional planning projects. Structured for research, analysis, synthesis, and implementation practice. Interrelationships of natural and built environments, transportation systems, and economic and social conditions at various planning scales. Includes field trips, and individual, team and interdisciplinary approaches. 2 seminars, 2 laboratories. Prerequisite: CRP 552.

**CRP 556 Community and Regional Planning Studio III (4)**

Application of planning theory and methods to community and regional planning projects. Individual faculty-assigned laboratory work leading to the completion of a professional quality project focused on a real-world planning task. Structured for research, analysis, synthesis and implementation practice. 3 seminars and supervised work. Prerequisite: CRP 554, or consent of instructor.

**CRP 570 Selected Topics in Planning (4)**

Directed group study of selected planning topics. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**CRP 571 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Graduate standing or consent of instructor.

**CRP 596 Professional Project (2-4)**

Individual research under the supervision of the faculty, leading to completion of a professional project based on a real world planning task or carefully constructed simulation. Must be taken in all quarters requiring supervision; minimum of 6 units required for degree. Total credit limited to 8 units. Prerequisite: CRP 513, and consent of the graduate program coordinator.

**CRP 597 Policy, Planning and Management (4)**

This course provides a synthesis of the MCRP program. Expansion and integration of material on planning principles, practice, theory and quantitative methods. 4 seminars. Prerequisite: CRP 409, CRP 510, CRP 516, CRP 518, CRP 525, CRP 530, CRP 535, CRP 552 and CRP 554.

**CRP 599 Thesis (2-4)**

Individual research under the general supervision of the faculty, leading to a graduate thesis. Must be taken in all quarters requiring supervision; minimum of 6 units required for degree. Total credit limited to 8 units. Prerequisite: CRP 513, and consent of the graduate program coordinator.



**2009-11 Cal Poly Catalog****Dairy Science Department****BS DAIRY SCIENCE**

□ 60 units upper division

□ GWR

□ 2.0 GPA

□ USCP

\* = Required in Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

DSCI 100 Enterprise Project or	
DSCI 339 Internship in Dairy Science.....	2
DSCI 101 Dairy Feeds and Feeding .....	4
DSCI 121 Elements of Dairying or	
DSCI 230 General Dairy Husbandry .....	4
DSCI 123 Dairy Science Orientation .....	1
DSCI 134 Intro. to Dairy Products Tech (4) or	
DSCI 231 General Dairy Manufacturing (3) and	
DSCI 232 Gen Dairy Manufacturing Lab (1) .....	4
DSCI 202 Dairy Promotion and Marketing .....	4
DSCI 223 Frozen Dairy Foods or	
DSCI 241 Dairy Cattle Selection, Breeds, Fitting	
and Showing .....	4
DSCI 233 Milk Processing and Inspection.....	4
DSCI 234 Dairy Foods Evaluation.....	2
DSCI 301 Dairy Cattle Nutrition or	
DSCI 401 Physical and Chemical Properties of	
Dairy Products .....	4
DSCI 321 Lactation Physiology or	
DSCI 444 Dairy Microbiology .....	4
DSCI 330 Artificial Insemination and Embryo	
Biotechnology or DSCI 434 Cheese and	
Fermented Dairy Foods .....	4
<sup>2</sup> DSCI 333 Dairy Cattle Management, Safety and	
Animal Well-Being (4) or DSCI 402 Quality	
Assurance and Control of Dairy Products (4) or	4
DSCI 412 Dairy Farm Consultation (4) or ASCI	
415 HACCP for Meat and Poultry Operations (3)	
(6/15/12).....	
DSCI 422 Breeding and Genetics of Dairy Cattle or	
DSCI 435 Concentration/Fractionation and	
Butter Technology .....	4
DSCI 432 Advanced Dairy Herd Management or	
DSCI 433 Dairy Plant Mgt. & Equipment.....	4
DSCI 461 Senior Project.....	3
DSCI 463 Undergraduate Seminar .....	2
	<b>58</b>

**SUPPORT COURSES**

\* = Satisfies General Education requirement

MCRO 221 Microbiology (B2 & B4)* .....	4
CHEM 111 Survey of Chemistry or CHEM 127	
General Chemistry (B3&B4)* .....	5/4
CHEM 312/BIO 111/BIO 115/BIO 161 (10/22/09)	5/4
MATH 118 Pre-Calculus Algebra (B1)* .....	4
(MATH 116 & 117 substitute)	

<sup>1</sup> Approved electives. .... 41

Select 41 units from the following. At least 18 units must be 300-400 level:

AGB 212, 214, 301, 310, 321, 401; (10/28/13)  
 AGED 102, 330, 404;  
 ASCI 112, 211, 216, 221, 226, 304, 311, 351,  
 366, 405, 420;  
 ASCI/VS 229, 310, 312, 438, 440;  
 BIO 162, 303;  
 BRAE 121, 141;  
 BUS 212;  
 CHEM 128, 129, 216, 217, 312, 313, 316, 317,  
 371; (7/12/12)  
 COMS 301;  
 CRSC 123;  
 Any DSCI course;  
 EHS 230;  
 FRSC 230;  
 FSN 125, 230, 270, 275, 330, 335;  
 JOUR 203, 205;  
 MCRO 342, 421;  
 NR 141;  
 PHYS 121, 122;  
 STAT 130, 218, 313;  
 VGSC 230;  
 Any courses used in the following minors:  
 Agribusiness  
 Agricultural Communication  
 Crop Science  
 Equine Science  
 Food Science  
 Poultry Management  
 Soil Science

**57/59****GENERAL EDUCATION (GE)**

72 units required, 12 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (4 units)**

B1 Mathematics/Statistics * 4 units in Support plus	4
B2 Life Science * 4 units in Support.....	0
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.<sup>2</sup> If ASCI 415 (3) is taken to meet the requirement, an additional unit of 300-400 level approved electives is required as well.



**Area C Arts and Humanities (20 units)**

C1 Literature.....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division)**

(4 units).....	4
	<b>60</b>

<b>FREE ELECTIVES .....</b>	<b>3/5</b>
	<b>180</b>

**2009-11 Cal Poly Catalog****Dairy Science Department****DAIRY SCIENCE MINOR**

The purpose of this minor is to help students from other disciplines gain a basic understanding of the terminology and practices used within the field of dairy science. The curriculum is flexible enough to accommodate students' interests in animal and/or food-oriented aspects of Dairy Science. After completion of the minor, students should have a basic understanding of cattle, dairy nutrition, milk production and management as well as dairy food processing, quality and regulatory control. Specific programs are designed to reflect the individual student's interests and needs.

The Dairy Science Minor requires two introductory courses. Students must obtain prior program approval from the Dairy Science Minor Coordinator in selecting an additional five courses according to their interests and goals. A minimum of 26 hours is required for the minor, at least half of which must be at the 300 and 400 level.

**Required courses**

DSCI 121 Elements of Dairying	
or DSCI 230 General Dairy Husbandry .....	4
DSCI 134 Intro to Dairy Products Technology	
or DSCI 231 General Dairy Manufacturing .....	3

**Advisor approved electives ..... 19**

Select units from the following, with approval of minor coordinator:

**ASCI 415 HACCP for Meat and Poultry**  
**Operations (3) (6/15/12)**

DSCI 101 Dairy Feeds and Feeding (4)	
DSCI 202 Dairy Promotion and Marketing (4)	
DSCI 223 Frozen Dairy Foods (4)	
DSCI 233 Milk Processing and Inspection (4)	
DSCI 234 Dairy Foods Evaluation (2)	
DSCI 241 Dairy Cattle Selection, Breeds, Fitting and Showing (4)	
DSCI 301 Dairy Cattle Nutrition (4)	
DSCI 321 Lactation Physiology (4)	
DSCI 330 Artificial Insemination and Embryo Biotechnology (4)	
DSCI 333 Dairy Cattle Mgt, Safety and Animal Well-Being (4)	
DSCI 340 Dairy Waste Management and Resource Recovery (3)	
DSCI 401 Phys/Chem Properties of Dairy Products (4)	
DSCI 402 Quality Assurance and Control of Dairy Products (4)	
DSCI 412 Dairy Farm Consultation (4)	
DSCI 422 Breeding/Genetics of Dairy Cattle (4)	
DSCI 432 Advanced Dairy Herd Management (4)	

DSCI 433 Dairy Plant Management and Equipment (4)	
DSCI 434 Cheese and Fermented Dairy Foods (4)	
DSCI 435 Concentration/Fractionation and Butter Technology (4)	
DSCI 444 Dairy Microbiology (4)	

## 2009-11 Cal Poly Catalog

### Theatre & Dance Department

#### DANCE MINOR

The Dance Minor consists of 30 units designed to provide the student with a well-balanced program in the art and education of dance. Admission to the minor is contingent upon a departmental interview and review. Students must have more than a 2.0 GPA.

Core courses	Units
† DANC 134 Beginning Ballroom Dance or DANC 234 Intermediate Ballroom Dance or DANC 130 (7/17/14) .....	2
DANC 221 Dance Appreciation (C3) .....	4
DANC 231 Intermediate Ballet .....	2
DANC 232 Intermediate Modern Dance .....	2
DANC 321 Cultural Influences on Dance in America (C4) (USCP) .....	4
DANC 340 Dance Composition .....	4
DANC 381 Dance for KINE/Dance Minors .....	4
<b>Elective courses to be selected from:</b> .....	8
(at least 3 elective units must be upper division)	
DANC 130 Pilates/Physicalmind Conditioning Method (2-6)	
DANC 135 International Folk Dance (2-6)	
DANC 139 Beginning Tap (2-6)	
DANC 233 Intermediate Jazz (2-6)	
DANC 234 Intermediate Ballroom Dance (2-6)	
DANC 311 Dance in American Musical Theatre (4) (C4)	
DANC 331 Advanced Ballet and Repertory (2-6)	
DANC 332 Modern Dance Repertory (2-6)	
DANC 345 Choreography (4-12)	
DANC 346 Dance Production (4-12)	
DANC 400 Special Problems for Undergrads (1-8)	
DANC 470 Selected Advanced Topic (1-8)	
DANC 471 Selected Advanced Laboratory (1-8)	
	<hr/> 30

† If credit in any of these courses is used to meet a core requirement in the minor, the credit cannot be double-counted as an elective.  
(7/17/14)

## 2009-11 Cal Poly Catalog

### Dairy Science Department

## DSCI-DAIRY SCIENCE

### DSCI 100 Enterprise Project (1-4) (CR/NC)

Selection and completion of a management/production project under faculty supervision. Project participation is subject to approval by the project supervisor and the Cal Poly Corporation. Degree credit limited to 12 units. Credit/No Credit grading only.

### DSCI 101 Dairy Feeds and Feeding (4)

Introduction to Dairy Cattle/Ruminant Nutrition. Classification and metabolism of nutrients. Nutrient content and identification of feeds common to dairy cattle. Nutrient analysis procedures and requirements. Ration formulation, feeding practices for maximizing growth and milk production. 3 lectures, 1 laboratory.

### DSCI 121 Elements of Dairying (4)

General information on statistics and opportunities in the dairy industry. Dairy cattle record keeping systems and their use in dairy herds. Principles of reproduction management, milking and milking machine function. Principles and practices of the feeding and management of dairy cattle. 3 lectures, 1 laboratory.

### DSCI 123 Dairy Science Orientation (1) (CR/NC)

Curricula, career paths, and opportunities for involvement in the dairy industry. Campus resources and tips for academic success. Student and professional organizations and affiliations. Meet and interact with each member of the faculty, Dairy Club officers, and industry guests. Credit/No Credit grading only. 1 lecture.

### DSCI 134 Introduction to Dairy Products Technology (4)

Science and technology in the development and manufacture of dairy food products. Equipment and dairy processing techniques for fluid milk, butter, cheeses, ice cream, yogurt, concentrated dairy foods and dried dairy foods. 3 lectures, 1 laboratory.

### DSCI 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

### DSCI 202 Dairy Promotion and Marketing (4)

National and state dairy promotional programs, advertising and merchandising. Marketing and pricing of milk and dairy products at the state and national level. 4 lectures. Prerequisite: DSCI 231.

### DSCI 223 Frozen Dairy Foods (4)

Technology, equipment, mix calculations and preparation required to process, freeze, package, harden and distribute ice cream and related products. 3 lectures, 1 laboratory. Prerequisite: DSCI 231.

### DSCI 230 General Dairy Husbandry (4)

Selection, breeding, feeding, and management of dairy cattle. Composition and food value of dairy products. Milk pricing, political influences, dairy industry statistics and opportunities. Producing and handling products. Intended as introductory course for non-dairy science majors. 3 lectures, 1 laboratory.

### DSCI 231 General Dairy Manufacturing (3)

Composition and properties of fluid milk and manufactured milk products. Chemistry and microbiology of dairy products. Processes and equipment involved in the manufacture of butter, cheeses, and other fermented dairy products, frozen, condensed, and dried dairy foods. 3 lectures.

### DSCI 232 General Dairy Manufacturing Laboratory (1)

Laboratory to complement DSCI 231 and provide experiences in the processes and equipment involved in the manufacturing of butter, cheeses, and other fermented dairy products, frozen, condensed, and dried dairy foods. 1 laboratory. Concurrent: DSCI 231.

### DSCI 233 Milk Processing and Inspection (4)

Composition and properties of fluid milk and its constituents. Equipment used to handle, process, and distribute fluid milk and related products. California dairy codes used for dairy farms and plants, with practice inspections of dairy farms and factories. 3 lectures, 1 laboratory. Prerequisite: DSCI 231.

### DSCI 234 Dairy Foods Evaluation (2)

Basic principles of sensory evaluation of dairy foods, physiology of various senses and their relationship to distinguishing the quality of dairy products by

sight, flavor, body and texture. Product defects, causes, and methods of prevention. 1 lecture, 1 laboratory.

### DSCI 241 Dairy Cattle Selection, Breeds, Fitting and Showing (4)

Selection of dairy cattle on type conformation and the correlation between type and production. Dairy cattle breeds and breed comparisons. Techniques to properly condition, groom and present dairy cattle for evaluation and merchandising. 2 lectures, 2 activities. Prerequisite: DSCI 121 or DSCI 230.

### DSCI 270 Selected Topics (1-4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### DSCI 301 Dairy Cattle Nutrition (4)

Principles of dairy cattle nutrition and management and their application to economical feeding practices and computerized ration formulation. 3 lectures, 1 activity. Prerequisite: DSCI 101 and DSCI 121 or DSCI 230.

### DSCI 321 Lactation Physiology (4)

Mechanisms of milk component secretion, including protein, lactose and fat metabolism. Disorders of the mammary gland (mastitis) and control strategies. Endocrine aspects of mammary gland development and lactogenesis. 4 lectures. Prerequisite: DSCI 101, DSCI 121, BIO 111, CHEM 111.

### DSCI 330 Artificial Insemination and Embryo Biotechnology (4)

Techniques in the collection, evaluation and processing of semen, along with embryo culturing and manipulation. Insemination procedures, fertility problems, record keeping, estrous synchronization, endocrine control of reproduction, treating reproductive disorders and embryo transfer. 3 lectures, 1 laboratory. Prerequisite: DSCI 121 or DSCI 230 or ~~ASCI/VS 229 VS-223~~ or consent of instructor. *Corrected 6/30/10.*

### DSCI 333 Dairy Cattle Management, Safety and Animal Well-Being (4)

Modern dairy management techniques, livestock handling and animal comfort. Dairy safety and development of an injury illness prevention program. Animal well-being issues and the Pasteurized Milk Ordinance. 3 lectures, 1 activity. Prerequisite: DSCI 121 or DSCI 230.

### DSCI 339 Internship in Dairy Science (1-12) (CR/NC)

Selected Dairy Science students will spend up to 12 weeks with an approved agricultural firm engaged in production or related business. Time will be spent applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Degree credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Consent of internship instructor.

### DSCI 340 Dairy Waste Management and Resource Recovery (3)

Management of dairy wastes to protect the environment while providing a return on investment. Selection of waste management systems, considering capital and operating costs and benefits from nutrient, biogas, and heat recovery. Best practices that meet current regulatory requirements. 3 lectures. Prerequisite: MCRO 221.

### DSCI 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

### DSCI 401 Physical and Chemical Properties of Dairy Products (4)

Composition, structure and properties of milk and milk products. Physical and chemical changes that occur during processing and storage of dairy products. Objective measurement of chemical and physical properties. 3 lectures, 1 laboratory. Prerequisite: CHEM 212/312 or consent of instructor.

### DSCI 402 Quality Assurance and Control of Dairy Products (4)

Current methods used to evaluate dairy products with respect to plant economics and consumer safety. Accurate procedures for chemical and biological testing, statistical approach to sampling and design and interpretation of HACCP programs for assuring product quality and safety. 3 lectures, 1 laboratory. Prerequisite: DSCI 233 and MCRO 221, STAT 130 or STAT 218.

### DSCI 412 Dairy Farm Consultation (4)

Student consultation teams of three or four students visit dairies and/or attend management training seminars followed by presenting management recommendations to the dairy owners, consultants, and other industry leaders. 1 seminar and supervised work. Prerequisite: DSCI 121 or DSCI 230, DSCI 330, DSCI 333, junior standing.

**DSCI 422 Breeding and Genetics of Dairy Cattle (4)**

Evaluation of inherited characteristics in dairy cattle from an economic standpoint. Proving and selecting sires and dams. 4 lectures. Prerequisite: DSCI 241.

**DSCI 432 Advanced Dairy Herd Management (4)**

Dairy herd management skills needed in dairy operations. Instruction and lab experience in management, records, feeding and nutrition, herd health, milk secretion, reproduction, mating and selection. 4 lectures. Prerequisite: DSCI 301, DSCI 241, DSCI 330, and DSCI 422.

**DSCI 433 Dairy Plant Management and Equipment (4)**

Basic management principles applied to the dairy industry. Industrial organization and control. Dairy plant design, facilities, layout. Inventory control and records. Milk pooling and stabilization records. Maintenance and operation of equipment. 3 lectures, 1 laboratory. Prerequisite: DSCI 233, DSCI 434.

**DSCI 434 Cheese and Fermented Dairy Foods (4)**

Scientific methods, ingredients, and equipment used in the manufacture of various fermented dairy products, including cheeses, buttermilk, sour cream, and yogurt. 3 lectures, 1 laboratory. Prerequisite: DSCI 231, MCRO 221.

**DSCI 435 Concentration/Fractionation and Butter Technology (4)**

Technology of evaporation, drying and membrane separation processes applied to dairy fluids. Design and performance of evaporators, driers, and membrane processing systems. Equipment, ingredients, and methods needed to manufacture butter and dairy spreads. 3 lectures, 1 laboratory. Prerequisite: DSCI 231.

**DSCI 444 Dairy Microbiology (4)**

Microorganisms involved in the fermentation and ripening processes in the dairy industry, as well as those involved in spoilage of milk and dairy products, in the transmission of disease through these products, and indicator systems used to determine sanitary quality of these products. 3 lectures, 1 laboratory. Prerequisite: MCRO 221 or MCRO 224.

**DSCI 461 Senior Project (3)**

Selection and completion of a project under faculty supervision. Projects are typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal written report. 2 lectures and supervised work. Prerequisite: Junior standing.

**DSCI 463 Undergraduate Seminar (2)**

Reports on student papers, bulletins, periodical articles, and dairy research experiments. Sources of dairy husbandry information. Practice in oral reporting. Recent developments and research work in the dairy industry. 2 seminars.

**DSCI 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**DSCI 471 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

**DSCI 500 Individual Study in Dairy Science (1-6)**

Advanced independent study planned and completed under the direction of a member of the Dairy Science faculty. Total credit limited to 6 units. Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

**DSCI 522 Bioseparation Processes in Dairy Product Technology (4)**

Physical and chemical principles governing bioseparation processes in dairy product technology. Factors influencing mass transport phenomena as it relates to filtration, chromatography, ion exchange, dialysis, centrifugation, adsorption, crystallization and other unit operations. Laboratories to emphasize application of bioseparations of commercial importance. Field trips to be required. 3 lectures, 1 laboratory. Prerequisite: DSCI 401, FSN 444.

**DSCI 539 Graduate Internship in Dairy Science (1-9)**

Application of theory to the solution of problems of agricultural production or related business in the field of Dairy Science. Analyze specific management problems and perform general management assignments detailed in a contract between the student, the firm or organization, and the faculty advisor before the internship commences. Degree credit limited to 6 units. Prerequisite: Consent of internship instructor.

**DSCI 560 Recent Developments in Dairy Science and Technology (1-3)**

Presentation and critical review of current research publications. Methodological advances and applications in dairy food systems. The Schedule of Classes will

list topic selected. Total credit limited to 6 units. 1-3 seminars. Prerequisite: Senior or graduate standing and approval of instructor.

**DSCI 570 Selected Topics in Dairy Science (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1 to 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**DSCI 571 Selected Advanced Laboratory in Dairy Science (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Consent of instructor.

**DSCI 581 Graduate Seminar in Dairy Science (1-3) (CR/NC)**

Current findings and research problems in the field and their application to industry. Group study of current problems of industry. Current experimental and research findings as applied to production and marketing. Credit/No Credit grading only. 1 or 3 seminars. Credit/ no credit grading only. Prerequisite: Graduate standing or consent of instructor.

**DSCI 585 Cooperative Education Experience in Dairy Science (1-6) (CR/NC)**

Advanced study, analysis and part-time work experience in the field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**DSCI 599 Thesis in Dairy Science (1-9)**

Systematic research of a significant problem in Dairy Science. Thesis will include problem identification, significance, methods, data analysis, and conclusion. Students must enroll every quarter in which facilities are used or advisement is received. Degree credit limited to 6 units. Prerequisite: Graduate standing and consent of instructor.

## 2009-11 Cal Poly Catalog

### Earth and Soil Sciences Department

#### BS EARTH SCIENCES

#### Flowchart

☐ 60 units upper division

☐ GWR

☐ 2.0 GPA

☐ USCP

\* = Required in Major; also satisfies GE

Note: No major, support or concentration courses may be taken as credit/no credit.

#### MAJOR COURSES

ERSC/SS 110 Orientation in Earth & Soil Sciences <i>or</i> NR 140 Careers in Forestry & Env Mgmt (7/2/13)	1
ERSC 144 Introduction to Earth Systems.....	4
ERSC 223 Rocks and Minerals .....	4
ERSC/GEOG 250 Physical Geography.....	4
ERSC 323 Geomorphology .....	4
ERSC/GEOG 333 Human Impact on the Earth.....	4
ERSC/GEOG 414 Global & Regional Climatology	4
ERSC <i>or</i> SS 461, 462 Senior Project I, II .....	1,3
ASTR 101 Introduction to the Solar System .....	4
BOT 121 General Botany (B2 & B4)* .....	4
BOT 326 Plant Ecology .....	4
BRAE 237 Intro to Engineering Surveying .....	2
CHEM 127, 128 General Chemistry (B3 & B4)* ....	4,4
GEOG 318 Applications in GIS .....	4
GEOG 328 Applications in Remote Sensing .....	4
GEOL 201 Physical Geology .....	3
GEOL 241 Physical Geology Lab .....	1
GEOL 415 Structural Geology .....	4
PSC 201 Introduction to Physical Oceanography....	4
SS 121 Introductory Soil Science.....	4
SS 321 Soil Morphology .....	4
STAT 218 Applied Statistics/Life Sciences (B1)*	4
Concentration (see below; 4 units B1)*.....	44 40-42
<i>Corrected (2-9-12)</i>	<b>124</b>
	<b>123-125</b>

#### GENERAL EDUCATION (GE)

72 units required, 16 of which are specified in Major.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

#### Area A Communication (12 units)

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing.....	4

#### Area B Science and Mathematics (no add'l units req'd)

B1 Math/Statistics * 8 units in Major & Conc .....	0
B2 Life Science * 4 units in Major .....	0
B3 Physical Science * 4 units in Major .....	0
B4 One lab taken with either a B2 or B3 course	

#### Area C Arts and Humanities (20 units)

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

#### Area D/E Society and the Individual (20 units)

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
(KINE 250 recommended for Geosciences Teaching Concentration)	
D5 Upper-division elective .....	4
(PSY 352 recommended for Environmental Interpretation and Assessment Concentration)	
<b>Area F Technology Elective (upper division)</b> .....	4
(BRAE 340 recommended for Geosciences Teaching Concentration)	

**56**

<b>FREE ELECTIVES</b> .....	<b>0-1</b>
<i>Corrected (2-9-12)</i>	<b>180</b>

#### CONCENTRATIONS (select one):

##### Climate Change Studies Concentration

ERSC 463 Undergraduate Seminar .....	2
GEOG 325 Climate and Humanity.....	4
GEOG 415 Applied Meteorology/Climatology .....	4
MATH 118 Pre-Calculus Algebra.....	4
MATH 119 Pre-Calculus Trigonometry .....	4
PHYS 121 College Physics I .....	4
SOC 218 International Political Economy .....	4
UNIV 350 The Global Environment.....	4
Energy/Sustainability: BRAE 348 <i>or</i> PSC 320 .....	4
<sup>1</sup> Approved electives.....	7-8
Choose from: CRP 375, 438, CRP/FNR 404; EDES 406; ENVE 324; GEOG 301, 440; PHIL 340.	
Note: CRP 438 <i>or</i> ENVE 324 recommended	
	41-42

##### Environmental Interpretation and Assessment Concentration

ERSC 202 Soil Erosion and Water Conservation	4
ERSC/GEOG 325 Climate and Humanity.....	4
ERSC <i>or</i> SS 463 Undergraduate Seminar .....	2
CRP 420 Land Use Law.....	4
GEOG 301 Geography of Resource Utilization.....	4
MATH 118 Pre-Calculus Algebra (B1)* .....	4
MATH 119 Pre-Calculus Trigonometry .....	4
PHYS 121 College Physics I.....	4
<sup>1</sup> Approved electives.....	11
Select 11 units from the following:	
CRP 212, 336;	
CRP/NR 404, 408;	
GEOG 440;	
NR 306, 320, 416, 418, 425; NR/ES 406 (6/30/13)	
SS 339 <sup>†</sup>	
	41

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>†</sup> No more than 4 units of SS 339 may be used.



**Geosciences Teaching Concentration**

ASTR 102 Introduction to the Stars and Galaxies	4
BIO 113 Animal Diversity and Ecology <i>or</i> BIO 112 (10/3/13)	4
EDUC 300 Intro to the Teaching Profession	3
GEOG 301 Geography of Resource Utilization	4
GEOG 325 Climate and Humanity	4
GEO 203 Fossils and the History of Life	4
GEO 204 Geologic History of California	3
MATH 118 Pre-Calculus Algebra	4
MATH 119 Pre-Calculus Trigonometry	4
PHYS 121 College Physics I	4
PSC 424 Organizing/Teaching of Phys Sciences <i>or</i> EDUC 480 Computer Based Curriculum	4/3 2
<i>Corrected 2-9-12</i>	<del>41</del> 40-42

**Land and Water Resources Concentration**

ERSC 202 Soil Erosion and Water Conservation	4
ERSC 463 Undergraduate Seminar	2
BRAE 415 Hydrology	4
CHEM 129 General Chemistry	4
MATH 141, MATH 142 Calculus I, II (B1)*	4,4
PHYS 141, 132 General Physics IA, II	4,4
<sup>1</sup> Approved electives (min 6 units 300-400 level)	11
<i>Select 11 units from the following:</i>	
ANT 202, 309, 310;	
CRP/NR 408;	
ERSC/GEOG 415;	
ERSC/GEO 401, 402;	
GEOG 440;	
NR 306, 320, 418;	
SS 339 <sup>†</sup> , 432	
	41

**Individualized Course of Study**

ERSC 463 Undergraduate Seminar	2
MATH 118 Pre-Calculus Algebra (B1)*	4
MATH 119 Pre-Calculus Trigonometry	4
PHYS 121 College Physics I	4
Approved electives (min 10 units 300-400 level)	27
	41

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>†</sup> No more than 4 units of SS 339 may be used.

## 2009-11 Cal Poly Catalog

### Orfalea College of Business

## ECON–ECONOMICS

### ECON 200 Special Problems for Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Sophomore standing and consent of department head.

### ECON 201 Survey of Economics (4)

GE D2

Basic principles of microeconomics and macroeconomics. Emphasis on applications to current national and global economic issues. For majors requiring one quarter of economics. Not open to students having previous credit in ECON 222 or equivalent. 4 lectures. *Crosslisted as ECON/HNRS 201.* Fulfills GE D2.

### ECON 221 Microeconomics (4)

Microeconomic principles. Marginal and equilibrium analysis of commodity and factor markets in determination of price and output. Normative issues of efficiency and equity. 4 lectures.

### ECON 222 Macroeconomics (4)

GE D2

Introduction to economic problems. Macroeconomic analysis and principles. Aggregate output, employment, prices, and economic policies for changing these variables. International trade and finance. Issues of economic growth and development. Comparative economic systems and economies in transition. 4 lectures. Fulfills GE D2.

### ECON 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### ECON 303 Economics of Poverty, Discrimination and Immigration (4)

GE D5 USCP

Economic analysis of the cause, extent and impact of poverty, discrimination and immigration and of the policies designed to address these socioeconomic issues. Emphasis on the experience of African-Americans, Latinos, and women in the United States. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A, D1, and either ECON 221 and ECON 222, or ECON 201. Economics majors will not receive GE Area D5 credit. *Crosslisted as ECON/HNRS 303.* Fulfills GE D5 and USCP.

### ECON 304 Comparative Economic Systems (4)

GE D5

Analysis of economic systems as a set of mechanisms and institutions for decision making, and the implementation of decisions regarding income distribution, the levels of consumption and production, and the level of economic welfare. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A, D3, and either ECON 221 and ECON 222, or ECON 201. Fulfills GE D5 except for Economics majors.

### ECON 311 Intermediate Microeconomics (4)

Economics of prices and markets. Demand and supply. Returns and costs, factor pricing and income distribution, welfare and economic progress. 4 lectures. Prerequisite: MATH 142 or MATH 221, and STAT 252 or STAT 302, and either ECON 221 and ECON 222, or ECON 201.

### ECON 313 Intermediate Macroeconomics (4)

Analysis of national income, price level, employment, international trade and economic growth. Development of the theory of national income determination. Evaluation of roles of monetary and fiscal policy. 4 lectures. Prerequisite: ECON 311.

### ECON 322 Economic History of the Advanced World (4)

GE D5

Analysis of the growth of economic institutions from about 600. Includes the spread of economic structures and institutions to colonies. Analyzes the internal development of the industrial economy in Europe and its expansion to other parts of the globe. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A, D3, and either ECON 221 and ECON 222, or ECON 201. Fulfills GE D5 except for Economics majors.

### ECON 324 American Economic History (4)

Topical and statistical analysis of the major trends and events of American economic history. Examines the causes and evolution of the United States economy from colonial times to the present. Assessment of agriculture, transportation, industrial and government sectors and their interconnections. 4 lectures. Prerequisite: Completion of GE Areas A, D1, and either ECON 221 and ECON 222, or ECON 201.

### ECON 325 Economics of Development and Growth (4)

Analysis of the economy of less developed countries, and a survey of public policies designed to stimulate economic growth and reduce poverty. Topics include financing development, technology, population problems, human capital, rural and urban development, trade policy and the economic relationships between developed and developing nations. 4 lectures. Prerequisite: Completion of GE Areas A, D3, and either ECON 221 and ECON 222, or ECON 201.

### ECON 330 International Trade (4)

Theory of comparative advantage, gains from trade, and recent developments in trade theory; examination of tariffs, quotas, exchange controls, other trade barriers and underlying policy issues; review of U.S. commercial policy, GATT, the common market, regional and world economic organizations. 4 lectures. Not open to students with credit in ECON 404 or equivalent. Prerequisite: Either ECON 221 and ECON 222, or ECON 201.

### ECON 337 Money, Banking and Credit (4)

Financial markets and institutions. Structure of the banking industry and impacts of technological change in banking. Structure and operations of the Federal Reserve. Impacts of monetary policy on the economy. 4 lectures. Prerequisite: Either ECON 221 and ECON 222, or ECON 201.

### ECON 339 Econometrics (4)

Application of statistical methods useful in economics. General linear regression model. Specific issues and problems related to economic models: multicollinearity, autocorrelation, heteroscedasticity, dummy variables, lagged variables, and simultaneous equation estimation. Application and evaluation of selected examples of empirical economic research. Microcomputer applications. 3 lectures, 1 activity. Prerequisite: MATH 142 or MATH 221, and STAT 252 or STAT 302, and either ECON 221 and ECON 222, or ECON 201, or consent of instructor.

### ECON 340 Advanced Econometrics (4)

Advanced topics in undergraduate econometrics. Single equation estimation topics including: distributed lag models, causality, cointegration and error correction models and nonlinear estimation. Forecasting with a single equation model. Simultaneous equation estimation, including instrumental variables, two stage least squares and seemingly unrelated regression. 3 lectures, 1 activity. Prerequisite: ECON 339.

### ECON 400 Special Problems for Advanced Undergraduates (1–4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Consent of department head.

### ECON 403 Industrial Organization (4)

Application of basic tools of economics to American Industry. Case studies of individual firms and industries. Performance of various business structures, such as monopoly and oligopoly. Effects of government regulation and antitrust policy. 4 lectures. Prerequisite: ECON 311 or consent of instructor.

### ECON 404 International Trade Theory (4)

Theory of comparative advantage, neoclassical model of trade, offer curves and terms of trade, edgeworth boxes, valuation of factor inputs, effects of migration and mobility of funds, emerging growth and trade distortions, welfare effects of trade, and recent developments in trade theory. 4 lectures. Prerequisite: ECON 311 or consent of instructor.

### ECON 405 International Monetary Economics (4)

Nature of international payments, U.S. balance of payments. Theory and practice of foreign exchange rate determination under the gold standard, paper standard, and IMF system; international money and capital markets; problems of international liquidity and monetary stability. 4 lectures. Prerequisite: ECON 311 and ECON 404, or consent of instructor. *Change effective Spring 2011.*

### ECON 406 Applied Forecasting (4)

Causes and measurement of business fluctuations. Techniques of forecasting with microcomputer applications. 3 lectures, 1 activity. Prerequisite: ECON 311 and ECON 339, or consent of instructor.

### ECON 408 Mathematical Economics (4)

Applications of quantitative techniques to topics in microeconomic and macroeconomic theory. Use of multivariate calculus and linear algebra in formulating static economic models. Applications of statistical inference, estimation and forecasting in economic models. 4 lectures. Prerequisite: ECON 313, or consent of instructor.

### ECON 409 Probability Models for Economic Decisions (4)

Decision making in complex, realistic situations. Simulation of random variables in Excel. Risk aversion. Subjective assessment of probabilities and correlations.

Decision trees. Optimal bidding in auctions. The winner's curse. Moral hazard and risk sharing. Repeated investment decisions under risk. 4 lectures. Prerequisite: ECON 311, or consent of instructor.

#### **ECON 410 Public Finance and Cost-Benefit Analysis (4)**

Principles of rational decision making with respect to government revenues and spending. Measurement of costs and benefits, and criterion selection. Taxation, user fees, deficit financing, public goods, neighborhood effects and zoning. Microcomputer applications. 4 lectures. Prerequisite: ECON 311, or consent of instructor.

#### **ECON 413 Labor Economics (4)**

Wage determination theory, basic economic factors that affect the labor movement, economic impact of union activities on employment, output, income, wages, prices, and national economic policy. 4 lectures. Prerequisite: ECON 311, or consent of instructor.

#### **ECON 417 Development of Economic Analysis (4)**

Analysis of ideas related to the development of economic theory in the Western civilization from the Greeks through the classical, neoclassical, and Keynesian to the current post-Keynesian concepts. 4 lectures. Prerequisite: ECON 311, or consent of instructor.

#### **ECON 420 Advanced Macroeconomics (4)**

Macroeconomics for advanced students. Inflation, unemployment, interest rates, real output, exchange rates, business cycles and macroeconomic policy. Analysis of current data on the macro-economy within the scope of competing views on the macro-economy. 4 lectures. Prerequisite: ECON 313, or consent of instructor.

#### **ECON 424 Monetary Economics (4)**

The role of money in our economy. Focus on the links between monetary policy, interest rates, prices, housing markets, mortgage lending and overall economic activity. Public policy issues relating to real estate markets. 4 lectures. Prerequisite: ECON 311 or consent of instructor. Recommended: ECON 313.

#### **ECON 430 Internship (2-8) (CR/NC)**

Placement of student for part-time supervised work experience in a business enterprise or government agency approved by the area chair. Collateral reading correlated with work assignments and periodic written progress reports required. Credit/No Credit grading only. Prerequisite: approval of area chair, junior standing, and a CPSLO cumulative GPA of at least 2.5 without being on academic probation.

#### **ECON 431 Environmental Economics (4)**

Economic dimensions of environmental abuse and protection. Use of simple economic models in developing and evaluating environmental policies. Overview of current environmental problems. Issues related to the sustainability of economic growth at the national and international levels. 4 lectures. Prerequisite: ECON 311, or consent of instructor.

#### **ECON 432 Economics of Energy and Resources (4)**

Economic theory and public policies as applied to problems of natural resources and energy. Dynamic resource and energy models developed with reference to public and private sector growth. Application of the principles of capital theory emphasized. Case studies. Computer software applications in the study of natural resources and energy under uncertainty. 4 lectures. Prerequisite: ECON 311, or consent of instructor.

#### **ECON 434 Urban Economics (4)**

Application of basic tools of economic analysis to problems of urban regions. Causes and possible cures for inadequate growth rate, income levels, and the quality of life in urban regions. 4 lectures. Prerequisite: ECON 311, or consent of instructor.

#### **ECON 435 Economics of Land and Water (4)**

Economic analysis of natural resource issues, policies and management with an emphasis on land and water use decisions in the western U.S. Urban demand for water; water supply and economic growth; economic impacts of surface water law and institutions; economics of land management. 4 lectures. Prerequisite: ECON 311, or consent of instructor.

#### **ECON 461, 462 Senior Project I, II (2) (2)**

Selection and analysis of a problem under faculty supervision. Problems typical of those which graduates must solve in their fields of employment. Formal report is required. Minimum 120 hours total time. Prerequisite: ECON 313 and senior standing.

#### **ECON 464 Applied Senior Project (4)**

Analysis of selected economic topics and problems in directed individual or group-based projects, which require application of economic models, principles

and theory to investigate important business, economic or social issues. Formal report required. 4 seminars. Prerequisite: ECON 313 and senior standing.

#### **ECON 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

#### **ECON 500 Independent Study (1-4)**

Advanced study planned and completed under the direction of a departmental faculty member. Open only to graduate students demonstrating ability to do independent work. Enrollment by petition. Prerequisite: Consent of department head.

#### **ECON 510 Quantitative Methods (4)**

Review and discussion of the basic math tools needed for graduate work in economics, including set theory, linear algebra, properties of functions, static and dynamic optimization. 4 lectures. Prerequisite: ECON 408 or MATH 244 or equivalent, and graduate standing, or consent of instructor.

#### **ECON 511 Microeconomic Analysis (4)**

Basic microeconomic theory including theory of the firm, consumer theory, general equilibrium, capital theory, and welfare economics. 4 lectures. Prerequisite: Concurrent with ECON 510 and graduate standing, or consent of instructor.

#### **ECON 512 Macroeconomic Analysis (4)**

Basic macroeconomic theory including markets for commodities and credit, the demand for money, market-clearing and the labor market, inflation and interest rates, investment, real business cycles and unemployment, economic growth, government consumption and the role of public services, and taxes, transfers, and the public debt. 4 lectures. Prerequisite: ECON 511 and graduate standing, or consent of instructor.

#### **ECON 520 Advanced Econometrics I (4)**

The use of statistical procedures to measure theoretical economic relationships and to verify and reject theories. Advanced coverage of regression analysis and hypothesis testing. 4 lectures. Prerequisite: ECON 339, ECON 511 and graduate standing, or consent of instructor.

#### **ECON 522 Advanced Econometrics II (4)**

The use of statistical procedures to deal with simultaneous equations, limited dependent variables and time-series data. Includes methods of instrumental variables, generalized method of moments and maximum likelihood. 4 lectures. Prerequisite: ECON 520 and graduate standing, or consent of instructor.

#### **ECON 532 Environmental and Natural Resource Economics (4)**

Economic analysis of pollution, congestion, public good provision, and natural resource conservation. Static and dynamic efficiency, economic growth and sustainability, pollution taxes, marketable permits, and the design of market-based regulations. 4 lectures. Prerequisite: ECON 511 and graduate standing, or consent of instructor.

#### **ECON 534 International Economics (4)**

Analysis of the international movement of goods, services, capital and payments. The role of exchange rates, tariffs, quotas, and transport costs. Relationship between international trade and economic growth. 4 lectures. Prerequisite: ECON 511 and graduate standing, or consent of instructor.

#### **ECON 536 Public Economics (4)**

Economic analysis of the rationale for public expenditure and taxation. Externalities, pollution and public policy, income redistribution and public welfare, public goods, collective choice and political institutions, public budgeting techniques and cost-benefit analysis, taxation and tax policy, state-local finance and fiscal federalism. 4 lectures. Prerequisite: ECON 511 and graduate standing, or consent of instructor.

#### **ECON 538 Industrial Economics (4)**

Economic theories of industrial organization with specific reference to such topics as cartels, market concentration and performance, vertical integration, franchise contracts, ownership and control of firms, multipart and discriminatory pricing, and tie-in sales. Economic aspects of antitrust law and government regulation of industry. 4 lectures. Prerequisite: ECON 511 and graduate standing, or consent of instructor.

#### **ECON 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Graduate standing or consent of instructor.

**ECON 580 Seminar in Economics (1-4)**

Advanced topics in economics chosen according to the common interests and needs of the students enrolled. Schedule of Classes will list topic selected. 1-4 seminars. Prerequisite: Graduate standing or consent of instructor.

**ECON 599 Thesis (4)**

Individual research under the general supervision of the faculty, leading to a graduate thesis of suitable quality. Minimum of 8 units required for degree. Prerequisite: Graduate standing and consent of thesis committee.

# Economics

Business Bldg. (03), Room 407  
805 756-2783

## Area Chair: Steve Hamilton

Phillip Fanchon	Kathryn Marshall
Eric Fisher	Aric Shafran
Sanjiv Jaggia	Daniel J. Villegas
Jason Lepore	Eduardo Zambrano
Michael L. Marlow	

The mission of the economics program is to educate students in the models and problem solving tools of economics. The **learning objectives** for the Economics degree program are:

1. To be able to identify measures of economic activity and understand the descriptive statistics commonly used by economists.
2. To be able to identify the role of supply and demand in a market economy and to understand the efficiency advantages of a market system and the role of prices in achieving efficiency.
3. To have a working understanding of the economic role of government, fiscal and monetary policy, the Federal Reserve, and market structure.
4. To be able to identify the benefits and costs of a global economy.
5. To be able to apply economic theory to a range of economic problems and from a diverse set of perspectives and to be able to effectively communicate their analysis.
6. To be able to define and analyze economic problems using algebraic, graphical, and statistical methods.
7. To be able to identify policy options and to recognize the ethical and efficiency implications of these policies.
8. To develop a basic understanding of research methodology including literature surveys, data gathering, data analysis, and policy implications.

## CONCENTRATIONS

Students may select one of the following concentrations or advisor approved electives.

**Business Concentrations.** Choose from accounting, entrepreneurship, finance, international business, management, marketing, packaging and logistics, and management information systems.

**Quantitative Economics.** Emphasizes the skills needed to analyze market data in fast-paced industries such as manufacturing, financial services, and advertising, and provides the technical training required to engage in consulting. There is also a continued need for quantitative economic analysis by lawyers, accountants, engineers, health service administrators, urban planners, and local,

national, and international government agencies. The concentration prepares students for jobs that entail forecasting, market assessment, economic feasibility studies, commodity pricing and data analysis, and provides a solid foundation for graduate study in economics and business.

**Real Estate Economics.** Provides a program of study that focuses on emerging trends and issues in real estate markets. Students learn to apply economic techniques to real estate markets, and to describe, explain, and predict patterns of real estate prices, building production, and real estate consumption. The program prepares real estate professionals for public sector and private industry jobs in real estate analysis, appraisal, corporate asset management, development, insurance, and investment.

**Advisor Approved Electives.** The most fundamental and enduring strength of economics is that it provides a logical way of looking at a variety of problems. Economic tools can be applied to the analysis of costs and benefits, crime, the environment, health, labor, law, politics and other fields. The study of economics can be preparation for careers in engineering cost-benefit analysis, environmental protection, health administration, labor representation, law, and public administration. The Advisor Approved Electives offers the opportunity for students to design a program of study to emphasize individual talents and interests.

## BS ECONOMICS

☐ 60 units upper division

☐ 2.0 GPA

☐ GWR

☐ USCP

\* = Required in Major/Support; also satisfies GE

Note: No major, support or concentration courses may be taken as credit/no credit.

## MAJOR COURSES

ECON 221 Microeconomics .....	4
ECON 222 Macroeconomics (D2) * .....	4
ECON 311 Intermediate Microeconomics .....	4
ECON 313 Intermediate Macroeconomics.....	4
ECON 461, 462 Senior Project I, II <i>or</i>	
ECON 464 Applied Senior Project.....	4
ECON electives (300-400 level).....	12
ECON electives (400 level).....	16
Concentration or upper division electives .....	28
	<b>76</b>

## SUPPORT COURSES

BUS 207 Legal Responsibilities of Business .....	4
BUS 214 Financial Accounting .....	4
BUS 215 Managerial Accounting .....	4
<sup>1</sup> MATH 221 Calculus-Business & Econ. <i>or</i>	
MATH 141, 142 Calculus I, II (B1)*.....	4/8
<sup>2</sup> STAT 251, 252 Statistical Inference-Mgmt I, II	
(B1)* <i>or</i> STAT 301, 302 Statistics I, II.....	9/8
	<b>24/29</b>

<sup>1</sup> Students pursuing the Quantitative Economics concentration should take MATH 141 and 142 instead of MATH 221.

<sup>2</sup> Students pursuing the Quantitative Economics concentration should take STAT 301 and 302 instead of STAT 251 and 252.

**GENERAL EDUCATION (GE)**

72 units required, 12 of which are specified in Major/Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing ..... 4

A2 Oral Communication ..... 4

A3 Reasoning, Argumentation, and Writing ..... 4

**Area B Science and Mathematics (8 units)**

B1 Mathematics/Statistics \* 8 units in Support .... 0

B2 Life Science ..... 4

B3 Physical Science ..... 4

B4 One lab taken with either a B2 or B3 course

**Area C Arts and Humanities (20 units)**

C1 Literature ..... 4

C2 Philosophy ..... 4

C3 Fine/Performing Arts ..... 4

C4 Upper-division elective ..... 4

Area C elective (Choose one course from C1-C4) 4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) ..... 4

D2 Political Economy \* 4 units in Major ..... 0

D3 Comparative Social Institutions ..... 4

D4 Self Development (CSU Area E) ..... 4

D5 Upper-division elective (**Not ECON**) 1/6/10... 4**Area F Technology Elective (upper division) (4 units)** 4**60****FREE ELECTIVES** ..... **20/15**  
**180****CONCENTRATION OR ADVISOR APPROVED  
ELECTIVES (select one)****Quantitative Economics Concentration**

ECON 339 Econometrics ..... 4

ECON 408 Mathematical Economics ..... 4

Electives. Select from the following or advisor

approved courses: ..... 20

ECON 340, 403, 404, 405, 406, 409, 431, 432;

BUS 431, 439, 442, 444;

MATH 143, 206, 241, 242, 244, 248, 304, 306,

344, 406, 408, 409, 412, 416, 418, 437, 451,

453;

STAT 323, 324, 325, 330, 416, 419, 425, 426,

427, 430

**28****Real Estate Economics Concentration**

ECON 424 Monetary Economics ..... 4

ECON 434 Urban Economics ..... 4

ECON 435 Economics of Land and Water ..... 4

Electives. Select from the following or advisor

approved courses: ..... 16

AGB 310, 315, 324, 326;

BUS 320, 409, 434, 435, 439;

CM 475;

CRP 446;

ECON 410, 431, 432

**28****Individualized Course of Study**

Students are required to complete at least 12 units

300-400 level ECON coursework, plus any 16

units of coursework at 300-400 level ..... 28



# School of *Education*

Education Bldg. (02), Room 120  
(805) 756-2126

Glen Casey	Bonnie Konopak
James L. Gentilucci	Donald K. Maas
Kathleen C. Harris	Shirley J. Magnusson
Anita C. Hernandez	Patricia A. Mulligan
Roberta J. Herter	George J. Petersen
Jodi D. Jaques	Louis B. Rosenberg
Steven Kane	Michael B. Ruef

## Affiliated Faculty

The following faculty participate with the School of Education and hold academic rank in a department outside the School of Education:

John Battenburg	Elsa Medina
Michael Black	Grace Neff
Seth Bush	Joel Orth
Denise Daniels	Jeannine Richison
Ann De Lay	Kate J. Riley
Robert A. Flores	Johanna Rubba
Todd A. Grundmeier	Michael Sutliff
Ed Himelblau	Kevin Taylor
Chance Hoellwarth	Scott Vernon
John M. Keller	Wendy Warner
William C. Kellogg	Raymond F. Zeuschner

## VISION, MISSION AND PROGRAMS

**Vision:** The School of Education develops and supports qualified, competent, and caring education professionals who prepare a diverse student population to become active and thoughtful participants in a democratic society.

**Mission:** The School of Education leads the campus in an all-university approach to preparing education professionals. These professionals create, assess and modify environments, practices, and policies to foster the achievement of each and every learner; they strive for equity in schools and society; and they are committed to inquiry and professional growth for themselves and the advancement of P-20 education.

School of Education faculty models leadership in its teaching, scholarship, and service through a grounded, reflective *learn-by-doing* approach and through sustained collaborations with its education partners: P-12 schools, families, community colleges, universities, and local, state, and national agencies.

**Learning Outcomes:** All candidates who complete a credential, master's degree, or doctorate in the School of Education will:

- *Be Qualified, Competent, and Caring Professional Educators*
- *Integrate Principles and Practices of Professional Fields to Support Student Learning*
- *Engage in Cross-Disciplinary and Collaborative Practices*
- *Demonstrate Authentic Assessments Designed for Student Success, Individual Growth, and Program Improvement*
- *Effect Sustainable Communities in a Multicultural Environment*
- *Engage in Professional Practices*

**Programs:** The School offers a wide variety of courses and programs leading to careers in education. Common to all programs is a commitment to excellence, to partnerships and collaboration, and to preparation for future educational challenges. As the state's population grows, enrollments in grades P-12 increase and with them the demand for well-prepared teachers, and for specialists in administration and special education.

To meet the need for excellent teachers the School seeks talented, creative students who are committed to a long-term career in education and to the improvement of educational processes and institutions.

The School offers programs that lead to a preliminary credential in Multiple Subject or Single Subject Instruction, in Administrative Services or as an Education Specialist. Supplementary and subject matter authorizations are available in a variety of subject areas.

The School offers a Master of Arts in Education degree with specializations in Counseling and Guidance, Educational Leadership and Administration, and Special Education.

A Doctor of Education degree (Ed.D.) in Educational Leadership for working professionals is offered by the School in partnership with the Gevirtz Graduate School of Education at the University of California, Santa Barbara. The program is designed to prepare and support exemplary educational leaders in K-16 settings.

Courses in these programs are offered to meet the needs of the students. To accommodate the working professional, courses in some programs are offered during the late afternoons, evenings, weekends, and during the summer.

Stressing the "learn by doing" philosophy, the School provides opportunities for extensive student on-site observation, tutoring, and fieldwork. Cal Poly maintains cooperative relations with the surrounding school districts, and within our service area students can enjoy cross-cultural, city and rural fieldwork.

# Teacher Education

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Education Bldg. (02), Room 130  
(805) 756-1503

**Multiple Subject Coordinator, Patricia A. Mulligan**  
**Single Subject Coordinator, Jeannine Richison**

The following credential programs are accredited by the California Commission on Teacher Credentialing (CCTC) to prepare candidates and recommend for these credentials.

## Instructional Credential Programs

Agriculture Specialist

Multiple Subject Instruction

Multiple Subject: Bilingual Crosscultural Language and Academic Development (BCLAD) Emphasis

Single Subject: Agriculture Instruction

Single Subject: Biological Science Instruction

Single Subject: Chemistry Instruction

Single Subject: English Instruction

Single Subject: Mathematics Instruction

Single Subject: Social Science Instruction

Single Subject: Physics Instruction

Credential programs consist of coursework and field experiences, including student teaching, that are required to obtain the Preliminary Multiple or Single Subject teaching credentials in California. The teaching credential programs typically take four or five quarters of full-time enrollment, depending on completed prerequisites. The School has technology in place to assist students in meeting California's teaching performance assessment requirements.

Applications are accepted during specific periods at the beginning of each fall, winter and spring quarter. Detailed information about dates and other requirements are available on the School of Education website at [www.soe.calpoly.edu](http://www.soe.calpoly.edu).

## Multiple Subject Teaching

A student may enter the Multiple Subject Credential program as a Cal Poly Liberal Studies undergraduate, as a graduate student, or as a Cal Poly undergraduate in any program leading to a baccalaureate degree. The integrated, pre-professional program offers undergraduates in the Liberal Studies major the opportunity to earn a BS degree while also pursuing a teaching credential. The Liberal Studies Program is designed so that students take education related courses in their freshman and sophomore years to help them meet the prerequisites for admission to the program, and begin professional education course work and field experiences during their junior and senior years.

Students applying for the post-baccalaureate Multiple Subject Credential program must have completed a baccalaureate degree. During the program, candidates take educational foundation and methods courses; engage in extensive field experiences, one quarter of part-time student teaching, and a final quarter of full-time student teaching. Upon successful completion of the program, candidates are recommended for a Preliminary Multiple Subject Teaching Credential.

Candidates may also elect to earn a Preliminary Multiple Subject Teaching Credential with a Bilingual Crosscultural Language and Academic Development emphasis (BCLAD). The Bilingual emphasis requires proficiency in Spanish and additional course work in the foundations and methods for bilingual teaching, and knowledge of the history of Mexico/Latin America. Detailed information for the Multiple Subject Credential and the BCLAD emphasis is available on the School of Education website at [www.soe.calpoly.edu](http://www.soe.calpoly.edu).

## Single Subject Teaching

The Single Subject Teaching Credential is for candidates who wish to teach a specific content area at the secondary level. Single subject candidates must demonstrate subject matter competency by completing a California Commission on Teacher Credentialing approved subject matter course work program in that subject matter area or provide evidence of passing the appropriate California Subject Examinations for Teachers (CSET) specialty area test(s). Demonstration of subject matter competency must be completed before candidates begin their part-time student teaching experience.

Candidates for the Single Subject teaching credential in Agriculture or the Agricultural Specialist credential complete their preparation program through the Agricultural Education and Communication Department at Cal Poly and should communicate with the department credential advisor for further information or advisement (Dr. Robert Flores, at 805-756-2803 or [rflores@calpoly.edu](mailto:rflores@calpoly.edu)).

**NOTE:** Credential requirements are subject to change. Please check with program advisors for up-to-date information.

## ADMISSION REQUIREMENTS

Details concerning specific requirements are available from the appropriate advisor, the advisement handbook, or at [www.soe.calpoly.edu](http://www.soe.calpoly.edu).

The requirements for admission to Cal Poly to pursue a Multiple Subject credential differ slightly from those for the Single Subject credential. All applicants must first apply for admission to graduate studies in Education at Cal Poly by completing an application at [www.csumentor.edu](http://www.csumentor.edu).

**Preliminary Credential**

Admission to the university does not guarantee admission to either teacher education program. Admission to either Preliminary Credential program requires candidates to be in at least their junior year, pass the Basic Skills Requirement, earn a Certificate of Clearance, verify completion of early field experience, and satisfy all other prerequisites for a specific credential program.

To make successful progress through the program, candidates must maintain a B average in all professional education courses, and complete a series of applications (STEP I or A, II or B, & III) at specific transition points in the credential program. Check with the credential program advisor, the credential handbook, and [www.soe.calpoly.edu](http://www.soe.calpoly.edu) to be sure all requirements are completed.

**Clear Credential**

California Senate Bill 2042 transferred the granting of clear multiple subject and single subject teaching credential recommendations to school district based Induction Programs. Graduates obtaining their preliminary credential from Cal Poly should consult the school district employing them, whether in San Luis Obispo County or elsewhere in California, for information about the Induction Program and obtaining the clear credential.

**Supplementary and Subject Matter Authorizations**

Students are encouraged to complete additional authorizations that can be added to Preliminary Multiple and Single Subject credentials. These authorizations allow teachers to teach additional subjects without completing a full professional preparation program for that credential. To earn an authorization, students must complete a specific number of course credits in the new content area. See [www.ctc.ca.gov](http://www.ctc.ca.gov) for specific information on these authorizations.

# Graduate Studies in Education

Education Bldg. (02), Room 113  
(805) 756-7194

**Counseling and Guidance Coordinator, Jodi D. Jaques**  
**Educational Leadership and Administration**

**Coordinator, James L. Gentilucci**

**Joint Doctoral Program Coordinator, George J. Petersen**  
**Special Education Coordinator, Michael B. Ruef**

## **Certificate Program in:**

Educational Technology

## **Credential Programs in:**

Administrative Services

Education Specialist (Mild/Moderate Disabilities)

These credential programs are accredited by the California Commission on Teacher Credentialing (CCTC) to prepare candidates and recommend for these credentials.

## **M.A. in Education with Specializations in:**

Counseling and Guidance

Educational Leadership and Administration

Special Education

## **Ed.D. in Educational Leadership**

### **Certificate Program in Educational Technology**

This certificate program prepares educators to be leaders in the use of emerging technologies in the classroom. The program is a four-course sequence that includes EDUC 507 Instructional Materials and Technology, EDUC 508 Digital Moviemaking for K-12 Educators, EDUC 509 Robotics for K-12 Educators, and EDUC 500 Independent Project on Educational Technology. At the completion of the sequence, students earn a university certificate and, as credentialed teachers, have the opportunity to earn a supplementary authorization in Computer Concepts and Applications. The supplementary authorization allows educators to teach computer-based classes in grades 9 and below.

## **Credential Programs**

### **Admission Requirements**

Details concerning specific requirements are available from the appropriate advisor, the advisement handbook, or at [www.soe.calpoly.edu/](http://www.soe.calpoly.edu/).

## **ADMINISTRATIVE SERVICES**

Preliminary (Tier I)

Administrative Intern

Administrative Services offers two credential programs: one leading to recommendation for the Preliminary Administrative Services Credential, and a second, the Administrative Intern Credential, for those persons earning

their Preliminary Administrative Services Credential and who concurrently serve in an administrative position.

**Preliminary Administrative Services.** This program emphasizes a comprehensive knowledge of public school administration including applied theory, administration and leadership, schools in contemporary society, and effective management related to educational outcomes. As a basis for credential recommendation, the preliminary program emphasizes applied theory with actual experience in fieldwork assignments and an evaluation of administrative competence.

The credential program requires 45 quarter units, most of which are applicable to the MA in Education with a Specialization in Educational Leadership and Administration. The Preliminary Administrative Services Credential authorizes service in any administrative position at any grade level in California.

**Administrative Intern.** This program supports districts that have an immediate need for an administrator and are without suitable candidates. Candidates earn the Preliminary Administrative Services Credential as they serve in an administrative capacity within a one year timeframe.

## **EDUCATION SPECIALIST (Mild/Moderate Disabilities)**

Preliminary Level I

Clear Level II

This credential authorizes the holder to teach in the following settings: special day classes, special schools, home/hospital settings, correctional facilities, nonpublic schools and agencies, and resource rooms.

The program is designed to prepare candidates to work with pupils with mild/moderate disabilities, which include specific learning disabilities; mild to moderate mental retardation; attention deficit and attention deficit hyper-activity disorders; and serious emotional disturbance, and authorizes serving individuals in K-12, and in classes organized for adults through age 22.

A full-time candidate may complete the requirements in one calendar year. The Education Specialist program is heavily field based and requires 57 quarter units, most of which are applicable to the MA in Education with a Specialization in Special Education.

A Multiple or Single subject teaching credential is *not* required for admission. However, some coursework taken for the Single Subject or Multiple Subject Credential program may be applied to the Education Specialist Credential program.

Candidates who complete the Preliminary Level I program are required to obtain a **Clear Level II** Education Specialist Credential. The program requires 20-28 units and will be delivered on a two-year cycle. Entry requirements include the following:

- 1) a minimum of a 2.75 GPA over the last 90 quarter (60 semester) units;
- 2) a valid Preliminary Level I Education Specialist credential or Certificate of Eligibility in Mild/Moderate Disabilities;
- 3) verification of employment as a special education teacher of students with mild/moderate disabilities in a California school district, non-public school or agency, or county office of education; and
- 4) two letters of recommendation from persons familiar with the applicant's teaching ability.

In addition to required university coursework, students are required to work with district personnel to identify an Emphasis Area for their work. The Emphasis Area is pursued through 80 hours of university coursework or non-university activities. Check with the credential program advisor, the credential handbook, and [www.soe.calpoly.edu/](http://www.soe.calpoly.edu/) to be sure all requirements are completed.

## Master of Arts in Education

### General Characteristics

The Master of Arts degree program in Education is designed to provide a broad-based perspective of education. The specializations are closely related to the occupational and professional requirements of a variety of pursuits in the fields of education, college student affairs, and agencies involved with community affairs.

### Admission

Admission to the MA in Education degree program minimally requires the following:

- 3.0 GPA in last 90 quarter units
- Letters of recommendation
- Bachelors degree from an accredited college/university

Each specialization below may list additional requirements for the specific program (see the Graduate section of this catalog for additional information on admission).

### Program of Study

All specializations require a minimum of 45 quarter units of graduate work, with at least 40 units of 500-level Education (EDUC) courses. Courses taken in these specializations may also be applied toward related credentials.

Candidates must maintain a grade point average of 3.0 or better in all coursework and remain in good professional standing within their specialization. Calculation of the GPA includes all grades, although only the courses with A, B, or C grades are counted to satisfy requirements for the degree. Required courses with a grade of D or F must be repeated. All candidates must meet the Graduation Writing Requirement.

Credits earned in student teaching are not accepted toward completion of any specialization within the MA Education. At least 36 program-required units shall be completed in residence. Transfer and/or extension credits are only accepted when the credits are acceptable for master's degree credit by the offering institution in its own programs.

### Advising

The candidate must meet with his/her advisor on a regular basis. Continued consultation with the advisor assists a smooth progression toward completion of the degree.

### Formal Study Plan

The candidate is required to file a Formal Study Plan prior to completion of 12 units in his/her program. This plan is completed in consultation with the program advisor and helps the candidate to schedule courses in a sequence that results in timely completion of the program. A Formal Study Plan is required prior to Advancement to Candidacy.

### Advancement to Candidacy

Advancement to master's degree candidacy requires:

- Completing at least 24 units of program-required courses in residence, specified in a formal program of study, with minimum GPA of 3.0;
- Having met the university Graduation Writing Requirement;
- Receiving formal recommendation of the graduate faculty;
- GPA of 3.0 in all coursework included on the formal program of study, and in all coursework completed subsequent to admission to postbaccalaureate standing; and
- Having satisfactorily met any conditions of admission.

### Culminating Experience

Depending on the specialization, final assessment of a candidate's progress shall include a comprehensive written examination and EDUC 590 Research Applications in Education, *or* the completion of a thesis/project. Students must enroll in EDUC 599 Thesis/Project for every quarter in which they are receiving advisement.



### MA Education, Specialization in COUNSELING & GUIDANCE

This program prepares students for careers as counselors in higher education. Admission to the program, which occurs **only** in spring quarter, requires references, an auto-biographical statement, and an interview. Students who have career goals of working in clinical counseling in agency settings or in private practice should refer to the MS Psychology in the College of Liberal Arts.

#### Education Core

EDUC 586 Introduction to Inquiry in Education .....	4
EDUC 587 Educ Foundations & Current Issues .....	4
EDUC 588 Education, Culture and Learning .....	4
EDUC 589 Educational Research Methods .....	4
EDUC 590 Research Applications in Education (4) and comprehensive exam or	
EDUC 599 Thesis/Project (3) (3) .....	4/6

#### Required in the Area of Specialization: .....

EDUC 555 Intro to the Counseling Profession (4)	52
EDUC 556 Multicultural Counseling (4)	
EDUC 557 Career Counseling (4)	
EDUC 560 Counseling Theories (4)	
EDUC 561 Group Counseling (4)	
EDUC 562 Student Dev-Higher Education (4)	
EDUC 564 Legal & Ethical Issues in Counseling (4)	
EDUC 565 Measurement & Assess. Counseling (4)	
EDUC 566 Leadership & Consultation Counsel (4)	
EDUC 568 Counseling Techniques (4)	
EDUC 573 Field Experience, Counseling (12)	

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72/74

### MA Education, Specialization in EDUCATIONAL LEADERSHIP and ADMINISTRATION

The fast-track M.A. and Preliminary Administrative Services Credential program allows students to complete their master's degree and/or credential in 15 weekends (Friday evenings and all day Saturdays) and one summer session during an 11-month period. This rigorous, practical program is designed for those seeking leadership positions in K-12 schools, community colleges, universities, government agencies, and educationally related organizations. Students are admitted once each year in the fall, and they progress through the program as a cohort. The application deadline is MARCH 1. The fast-track program emphasizes applied theories of educational leadership, mastery of practical skills required for effective school administration, and competence in research methods necessary for understanding and assessing learning organizations. While designed primarily for K-16 leaders, the program is beneficial for leaders from other fields. Individuals interested in leading nonprofit organizations are encouraged to apply.

#### Fall Quarter

EDUC 586 Introduction to Inquiry in Education .....	4
EDUC 512 Educational Organization & Mgmt .....	4
EDUC 513 Educ. Planning & Decision Making .....	4
<sup>1</sup> EDUC 518 Supervised Fieldwork.....	3

#### Winter Quarter

EDUC 514 School Site Administration.....	4
EDUC 515 <del>Curriculum and Program Evaluation</del> Educational Program Management & Eval .....	4
EDUC 516 Personnel Supervision and Evaluation	4
<sup>1</sup> EDUC 518 Supervised Fieldwork.....	3

#### Spring Quarter

EDUC 510 Educ Finance & Resource Allocation ...	4
EDUC 511 Educational Law and Governance.....	4
EDUC 589 Educational Research Methods .....	4
<sup>1</sup> EDUC 518 Supervised Fieldwork.....	3

#### Summer Session

EDUC 587 Educ Foundations & Current Issues .....	4
EDUC 588 Education, Culture and Learning .....	4
<sup>2</sup> EDUC 590 Research Applications in Education.....	4

M.A. degree only requires 48 units minimum; 48/57

M.A. and credential require 57 units minimum

11-9-11

### MA Education, Specialization in SPECIAL EDUCATION

Applicants must meet personal and professional standards, including necessary qualifying examinations, presentation of personal recommendations, and a personal interview. Approved units for the master's degree program can be applied towards the requirements for a Preliminary Level I Education Specialist Credential. It is also possible for the qualified student to complete the requirements for the Specialist Credential while pursuing the requirements for the Master of Arts degree in Education.

#### Education Core

EDUC 586 Introduction to Inquiry in Education .....	4
EDUC 587 Educ Foundations & Current Issues .....	4
EDUC 588 Education, Culture and Learning .....	4
EDUC 589 Educational Research Methods .....	4
EDUC 590 Research Applications in Education and comprehensive exam .....	4

#### Required in Area of Specialization

EDUC 544 Adv Collaboration and Consultation for Teachers of Pupils with Special Needs .....	5
EDUC 545 Characteristics and Instruction of Pupils with Mild/Moderate Disabilities .....	5
EDUC 550 Assess Strategies Special Education.....	5
<b>Electives</b> (to be selected with advisor's approval).....	10
	45



## Doctor of Education in Educational Leadership (Ed.D.)

The School of Education at California Polytechnic State University, San Luis Obispo and the Gevirtz Graduate School of Education at the University of California, Santa Barbara offer a field-based Ed.D. in Educational Leadership for working professionals. The program is designed to prepare and support exemplary educational leaders who will demonstrate the abilities to:

- Engage in scholarly research and effectively use extant data to make sound, information-driven decisions;
- Critically examine current educational practices and policies from a variety of relevant theoretical perspectives;
- Formulate and implement effective leadership, managerial, and instructional practices that will improve student achievement and organizational productivity; and
- Engage in reflective praxis to assess personal and professional leadership effectiveness.

Graduates typically pursue employment in leadership and administrative roles in K-12 schools, community colleges, universities, government agencies, and other allied organizations.

The program takes advantage of the unique strengths of each institution (research and field-based practice) to provide innovative programmatic features including a focus on non-urban schools, an accelerated time to degree, research in K-14 Professional Development Districts (PDDs), the inclusion of reflective praxis in all elements of the program, and annual dissemination of student research findings at summer institutes. The program is built upon a tripartite relationship among universities, local K-12 school districts, and community colleges. For additional information, please contact Dr. George Petersen and visit our web site:

[www.education.ucsb.edu/Graduate-Studies/Joint-Doc-Educational-Leadership/home.htm](http://www.education.ucsb.edu/Graduate-Studies/Joint-Doc-Educational-Leadership/home.htm)

### Admission Criteria

Prospective students must meet UCSB admission criteria. Information about these requirements can be found at [www.graddiv.ucsb.edu/admissions](http://www.graddiv.ucsb.edu/admissions). Faculty admit only those applicants who possess the highest potential for successful graduate study and who, with the benefit of doctoral education, will contribute substantially to their academic or professional field through teaching, research, and professional practice. Successful applicants must have:

- Received a master's degree or its equivalent from a regionally accredited university prior to the quarter for which they seek admission;
- Maintained an upper-division grade point average of 3.0 or above;
- Earned Graduate Record Exam (GRE) scores that indicate sufficient ability for successful doctoral study;
- Shared research and/or practice goals with program faculty;

- References indicating their ability to work productively with others; and
- Writing and speaking ability appropriate for doctoral study.

### Program of Study

The program consists of 72 quarter units (minimum) of coursework, field-based research, practicums, summer institutes, and dissertation research and writing. Because the program is time delimited (expected completion within 36-42 months) there are no electives offered in the program.

Students are expected to enroll in a minimum of 12 consecutive quarters (fall, winter, spring, summer) and satisfy all requirements for the degree in no more than four years plus two additional quarters after admission. The curriculum is divided into five parts:

- 1) Three core courses that ground students in the theoretical and empirical work that defines the field;
- 2) Four methods courses that teach students how to frame research questions and seek answers using a variety of methodological tools;
- 3) Five specialized seminars and practicums that focus on the application of theory to problems of educational practice;
- 4) Two summer institutes that provide opportunity for independent study and the presentation of research during the institutes; and
- 5) A dissertation that is concerned with the application and development of research-based knowledge in the field of educational leadership.

### Fees and Residency Requirements

Students are considered UC students for the purposes of academic residency and fee requirements and must pay UC graduate fees for the duration of the program. They must also complete three consecutive quarters of residency in regular session at UCSB before they are permitted to advance to candidacy for the degree. *Note:* The residency requirement can be satisfied by enrolling as a part-time (8 units) graduate student. Students can remain fully employed *and* meet the UC residency requirement.

### Dissertation

Students are required to research and write a dissertation that integrates theory with practice. Unlike the Ph.D. dissertation that is largely theoretical in nature, the goal of the applied dissertation is to improve educational practice within students' professional work environment and normally represents the culmination of their prior field-based research in Professional Development Districts.

1 Administrative services credential candidates only.

2 All students are required to complete a comprehensive electronic portfolio and pass an oral examination at the end of the program.

## 2009-11 Cal Poly Catalog

### School of Education

#### EDUC–EDUCATION

##### EDUC 125 First Year Seminar (2) (CR/NC)

Issues associated with the successful transition from high school or community college to Cal Poly. Links fostered between student needs and campus resources. Coverage of academic policies and procedures, university study skills, goal setting, career planning, wellness and other topics relevant to student success. Credit/No Credit grading only. 1 lecture, 1 activity. *Crosslisted as UNIV 125. Effective Fall 2009.*

##### EDUC 207 The Learner's Development, Culture and Identity in Educational Settings (4)

Theoretical background of child and early adolescent development within diverse cultural settings and implications for the teaching-learning process. Observations of children in everyday settings. 3 lectures, 1 activity. *Participation in public schools requires mandated fingerprint clearance.* Prerequisite: PSY 201 or PSY 202. *Crosslisted as CD/EDUC 207. Change effective Fall 2010.*

##### EDUC 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### EDUC 300 Introduction to the Teaching Profession (3) (CR/NC)

Historical, philosophical, and social foundations of public education. Public school curriculum and professional education dispositions. Structured observation and participation in K-12 public schools with attention to instructional practices for diverse learners. Total credit limited to 6 units. Credit/No Credit grading only. 2 lectures, 1 activity. *Participation in public schools requires mandated fingerprint clearance.* Prerequisite: Junior standing or consent of instructor. *Change effective Fall 2010.*

##### EDUC 304 Orientation to the Teaching of Students with Disabilities (2) (CR/NC)

Introduction to the Education Specialist Credential and role of special education in the public school. Required first course in program. Orientation to program and study of self and others, laws and current conditions of special education. Required field observations and activities. 1 seminar, 1 activity. Credit/No Credit grading only. Prerequisite: Acceptance into Level I Special Education Credential Program, and must have fulfilled early field experience requirement.

##### EDUC 310 Effective Teaching and Classroom Management with a Multicultural Perspective in K-3 and 4-8 Settings (4)

Knowledge, theory, fieldwork and research related to effectively managing, planning, and teaching in K-3 and 4-8 classrooms; connections between preventing discipline problems and choices about curriculum, instruction, and management; creating a positive learning environment for all students. *Participation in public schools requires mandated fingerprint clearance.* 2 seminars, 2 activities. Prerequisite: *Junior standing, and either LS 230 and LS 250 or EDUC 300 (may be taken concurrently), or consent of instructor* ~~EDUC 300 or equivalent course may be concurrent. Completion of GE Area A and junior standing or consent of instructor.~~ *Change effective Fall 2010. Change effective Spring 2011.*

##### EDUC 400 Special Problems for Undergraduates (1–4)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Junior standing and consent of instructor.

##### EDUC 410 Social, Historical and Ethical Perspectives on Teaching and Learning (4) (CR/NC)

Inquiry into the social, historical, philosophical and psychological foundations of education with an emphasis on applying theory to practice. Prepares single subject credential students for teaching. Credit/No Credit grading only. 2 lectures, 2 activities. Prerequisite: EDUC 300 or equivalent course. Admission to the Single Subject Credential Program or consent of instructor. Concurrent: EDUC 412 and EDUC 414.

##### EDUC 412 Access to Learning in a Pluralistic Society (4) (CR/NC)

The role of culture, status, identity, and development in public school experiences for diverse learners. Organization and management of secondary classrooms as related to adolescent development and access to learning. PACT

assessments embedded in course prepare credential candidates for the teaching event. Credit/No Credit grading only. 2 lectures, 2 activities. Prerequisite: EDUC 300 or equivalent course. Admission to the Single Subject Credential Program. Concurrent: EDUC 410 and EDUC 414.

##### EDUC 414 Curriculum and Inquiry in Public Schools (4) (CR/NC)

Principles, methods and practices of organizing curriculum, instruction, and assessment for secondary subject area content, with an emphasis on backward design in curriculum development and assessment. Site visits to local schools to allow analysis of planning, instruction, and assessment in secondary classrooms. PACT assessments embedded in course prepare credential candidates for the teaching event. Credit/No Credit grading only. 2 lectures, 2 activities. Prerequisite: EDUC 300 or equivalent course. Admission to the Single Subject Credential Program or consent of instructor. Concurrent: EDUC 410 and EDUC 412.

##### EDUC 416 Literacy, Language, and Culture in Content Area Classrooms (4) (CR/NC)

Theories and application of literacy learning, assessment and second language acquisition in content classrooms. Observing classrooms, tutoring English language learners, and designing and teaching literacy lessons. Planning and implementing assessments for learners across content areas. Developing theories of literacy teaching and learning consistent with content teaching standards. Recognizing the role of culture in language acquisition. Accommodating multiple literacies in teaching and learning. Credit/No Credit grading only. 2 lectures, 2 activities. Prerequisite: Admission to the Single Subject Credential Program or senior standing for Agricultural Education candidates. Concurrent: EDUC 418 and EDUC 469 (except students enrolled in Agricultural Education Credential Program).

##### EDUC 418 Culturally Responsive Teaching in Diverse Classrooms (4) (CR/NC)

Differentiated instruction and further theoretical knowledge and skills needed for successful teaching of linguistically and culturally diverse learners, as well as students with special learning needs. PACT assessments embedded in course prepare credential candidates for the teaching event. Credit/No Credit grading only. 2 lectures, 2 activities. Prerequisite: EDUC 412, EDUC 414, and content methods course. Concurrent: EDUC 416 and EDUC 469, or AGED 438 for students enrolled in Agricultural Education Credential Program.

##### EDUC 423 Bilingual Literacy (4)

Patterns of classroom organization, application of reading programs, approaches, methods in English and Spanish, and supervised field experiences in elementary classrooms with bilingual students. 3 seminars, 1 activity. Limited to students seeking BCLAD certification. Prerequisite: Junior standing, Spanish proficiency and/or consent of instructor.

##### EDUC 427 Theories, Methods, and Assessment for First and Second Language Acquisition in Secondary Schools (3)

Theories, methods, materials and assessment involved in the instruction of limited English proficient (L.E.P.) students. Bilingual, transitional, and English only programs compared across a historical framework. An integrated language arts approach emphasized, including application of reading programs based on theories of language acquisition. 2 seminars, 1 activity. Prerequisite: Admission to single subject teaching credential program or junior standing in agricultural education major.

##### EDUC 430 Teaching Reading and Language Arts with a Multicultural Perspective (6)

Development of knowledge and skills for planning, teaching, and assessing a balanced, comprehensive, research-based K-8 reading and language arts program. State/national standards and trends. Attention to children of all abilities and backgrounds. PACT assessment task and RICA preparation. 4 seminars, 2 activities. Prerequisite: Admission into the Multiple Subject Credential Program.

##### EDUC 431 Teaching Social Science and the Arts with a Multicultural Perspective (4)

Development of knowledge and skills related to planning, implementing and evaluating integrated social science units of instruction; effects of culture on the selection and implementation of curriculum; knowledge and integration of physical education, art, and music. 2 seminars, 2 activities. Prerequisite: Admission into the Multiple Subject Credential Program.

##### EDUC 432 Teaching Science and Mathematics with a Multicultural Perspective (4)

Curriculum and instruction in elementary school science and mathematics. Selecting, organizing, and teaching science and mathematics at the appropriate

level throughout the elementary school curriculum. Emphasis on teaching via inquiry in science and through problem solving in mathematics following state standards. 2 seminars, 2 activities. Prerequisite: Admission to Multiple Subject Credential Program. Can be taken concurrently with Student Teaching I (EDUC 434 or EDUC 454). Prerequisite for Liberal Studies majors: Completion of MATH 227 and MATH 326.

#### **EDUC 433 Foundations of Bilingual Education (4)**

History, theories, and practices associated with contemporary bilingual education in California and the U.S. Observation and limited teaching in bilingual classrooms. Approximately one-half of the class taught in Spanish. 3 seminars, 1 activity. Prerequisite: Spanish proficiency demonstrated by passing SPAN 122 or equivalent with a grade of B or better, or consent of instructor.

#### **EDUC 434 Student Teaching – Multiple Subject Credential (10) (CR/NC)**

Field assignment involving observation, teaching, research and related activities in public elementary and middle school classrooms. Credit/No Credit grading only. Concurrent: EDUC 455. Prerequisite: EDUC 430 and EDUC 432, and admission to STEP II or STEP B of the Multiple Subject Credential Program.

#### **EDUC 435 Learning to Teach K-8 Mathematics with a Multicultural Perspective (4)**

Planning, instruction, assessment and reflection on teaching mathematics through problem solving to culturally diverse groups of students in grades K-8, with emphasis on the historical and cultural development of mathematics, using manipulatives to promote students' understanding and development of mathematical knowledge and reasoning. 3 seminars, 1 activity. Prerequisite: Admission to STEP I or A of the Multiple Subject Credential Program. For Liberal Studies majors, MATH 227 and MATH 328 must be successfully completed with a grade of C- or better; prerequisite or concurrent: MATH 329.

#### **EDUC 436 Learning to Teach K-8 Science with a Multicultural Perspective (4)**

Planning, instruction, assessment and reflection on teaching science via inquiry and problem solving to culturally diverse students in grades K-8, with emphasis on the historical and cultural development of scientific inquiry, and teaching through investigation to promote the development of scientific knowledge and reasoning. 3 seminars, 1 activity. Prerequisite: Completion of Area B (for Liberal Studies majors) and admission to STEP I or A of the Multiple Subject Credential Program.

#### **EDUC 440 Educating Individuals with Exceptional Needs (4)**

Characteristics, incidence, and etiology of individuals with exceptional needs. Problems, assessment, and approaches toward accommodating students with exceptional needs in the regular classroom. 3 seminars, 1 activity. Prerequisite: Post baccalaureate status or consent of instructor.

#### **EDUC 441 Education Specialist Level II Induction Seminar (2) (CR/NC)**

Orientation class to develop a two (minimum) to five (maximum) year plan that will result in a Professional Clear Education Specialist Credential. Plan to contain elements that extend the learning of the Level I credential, foster critical reflection, include involvement of employer (i.e., school district) representatives, and include both university and non-university academic work. Credit/No Credit grading only. 1 seminar, 1 activity. Prerequisite: Admission into Level II Special Education Credential Program.

#### **EDUC 442 Elementary Field Experience in General and Special Education (2-4) (CR/NC)**

Public school classroom experiences in both general education classrooms and special education classrooms at the elementary level. Teaching individuals and small groups, emphasis on reading skills. Minimum 20 hours per week. Total credit limited to 8 units. Credit/No Credit grading only. Prerequisite: Acceptance into Level I Special Education Credential Program, EDUC 304, EDUC 440. Must be taken concurrently with EDUC 451.

#### **EDUC 443 Assessment of Level II Education Specialists (2) (CR/NC)**

Use of multifaceted assessment process to verify that candidates have met the Level II Performance standards, including portfolio review, coursework competency review, and oral presentation before an assessor panel composed of trained professional practitioners. Credit/No Credit grading only. 1 seminar, 1 activity. Prerequisite: Admission into the Professional Level II Special Education Credential Program and completion of all Level II coursework and related activities.

#### **EDUC 444 The Atypical Infant (4)**

Exploration of issues pertinent to the development of atypical infants. Relationship of theory and research to intervention efforts with handicapped, developmentally delayed infants, and other at-risk infants. 3 seminars, 1 activity. Prerequisite: Junior standing, PSY 256, and EDUC 440 or consent of instructor. Crosslisted as EDUC/PSY 444.

#### **EDUC 445 Reading/Language Arts Instruction for Special Educators (4)**

Diagnosis and remediation of reading problems. Review of reading programs. General education (K-12) reading instructions. Alternative methods of developing English language reading skills. Field activities required. 3 seminars, 1 activity. Prerequisite: Acceptance into Level I Special Education Credential Program, EDUC 440, EDUC 446.

#### **EDUC 446 Adapting Instruction for Students with Disabilities in General Education Programs (4)**

Adapting instructional methods in science, social science, mathematics, reading and the arts in elementary and secondary general education settings for students with disabilities and English language learners. 3 seminars, 1 activity. Prerequisite: EDUC 440.

#### **EDUC 447 Secondary Field Experience in General and Special Education (2-4) (CR/NC)**

Public school classroom experiences in both general education classrooms and special education classrooms at the secondary level. Teaching individuals and small groups, emphasis on behavior management. Minimum 20 hours per week. Total credit limited to 8 units. Credit/No Credit grading only. Prerequisite: Acceptance into Level I Special Education Credential Program, EDUC 440. Must be taken concurrently with EDUC 451.

#### **EDUC 449 Special Education Student Teaching (8) (CR/NC)**

Participation in public schools as a student teacher in activities representing different roles of special education teachers. Assumption of a teacher's responsibility for individual and small groups. Minimum 4 days per week. Credit/No Credit grading only. Prerequisite: Acceptance into Level I Special Education Credential Program, and completion of all program requirements. Must be taken concurrently with EDUC 451.

#### **EDUC 451 Special Education Student Teaching Seminar (4) (CR/NC)**

Educational issues and research, development and assessment of teaching portfolio, completion of materials for a job search, and beginning the first year as a special educator. 3 seminars, 1 activity. Must be taken concurrently with EDUC 449. Prerequisite: Acceptance into Level I Special Education Credential Program; completion of program requirements for the Level I Special Education Program.

#### **EDUC 454 Multiple Subject Student Teaching I (7) (CR/NC)**

Field assignment involving observation, teaching, professional growth and related activities in public K-8 classrooms. Taken concurrently with EDUC 455. Credit/No Credit grading only. Prerequisite: Senior standing in BS in Liberal Studies and completion of LS 461, acceptance in STEP II or STEP B of the Multiple Subject Credential Program.

#### **EDUC 455 Multiple Subject Student Teaching Seminar I (3)**

Educational issues and research; rights and legal responsibilities (teachers and students); reform movements and moral dimensions in education; self evaluation based on teaching performance expectations (TPEs); student assessment and evaluation and development; assessment of MSCP Program Portfolio; and preparing a job search. 3 seminars. Prerequisite: Senior standing in BS in Liberal Studies and completion of LS 461, admission into STEP II or STEP B of the Multiple Subject Credential Program. Taken concurrently with EDUC 434 or EDUC 454.

#### **EDUC 456 Multiple Subject Student Teaching II (12) (CR/NC)**

Second field assignment involving observation, teaching, professional growth and related activities in public K-8 classrooms. Credit/No Credit grading only. Taken concurrently with EDUC 457. Prerequisite: Successful completion of EDUC 455 and LS 461.

#### **EDUC 457 Multiple Subject Student Teaching Seminar II (3)**

Issues related to teaching, moral responsibilities of educators, setting professional goals, parent conferencing, self-assessment, implementation of formal and standardized assessments, interviews, completion of materials for a job search, and beginning the first year as a teacher. Planning, implementation, and evaluation of units of instruction, teaching performance assessments, and multiple subject program portfolio. 2 seminars, 1 activity. Taken concurrently

with EDUC 456. Prerequisite: Successful completion of EDUC 434 or EDUC 454 and EDUC 455.

**EDUC 458 Summer Quarter Field Experiences: General and Special Education (4) (CR/NC)**

Participation in public schools in activities representing different teaching roles in general and special education. Assumption of a teacher's responsibility for individual and small groups. May include student teaching in special education. Minimum 20 hours per week. Total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: EDUC 304 and acceptance into Education Specialist Credential program. Must be taken concurrently with EDUC 459.

**EDUC 459 Summer Quarter Special Education Seminar (4) (CR/NC)**

Provides support and understanding of field experiences and the role of general and special education. Total credit limited to 8 units. 4 seminars. Credit/No Credit grading only. Prerequisite: EDUC 304 and acceptance into Level I Special Education Credential Program. Must be taken concurrently with EDUC 458.

**EDUC 469 Part-Time Student Teaching (6) (CR/NC)**

Part-time assignment in a classroom (Single Subject only). Includes teaching activities under the direction of a selected cooperating teacher in consultation with a university supervisor. Assignment consists of an entire morning in the classroom (or the equivalent) for one quarter. Credit/No Credit grading only. Prerequisite: Completion of courses and requirements to begin student teaching and approval of campus screening committee for credential candidates. Taken concurrently with EDUC 416, EDUC 418, content seminar (except AGED).

**EDUC 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**EDUC 471 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Consent of instructor.

**EDUC 479 Student Teaching (12) (CR/NC)**

Full-time assignment in a classroom (Single Subject only). Includes teaching activities under the direction of a selected cooperating teacher in consultation with a university supervisor. Assignment consists of an entire teaching day in the school for one quarter. Credit/No Credit grading only. Prerequisite: Completion of all courses and requirements prerequisite to full-time student teaching and approval by campus screening committee for credential candidates.

**EDUC 480 Computer Based Curriculum (2)**

Computer assisted instruction and computer based technology. Lesson planning and integration of technology into the K-12 curriculum. Familiarization with available educational courseware and software. Emphasis on classroom application. 1 seminar, 1 activity. Prerequisite: **Completion of GE Area F: Junior standing. Change effective Spring 2011.**

**EDUC 481 Advanced Educational Technology Methods and Integration (4)**

Exploration of advanced educational technology methods and review of constructivist approaches to lesson design. Designing and running technology-based lessons in local K-12 classrooms, and preparing portfolio to meet Level II technology requirements as defined by CCTC. 3 seminars, 1 activity. Prerequisite: EDUC 480 or test equivalent.

**EDUC 500 Individual Study (1-4)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Total credit limited to 8 units. Prerequisite: Consent of department head, graduate major advisor, and supervising faculty member.

**EDUC 501 Applied Practices in Curriculum Development (4)**

Overview of major curriculum trends; planning and development of a comprehensive curriculum project geared toward use of technology in teaching. Emphasis on practicality. 3 seminars, 1 activity. Prerequisite: Graduate standing.

**EDUC 503 Seminar in Language Arts Curriculum and Methods (4)**

Language arts curriculum: objectives, methods, content, materials, evaluation, current trends, research and field work activities. 3 seminars. 1 activity. Prerequisite: Graduate standing.

**EDUC 504 Seminar in Science and Mathematics Curriculum and Methods (4)**

In-depth study of science and mathematics curriculum. Objectives, methods, content, materials, evaluation, current trends, and assessments. 3 seminars, 1 activity. Prerequisite: Graduate standing.

**EDUC 505 Seminar in Social Studies Curriculum and Methods (4)**

In-depth study of the social studies curriculum: objectives, methods, content, materials, evaluation, current trends and field work activities. 3 seminars, 1 activity. Prerequisite: Graduate standing.

**EDUC 506 Models of Instruction (4)**

Analysis of a wide variety of approaches to elementary and secondary teaching that guide instruction in the classroom and in other educational settings. In-depth analysis and implementation of selected teaching strategies. 3 seminars, 1 activity. Prerequisite: Graduate standing.

**EDUC 507 Instructional Materials and Technology (4)**

Examination of technology-supported instruction with special focus on the use of technology to enable constructivist learning experiences for K-12 students. A survey of advanced technologies including electronic media, digital geography, digital story telling, probeware, simulation, and blogging. 3 seminars, 1 activity. Prerequisite: Graduate standing.

**EDUC 508 Digital Moviemaking for K-12 Educators (4)**

Digital moviemaking as the centerpiece of constructivist learning projects in K-12 classrooms. Project-based. Tools and skills for digital moviemaking. Designing constructivist lessons that require K-12 students to make their own movies. 3 seminars, 1 activity. Prerequisite: EDUC 481 or EDUC 507 or consent of instructor.

**EDUC 509 Robotics for K-12 Educators (4)**

The use of robots as the centerpiece of constructivist learning projects in K-12 classrooms. Project-based. Learning to build and program robots and design constructivist lessons around them. No engineering background required. 3 seminars, 1 activity. Prerequisite: EDUC 480 or EDUC 481 or EDUC 507 or consent of instructor.

**EDUC 510 Educational Finance and Resource Allocation (4)**

Financing public schools in America: historical and current sources and types of funding. District level and site level funding and budgeting including priorities and purchasing procedures. Financial implications of personnel contracts and obligations. 3 seminars, 1 activity. Prerequisite: Graduate standing and consent of instructor.

**EDUC 511 Educational Law and Governance (4)**

Legal aspects of school administration including unions, collective bargaining, and contract administration. Governing roles of federal, state, and local agencies including boards and district administrators. 3 seminars, 1 activity. Prerequisite: Graduate standing and consent of instructor.

**EDUC 512 Educational Organization and Management (4)**

Principles of organization, management, and leadership and their relationship to educational effectiveness and productivity. Activity experience in the application of management theory in schools. 3 seminars, 1 activity. Prerequisite: Graduate standing and consent of instructor.

**EDUC 513 Educational Planning and Decision Making (4)**

Concepts of planning and decision making in educational administration that utilize a wide range of data gathering and analysis procedures. 3 seminars, 1 activity. Prerequisite: Graduate standing and consent of instructor.

**EDUC 514 School Site Administration (4)**

Principles and practices of effective building level administration in multicultural/multilingual environment. 4 seminars. Prerequisite: Graduate standing and consent of instructor.

**EDUC 515 Educational Program Management and Evaluation (4)**

Supervision, management, and evaluation of educational curriculum and educational programs. Current trends in program management including mapping, monitoring, alignment. 3 seminars, 1 activity. Prerequisite: Graduate standing and consent of instructor.

**EDUC 516 Educational Personnel Supervision and Evaluation (4)**

Principles and processes for the supervision and evaluation of certificated and classified staff including legal, research, and professional considerations. 3 seminars, 1 activity. Prerequisite: Graduate standing and consent of instructor.

**EDUC 518 Administrative Services Fieldwork (3) (CR/NC)**

Supervised fieldwork in school administration for supervision at the elementary and secondary level. Assignments must encompass three of the four academic quarters and must involve some multicultural experience. Total credit limited to 18 units, only 9 of which may be applied toward master's degree. Credit/No Credit grading only. Prerequisite: Admittance to the Administrative Services Credential program and consent of instructor.

**EDUC 525 Literacy and Reading Processes, Programs and Technology (4)**

Physiological, psychological and psycholinguistic components of the reading process. Applications of research findings of teaching reading, including innovative programs and the use of reading technology. 3 seminars, 1 activity. Prerequisite: Graduate standing.

**EDUC 526 Diagnostic Procedures in Literacy and Reading (4)**

Formal and informal methods of diagnosing and remediating reading problems in classrooms and reading clinics. 3 seminars, 1 activity. Prerequisite: Graduate standing.

**EDUC 527 Language and Literacy Models for Second Language Learners (4)**

Theory and models of learning in a second language at the high levels needed for school success. Analysis and synthesis of research in bilingualism and second language acquisition for teachers of second language learners. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 3 lectures, 1 activity. Prerequisite: EDUC 423 or EDUC 433 or comparable BCLAD coursework.

**EDUC 529 Bilingual Special Education and Reading Instruction (4)**

Principles, procedures and materials for teaching reading to bilingual students coupled with diagnostic and prescriptive methods for understanding reading problems of the bilingual and bilingual special education student. 2 seminars, 2 activities. Prerequisite: Graduate standing.

**EDUC 530 Secondary, College, and Adult Literacy Practices (4)**

Principles, procedures, and materials for improving literacy and reading in the subject matter areas with students of different backgrounds and abilities in grades 7 through college. Field experiences in teaching reading to adults, college, or secondary students. 3 seminars, 1 activity. Prerequisite: Graduate standing.

**EDUC 532 Advanced Field Experiences in Education (3–12) (CR/NC)**

Supervised advanced field experience and practical application of specialty for classroom teachers, reading and special education specialists, administrators and school support personnel. Total credit limited to 18 units for specialist credentials. Total credit limited to 6 units for the master's degree. 30 hours work experience per unit of credit. Credit/No Credit grading only. Prerequisite: Graduate standing, completion of basic teaching or administrative credential, or consent of instructor.

**EDUC 542 Administration of Special Programs and Services (4)**

Principles and practices of organizing and administering special education, reading, counseling, and other support programs. Assessment and placement procedures, middle management's role, overview of specially funded programs, historical precedents and future trends. 3 seminars, 1 activity. Prerequisite: Graduate standing and consent of instructor.

**EDUC 543 Advanced Studies in Assessment, Behavioral Support, Curriculum for Transition in Special Education (4)**

Advancement of Level II candidate's knowledge and skills in assessment driven decision making for pupils with disabilities, supporting pupils with serious emotional or behavioral problems, and preparing pupils with disabilities, including English Language Learners, for major life cycle school transitions. Analyzing assessment data to determine how to modify academic instruction, provide behavioral support, social skills training, career and vocational preparation. 3 seminars, 1 activity. Prerequisite: Admission into the Professional Level II Special Education Credential Program, EDUC 441.

**EDUC 544 Advanced Collaboration and Consultation for Teachers of Students with Special Needs (5)**

Advanced studies and skills in educational consultation. Emphasis on the collaborative and consultative role of the special educator with a wide range of individuals from diverse cultural backgrounds including school personnel, parents, outside agencies, and paraprofessionals. 3 seminars, 2 activities. Prerequisite: Admission into the Level I Special Education Credential Program and master's degree program in education.

**EDUC 545 Characteristics and Instruction of Pupils with Mild/Moderate Disabilities (5)**

Characteristics of, and instructional strategies for students with mild/moderate disabilities. Organization and management of the special classroom. Evaluation of the instructional system. Individualization of instruction, appropriate methods for English language learners and interaction in the total school environment. 3 seminars, 2 activities. Prerequisite: Acceptance into Level I Special Education Credential Program, EDUC 440.

**EDUC 547 Advanced Curricular and Instructional Adaptations for Students with Special Needs (4)**

Advanced studies and skills in adaptation and modification of curriculum and instructional techniques to meet the needs of students with special needs. Educational implications of current learning theories as applied to individuals with special needs. Development and application of a remedial therapy with appropriate individual(s). Development of instruction based on the adopted instructional program for English Language Development. 3 seminars, 1 activity. Prerequisite: Acceptance into Level II Special Education Credential Program and EDUC 441.

**EDUC 548 Advanced Collaboration, Consultation and Instructional Techniques for Teachers of Pupils with Disabilities (4)**

Advanced studies in assessment, adaptation and modification of curriculum, and instructional techniques for teachers of pupils with disabilities. Emphasis on the collaborative, consultative, and management roles of the special educator, focus on interactions with school staff, parents, and outside agencies. 3 seminars, 1 activity. Prerequisite: Admission into the Professional Level II Special Education Credential Program, EDUC 441.

**EDUC 550 Assessment Strategies for Special Education (5)**

Using norm referenced, criterion referenced, and curriculum based testing for assessing academic, behavioral, and physical status of individuals with exceptional needs, including English language learners, for referral purposes. Instructional and evaluation decisions regarding exceptional students in school settings. 3 seminars, 2 activities. Prerequisite: Acceptance into Level I Special Education Credential Program and MA in Education, EDUC 440, EDUC 446.

**EDUC 551 Characteristics and Instruction of Pupils with Moderate/Severe Disabilities (4)**

Definition and social behavioral characteristics of students with moderate to severe disabilities. Instructional strategies emphasizing law, assessment, educational settings, and the collaborative strategies necessary for facilitating the inclusion of students with moderate/severe disabilities in general education settings. Emphasis on the communication, social skills, movement, mobility, sensory and specialized health care issues of students with moderate to severe disabilities. 3 seminars, 1 activity. Prerequisite: Acceptance into Level I Special Education Credential Program, EDUC 440.

**EDUC 552 Support and Transition Strategies in Special Education (5)**

Basic guidance techniques for teachers working with exceptional individuals and their families. Career selection, preparation, and counseling. Transition from school to work, and community resource utilization. 3 seminars, 2 activities. Prerequisite: Acceptance into Level I Special Education Credential Program and MA in Education, EDUC 440, EDUC 446.

**EDUC 553 Current Issues, Emerging Research and Practices in Special Education (4)**

Consideration of assumptions and techniques of educational research regarding the educational, personal, social and vocational difficulties affecting the development of individuals with exceptional needs; emphasizing their applicability to general and specific educational programs. 4 seminars. Prerequisite: Admission to Level I Special Education Credential Program or masters degree program.

**EDUC 554 Behavior Disorders and Positive Behavior Support Strategies (5)**

Assessment of students whose behavior impedes either their own learning or the learning of other students. Strategies for facilitating proactive educational, environmental and social-emotional techniques for supporting students with challenging behavior. 3 seminars, 2 activities. Prerequisite: Acceptance into Level I Special Education Credential Program and MA in Education, EDUC 440, EDUC 446.

**EDUC 555 Introduction to the Counseling Profession (4)**

Overview of the counseling profession, history, philosophy, theory and ethics. Required activity. 3 seminars, 1 activity. Prerequisite: Admission to MA Education program.



**EDUC 556 Multicultural Counseling (4)**

Initiation of critical analysis of personal beliefs and attitudes regarding counseling in a diverse society. Focus on a variety of approaches to explore the beliefs and attitudes of the student in counseling settings, and examination of strategies considered effective in working with diverse populations. 3 seminars, 1 activity. Prerequisite: Admission to MA Education program.

**EDUC 557 Career Counseling (4)**

Focus on the study and application of career development theories in career counseling. Utilizing appraisal instruments, community referral resources, occupational information, computerized retrieval systems, and personal and social data and required activities. 3 seminars, 1 activity. Prerequisite: Admission to MA Education program.

**EDUC 558 Elementary School Counseling (4)**

Focus on the development of skills for the integration of counseling activities into elementary school curriculum – specifically the role of the counselor in the development of a comprehensive guidance program, classroom guidance, counseling, consultation, program design and evaluation, curriculum and administration of special programs. 3 seminars, 1 activity. Prerequisite: PPS credential candidate, or consent of instructor.

**EDUC 559 Secondary School Counseling (4)**

A basic understanding of the secondary school environment, the role and responsibilities of the counselor within the school environment/community, the components of a secondary school counseling program, the developmental issues of 13-18 year olds, emerging standards for school counselors and the changing nature of student populations. 3 seminars, 1 activity. Prerequisite: PPS credential candidate, or consent of instructor.

**EDUC 560 Counseling Theories (4)**

Theories and practice of counseling with special emphasis on the counseling process. Emphasis of conditions of counseling, counseling techniques, counseling diverse populations and the counselor as a professional helper. 3 seminars, 1 activity. Prerequisite: EDUC 555 and admission to MA Education program.

**EDUC 561 Group Counseling (4)**

Theory and practice of group counseling, client selection, group structure, process and termination, and application of theories to specific developmental groups. Communication and facilitation skills emphasized with relevant ethics and law. 3 seminars, 1 activity. Prerequisite: EDUC 555, EDUC 560 or consent of instructor.

**EDUC 562 Student Development–Higher Education (4)**

Exploration of the roles and competencies of the student development specialist in higher education. Review of relevant developmental theory with emphasis on practical implementation. Explore current issues and trends in higher education, and organizational framework. 4 seminars. Prerequisite: Admission to MA Education program.

**EDUC 563 Violence Prevention in Schools (4)**

Specific counseling strategies and issues related to violence in the schools. Alienation, violence, parenting, as they relate to the factors associated with school violence. Evaluation of effective intervention programs for K-12 schools. 3 seminars, 1 activity. Prerequisite: Admission to MA Education program.

**EDUC 564 Legal and Ethical Issues in Counseling (4)**

Consideration of legal, ethical, cultural and related professional issues as they affect the practice of counseling. 3 seminars, 1 activity. Prerequisite: Admission to MA Education Program or PPS Credential Program.

**EDUC 565 Counseling Measurement and Assessment (4)**

Training and evaluation in the utilization of tests, scales, measures, and other instruments with K-12, and college-age students. An understanding of culturally appropriate tests and measures, collaboration with school personnel, parents, and students in the review and interpretation of test scores and measures. 3 seminars, 1 activity. Prerequisite: Admission to MA Education Program, Counseling and Guidance Specialization, or to PPS Credential Program.

**EDUC 566 Leadership and Consultation in Counseling (4)**

Development of skills in planning, organizing, coordinating, and delivering programs that generate systemic change through establishing collaboration within schools, communities and other stakeholders. Emphasis on social action and its role in the counseling profession. 3 seminars, 1 activity. Prerequisite: Admission to MA Education Program or PPS Credential Program.

**EDUC 568 Individual Counseling Techniques (4)**

Theory and practice of individual counseling, process and termination, and application of theories to specific developmental issues working with K-12 students. Communication and facilitation skills emphasized, working with diverse populations and following legal and ethical guidelines. 3 seminars, 1 activity. Prerequisite: Admission to MA Education Program, Counseling and Guidance Specialization, or to PPS Credential Program.

**EDUC 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Graduate standing or consent of instructor.

**EDUC 573 Field Experience, Counseling (1–12) (CR/NC)**

Practical application of guidance services and counseling in public schools, colleges and community settings. Seminars with university staff included. Total credit limited to 24 units. Credit/No Credit grading only Maximum of 6 units may be applied toward MA Education. Prerequisite: EDUC 555, EDUC 560 and Advancement to Candidacy.

**EDUC 581 Graduate Seminar in Education (1–3)**

Contemporary problems in education. Trends, developments, and issues. Total credit limited to 9 units. Prerequisite: Graduate standing.

**EDUC 586 Introduction to Inquiry in Education (4)**

Introduction to professional literature search techniques and to professional organizations as a basis for educational inquiry. Explanation of social construction of knowledge, and the philosophical basis of quantitative and qualitative research. 3 seminars, 1 activity. Prerequisite: Admission to School of Education master's program.

**EDUC 587 Educational Foundations and Current Issues (4)**

Historical, organizational, legal and philosophical characteristics of American education. Emphasis on the analysis of contemporary issues focusing on these characteristics. 4 seminars. Prerequisite: Graduate standing.

**EDUC 588 Education, Culture, and Learning (4)**

Cultural characteristics of educational institutions and practice. Review of theory and research relating to the social and organizational context in which learning and teaching takes place. 4 seminars. Prerequisite: Graduate standing.

**EDUC 589 Educational Research Methods (4)**

Introduction to research methodologies, application of inferential and descriptive statistics, critical analysis of research designs and data collection techniques. 3 seminars, 1 activity. Prerequisite: EDUC 586.

**EDUC 590 Research Applications in Education (4)**

Application of social science research techniques to problems in education and human services. Capstone experience for the School of Education master's inquiry course sequence. Completion of an inquiry project required. 2 seminars, 2 activities. Prerequisite: EDUC 589.

**EDUC 599 Thesis or Project (3)**

Completion of a thesis or project pertinent to the field of education. Student must register for each quarter of advisement. Total credit limited to 6 units. Prerequisite: Consent of graduate committee and supervising faculty member(s).



## 2009-11 Cal Poly Catalog

### Horticulture and Crop Science Department

## EHS—ENVIRONMENTAL HORTICULTURAL SCIENCE

### EHS 123 Landscape Installation and Maintenance (4)

Planting and maintenance of trees, shrubs, ground covers, perennial plantings, color beds, specialty plantings, and small turf areas. Site selection, cultural requirements, scheduling of maintenance activities, pruning, landscape renovation and irrigation system repair. Equipment operation, maintenance, and safety. Speakers from industry. 3 lectures, 1 laboratory. Prerequisite: HCS 110, HCS 120 or consent of instructor.

### EHS 126 Landscape and Environmental Horticulture Construction (2)

Design, construction techniques and materials used in horticulture construction. Material quantity estimating, construction material substitutions, tools and equipment associated with horticulture construction. 1 lecture, 1 laboratory. Prerequisite: HCS 110, HCS 120, or consent of instructor.

### EHS 127 Horticulture and Landscape Design Introduction to Landscape Graphics (4)

Aesthetic aspects of environmental horticulture, ~~landscape drafting~~, introduction to computer aided ~~design drafting~~, presentation techniques and garden history. Field trip required. 2 lectures, 2 laboratories. *Change effective Winter 2011.*

### EHS 128 Principles of Horticultural Design (3)

Aesthetic aspects of environmental horticulture, including landscape drafting, computer aided design, landscape and floral design and history. Design in the use of and presentation of horticultural products. 2 lectures, 1 laboratory. Prerequisite: HCS 110, HCS 120.

### EHS 201 Field Studies in Ornamental Horticulture (1)

Field trip to see environmental horticulture in the field. Private and public sector facilities visited. Itinerary varies. Total credit limited to 2 units. 1 activity. Prerequisite: HCS 120.

### EHS 210 Enterprise Project I (1–4)

Selection and completion of a management/production project under faculty supervision. Project participation is voluntary and subject to approval by the department head and the Cal Poly Corporation. Degree credit limited to two units. Credit/No Credit grading only. Prerequisite: HCS 110, HCS 120, HCS 124.

### EHS 215 Floral Design I (3)

Fundamentals of theory, techniques and skills currently practiced in the floral industry. Intended as consumer education for non-majors as well as initial preparation for pre-professionals. Includes applied art principles, post-harvest care and handling practices, and proper use of florist tools and materials in developing basic designs. 1 lecture, 2 laboratories. *Formerly EHS 125.*

### EHS 225 Floral Design II (3)

Expanded exploration and application of design theory to commercial products and services in the retail floral industry. Appropriate utilization of current sales and business practices in a florist setting. Advanced techniques and skills for construction of designs for weddings, advanced arrangements, and designs for events. 1 lecture, 2 laboratories. Prerequisite: EHS 215.

### EHS 230 Environmental Horticulture (4)

Technical information and recommendations for the residential horticulturist. Propagation, pruning, planting, media, fertilizers, pest and weed control, landscaping, maintenance, identification and care of ornamental plants. Being a wise horticultural consumer. For non-EHS majors. 3 lectures, 1 laboratory.

### EHS 231, 232 Plant Materials I, II (4) (4)

Identification, habits of growth, cultural requirements, and use of ornamental plants in the landscape. 3 lectures, 1 laboratory.

### EHS 245 Horticultural Production Techniques (3)

Applied principles of plant growth in relation to the production horticulture industry. Emphasis on container media, fertilizing practices, irrigation, plant growth regulators, and miscellaneous growing structures. 2 activities, 1 laboratory. Prerequisite: HCS 120, HCS 124, SS 121, CHEM 110 or CHEM 111.

### EHS 301 Principles of Landscape Design (4)

Introduction to basic principles and elements of ~~single-family~~ residential landscape design, design theory, plant composition, creative problem solving, functional and aesthetic uses of landscape materials, client and maintenance criteria, ~~xeriscape and sustainable design~~ concepts, ~~and perspective drawing~~. *Expansion of EHS 127 Intermediate computer aided design drafting and drawing skills. 2 lectures, 2 laboratories. Prerequisite: EHS 123, EHS 126, EHS 127; EHS 231 or consent of instructor. Change effective Spring 2011.*

### EHS 310 Enterprise Project II (2–4) (CR/NC)

Selection and completion of a management/production project under faculty supervision. Project participation is voluntary and subject to approval by the department head and the Cal Poly Corporation. Degree credit limited to two units. Maximum degree credit for EHS 210 and EHS 310 limited to four units. Credit/No Credit grading only. Prerequisite: EHS 210 or consent of instructor.

### EHS 320 Horticultural Presentation Techniques (4)

Computer assisted presentation applications for horticultural business. Exposure to various media essential to horticultural presentations. Expanded computer applications for plan, elevation, perspective drawings and photo imaging. Exposure to estimating, plant materials database and plant selection programs. Required field trip. 2 lectures, 2 laboratories. Prerequisite: EHS 127 or consent of instructor.

### EHS 321 Residential Landscape Design (4)

Advanced principles of landscape design for single-family residential properties. Design process form, and space composition emphasized. Project involvement includes actual client contact. Application of xeriscape concepts. Computer assisted design applications emphasized. Required field trips. 2 lectures, 2 laboratories. Prerequisite: EHS 231, EHS 232, EHS 301. Recommended: EHS 320, EHS 381.

### EHS 324 Interior Plant Management (4)

Plant materials used in the interior landscape. Identification, production, utilization, placement. Interior plant specifics and maintenance. 3 lectures, 1 laboratory. Prerequisite: HCS 120, HCS 124 or consent of instructor, SS 121.

### EHS 325 Floriculture Grades and Standards (3)

Grades and standards for fresh flowers, and blooming and foliage plants. Score cards in evaluating florist crops. Comparative evaluation used to develop both verbal skills and appreciation of commercially grown floriculture crops. 1 activity, 2 laboratories. Prerequisite: HCS 120 or consent of instructor.

### EHS 331 Landscape Contracting (4)

Practices in supervising personnel and applying standard techniques in landscape construction. Cost finding and estimating for landscape trades. 3 lectures, 1 laboratory. Prerequisite: EHS 126, EHS 127.

### EHS 332 Landscape Contracting (4)

Practices in supervising personnel and applying standard techniques in landscape construction cost finding and estimating for landscape trades. Rules, regulations, and licensing laws, set forth by the State of California, governing landscape contractors. 3 lectures, 1 laboratory. Prerequisite: EHS 331.

### EHS 335 Computer Applications for Landscape Horticulture (4)

Computer assisted design, drafting and estimating advanced applications for landscape horticulture. In-depth study and extensive hands on exposure to various media programs essential to digital graphic landscape horticulture; CAD drawing/estimating, material databases, plant database programs and GIS. 2 lectures, 2 laboratories. Prerequisite: EHS 126; EHS 127; EHS 231; EHS 232; EHS 301 or EHS 321 or EHS 331 or consent of instructor.

### EHS 337 Park Planning and Management (4)

Overview of the management and maintenance of private and public parks and recreational areas. Field trips required. 3 lectures, 1 laboratory. Prerequisite: Junior standing or consent of instructor.

### EHS 341 Cut Flower Production (4)

Production of cut flowers and other fresh florists' commodities in greenhouses and outdoors. Preparation and scheduling of such commodities for major markets. Field trip required. 3 lectures, 1 laboratory. Prerequisite: HCS 340 or consent of instructor.

### EHS 342 Potted Plant Production (4)

Production of major commercial flowering potted plants in greenhouses and outdoors. Preparation and scheduling of potted flowering greenhouse crops for major markets. Field trip required. 3 lectures, 1 laboratory. Prerequisite: HCS 340 or consent of instructor.

**EHS 343 Turfgrass Management (4)**

Turfgrass species and uses. Principles of turfgrass physiology and communities under different environments. Overview of procedures and equipment for propagation, mowing, irrigation, fertilization, aerification, and pest control. 3 lectures, 1 laboratory. Prerequisite: HCS 120 or consent of instructor, EHS 123, SS 121.

**EHS 381 Native Plants for California Landscapes (4)**

Horticultural investigation of the California flora with emphasis on landscape use and potential. Plant recognition, identification, propagation and culture. Utilization of native plants in landscape design and habitat restoration. Field trips required. 3 lectures, 1 laboratory. Prerequisite: BOT 121, junior standing or consent of instructor.

**EHS 382 Restoration Horticulture (4)**

Role of horticulture in the successful implementation of restoration projects, including mitigation, revegetation, and erosion control. Practical application of restoration methods and guidelines for specific California plant communities including site-specific plant production. 3 lectures, 1 laboratory. Prerequisite: HCS 124, EHS 381, SS 121.

**EHS 402 Retailing Horticultural Products (4)**

Economics of operating and managing retail horticulture outlets. Location, selection, layout, and demographic studies. Personnel management, merchandising, advertising, pricing strategies and selling techniques, cooperative buying and industry contributions. 3 lectures, 1 laboratory. Field trip required. Prerequisite: HCS 120, EHS 128, BUS 271, junior standing, or consent of instructor. Recommended: BUS 488.

**EHS 421 Arboriculture (4)**

Care and management of large ornamental trees. Selection, planting, establishment and maintenance of specimen trees. Ropes and safety equipment required in tree maintenance. Cavity treatment, bracing and cabling, hazard identification, tree evaluation, and specialty power equipment operation. 3 lectures, 1 laboratory. Prerequisite: EHS 123, EHS 231, EHS 232, or consent of instructor.

**EHS 422 Advanced Arboriculture (2)**

Theory and practices utilized in the management of ornamental trees found in landscaped urban settings. Scheduling of cultural practices and safe usage of hand and power equipment, as specified by professional arborists, and other safety regulations. 2 activities. Prerequisite: EHS 421 or consent of instructor.

**EHS 424 Nursery Crop Production (4)**

~~Comprehensive and historical analysis~~ ~~History and overview~~ of the nursery industry. Types of wholesale nurseries and their products. Plant production systems, scheduling, ~~and~~ marketing. Emphasis on ~~medium to large woody plants and deciduous field-grown ornamental trees and shrubs~~ ~~the wholesale nursery industry~~ in the western U.S. Field trips required. 3 lectures, 1 laboratory. Prerequisite: HCS 124, EHS 245, HCS 327, SS 221; ~~or consent of instructor.~~ *Change effective Winter 2011.*

**EHS 425 Tissue Culture Propagation (3)**

Principles of tissue culture applied to the propagation of ornamental plants. Systems applicable to commercial crops, laboratory organization, media, and current research. 2 lectures, 1 laboratory. Prerequisite: HCS 124 and BIO 435 or HCS 410.

**EHS 430 Sports Field Construction and Management (4)**

Construction and maintenance of sports fields. Basic agronomics including sports field construction, sports turf establishment and maintenance, environmental issues, and personnel management. 3 lectures, 1 laboratory. Prerequisite: EHS 343, and junior standing. *Crosslisted as EHS/RPTA 430.*

**EHS 433 Golf Course Management Operations (4)**

Advanced maintenance and operation of golf course facilities. Systems of management, maintenance, business and finance. 3 lectures, 1 laboratory. Prerequisite: EHS 343, SS 221.

**EHS 434 Landscape Management (4)**

Maintenance procedures and operations. Operating a landscape management business. Estimating, scheduling, recordkeeping and implementation of landscape maintenance projects. Interior landscape maintenance. 3 lectures, 1 laboratory. Prerequisite: EHS 123, EHS 126, or consent of instructor.

**EHS 438 Teaching Methods in Environmental Horticulture (4)**

Use of horticulture as a context for teaching core academic subjects in science, mathematics, English and history/social science. Daily and unit lesson plans that adopt horticultural content, teaching methods and assessment for English

language learners and students with special needs. Class demonstrations, analysis, assessment and reflection. 2 lectures, 2 activities. Prerequisite: Completion of General Education B2; EHS 230 or horticultural experience; AGED 202; junior standing; credential candidate or consent of instructor.

**EHS 581 Graduate Seminar in Ornamental Horticulture (3)**

Group study of current problems of the ornamental horticulture industry; current experimental and research findings as applied to production and management. Total credit limited to 9 units. 3 seminars. Prerequisite: Graduate standing.

**EHS 599 Thesis in Environmental Horticultural Science (1-9)**

Systematic research of a significant problem in environmental horticulture. Thesis will include problem identification, significance, methods, data analysis and conclusion. Students must enroll every quarter in which facilities are used or advisement is received. Degree credit limited to 6 units. Prerequisite: Graduate standing and consent of instructor.

**2009-11 Cal Poly Catalog****Electrical Engineering Department****Flowchart****BS ELECTRICAL ENGINEERING**

□ 60 units upper division

□ GWR

□ 2.0 GPA

□ USCP

\* = Required in Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

EE 111, 151 Intro to Electrical Engineering & Lab	1,1
EE 112 Electric Circuit Analysis I.....	2
EE 129, 169 Digital Design and Lab (3)(1) <i>or</i> CPE/EE 133 Digital Design (4) (10/27/10) .....	4
EE 211, 241 Electric Circuit Analysis & Lab II .....	3,1
EE 212, 242 Electric Circuit Analysis & Lab III.....	3,1
EE 228 Continuous-Time Signals and Systems.....	4
EE 229, 269 Comp Des/Assembly Lang Prog, Lab (3)(1) <i>or</i> CPE/EE 233 Comp Des/Assembly Lang Prog (4) (10/27/10) .....	4
EE 255, 295 Energy Conversion Electromag, Lab...	3,1
EE 302, 342 Classical Control Systems and Lab.....	3,1
EE 306, 346 Semiconductor Device Electronics and Lab .....	3,1
EE 307, 347 Digital Electronics and Integrated Circuits and Lab.....	3,1
EE 308, 348 Analog Electronics and Integrated Circuits and Lab.....	3,1
EE 314 Introduction to Communication Systems.....	3
EE 328 Discrete Time Signals and Systems and EE 368 Signals and Systems Laboratory .....	3,1
EE 329 Programmable Logic and Microprocessor- Based Systems Design <i>or</i> CPE/EE 336 Microprocessor System Design (2/15/11) .....	4
EE 335 Electromagnetic Fields and Transmission	4
EE 375 Electromagnetic Fields/Transmission Lab...	1
EE 402 Electromagnetic Waves .....	4
EE 409, 449 Electronic Design and Lab.....	3,1
EE 460 Senior Project Preparation.....	2
EE 461 Senior Project I <i>or</i> EE 463 Senior Project Design Laboratory I.....	3
EE 462 Senior Project II <i>or</i> EE 464 Senior Project Design Laboratory II.....	2
<sup>1</sup> Technical electives .....	12
Select from the following, a minimum of 2 EE senior design laboratories and 2 EE senior design lectures:	
<i>EE lecture/laboratory electives</i>	
EE 410, 411, 413, 417, 420, 424, 433, 495 (taken Fall 2009 or later; max 4 units); EE/CPE 427, 428, 439, 521, 522, 523; EE 431/CPE 441	
<i>EE lecture electives</i>	
EE 400 <sup>†</sup> , 403, 405, 406, 407, 412, 415, 416, 418, 419, 421, 425, 440, 470, 502, 511, 513, 514, 515, 517, 518, 519, 520, 524, 526, 527, 528, 529, 530, 533, 570; EE/CPE 432, 438	

*EE laboratory electives<sup>††</sup>*EE 422, 443, 444, 445, 452, 455, 456,  
458, 459, 471, 480, 541, 544; EE/CPE 472*Non-EE electives*BMED 410, 420, 425, 430, 440, 445;  
BUS 311;  
CHEM 305, 313;  
CPE 482;  
CSC 341, 342, 343;  
CSC/CPE 315, 416, 453, 454, 458, 464, 471;  
ECON 330, 337, 403, 413;  
ENVE 331;  
IME 301, 319, 401, 405, 407, 457;  
MATE 340, 430, 435;  
MATH 304, 306, 406, 408, 409, 412, 413, 414,  
418, 451, 452, 453;  
ME 302, 318, 321, 343, 405, 406, 415, 423,  
450, 488;  
MU 311, 312, 411;  
PHYS 302, 303, 310, 313, 317, 322, 340, 341,  
342, 403, 405, 406, 408, 409, 412, 417,  
423, 424, 452;  
STAT 426, 427

Total units for Major Courses:

**87****SUPPORT COURSES**

BIO 213 <i>and</i> ENGR/BRAE 213 (B2)* .....	2,2
CHEM 124 Gen Chem for Engineering (B3/B4)*	4
CSC 101 Fundamentals of Computer Science I.....	4
ENGL 149 Technical Writing for Engineers (A3)*	4
IME 156 Basic Electronics Manufacturing <i>or</i> IME 157 Electronics Manufacturing .....	2
MATH 141, 142 Calculus I, II (B1)* .....	4,4
MATH 143 Calculus III (Add'l Area B)* .....	4
MATH 241 Calculus IV .....	4
MATH 244 Linear Analysis I .....	4
PHYS 141 General Physics IA (Add'l Area B)* ....	4
PHYS 132, 133 General Physics II, III .....	4,4
PHYS 211 Modern Physics I .....	4
STAT 350 Probability and Random Processes for Engineers (B6)* .....	4
<sup>1,2,3</sup> Approved engineering support electives .....	9
Select at least 3 courses from the following:	
BIO 111; BMED 212, 310, 450, 460;	
CHEM 125, 212, 216, 305, 313;	
CSC 141, 142, 341, 342, 343;	
CSC/CPE 102, 103, 315;	
CPE 290 Introduction to C++ Programming (7/18/13)	
IME 142, 143, 301, 314, 405, 407;	
MATE 210, 215, 232, 340, 430, 435;	

<sup>1</sup> Consultation with advisor is recommended prior to selecting technical  
electives or approved electives; bear in mind your selections may  
impact pursuit of post-baccalaureate studies and/or goals.<sup>2</sup> No course may be used to simultaneously satisfy both engineering  
support and technical elective requirements.<sup>3</sup> The number of units given for transfer credit will not exceed the number  
of units of the Cal Poly course.<sup>†</sup> Four units max count toward technical electives.<sup>††</sup> To use one unit max of EE 400 as lab elective, obtain department chair  
approval.

MATH 206, 304, 306, 406, 408, 409, 412, 413,  
414, 418, 451, 452, 453;  
ME 211, 212, 302, 341, 343;  
PHYS 212, 310, 313, 315, 317, 322, 323, 340,  
341, 342, 403, 405, 406, 408,  
409, 412, 417, 423, 424, 452;  
STAT 426, 427

Total units for Support Courses: 67

**GENERAL EDUCATION (GE)**

72 units required, 32 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 8 units required at the 300 level.

**Area A Communication (8 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing * 4 in Support .....	0

**Area B Science and Mathematics (no additional units  
required)**

B1 Mathematics/Statistics * 8 units in Support .....	0
B2 Life Science * 4 units in Support .....	0
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	
B5 (requirement for Liberal Arts students only)	
B6 Upper-division Area B * 4 units in Support.....	0
Additional Area B units* 8 units in Support.....	0

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4

40

**FREE ELECTIVES** ..... 0

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# College of *Engineering*

Mohammad N. Noori, Dean  
Daniel W. Walsh, Associate Dean  
Fred W. DePiero, Associate Dean  
Stacey M. Breitenbach, Assistant Dean  
Engineering Bldg. (13), Room 266  
(805) 756-2131

## ACADEMIC PROGRAMS

Aerospace Engineering .....	<a href="#"><u>BS*</u></a> , <a href="#"><u>MS</u></a>
Biomedical Engineering .....	<a href="#"><u>BS</u></a> , <a href="#"><u>MS</u></a>
BioResource & Agricultural Engineering ... (College of Agriculture, Food and Environmental Sciences)	<a href="#"><u>BS*</u></a>
Civil and Environmental Engineering .....	<a href="#"><u>MS</u></a>
Civil Engineering .....	<a href="#"><u>BS*</u></a>
Computer Engineering .....	<a href="#"><u>BS*</u></a>
Computer Science .....	<a href="#"><u>BS**</u></a> , <a href="#"><u>MS</u></a> , <a href="#"><u>Minor</u></a>
Electrical Engineering .....	<a href="#"><u>BS*</u></a> , <a href="#"><u>MS</u></a>
Engineering .....	<a href="#"><u>MS</u></a>
Engineering Management .....	<a href="#"><u>MBA/MS</u></a>
Environmental Engineering .....	<a href="#"><u>BS*</u></a>
Fire Protection Engineering <i>Fall 2010</i> .....	<a href="#"><u>MS</u></a>
General Engineering .....	<a href="#"><u>BS</u></a>
Industrial Engineering .....	<a href="#"><u>BS*</u></a> , <a href="#"><u>MS</u></a>
Manufacturing Engineering .....	<a href="#"><u>BS*</u></a>
Materials Engineering .....	<a href="#"><u>BS*</u></a>
Mechanical Engineering .....	<a href="#"><u>BS*</u></a> , <a href="#"><u>MS</u></a>
Multidisciplinary Design .....	<a href="#"><u>Minor</u></a>
Software Engineering .....	<a href="#"><u>BS</u></a>
Transportation Planning .....	<a href="#"><u>MCRP/MS</u></a>

\* Engineering programs accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 – telephone: (410) 347-7700.

\*\* BS Computer Science program accredited by the Computing Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 – telephone: (410) 347-7700.

Engineering and computer science programs at Cal Poly are strongly oriented toward preparing graduates for immediate entry into professional practice. Students declare their majors when they enter as freshmen, and they generally take at least one course in that major each quarter. This early introduction better motivates and prepares students to master the foundational mathematics, basic science, and engineering science or computer science central to success in all the engineering disciplines.

The undergraduate engineering disciplines listed above provide the education needed for entry to the engineering profession and for continued academic work toward advanced degrees. Many of our graduates enter graduate programs at Cal Poly or other institutions. Cal Poly engineering and computer science graduates are highly desired by industry and find a variety of professional opportunities awaiting them, such as engineering design, computer hardware and software engineering, test and evaluation, systems analysis, modeling and simulation, manufacturing, applied research, development, sales and field engineering. Graduates pursue careers in a broad cross-section of industry, government agencies, public utilities, marketing groups, and educational institutions.

The College of Engineering is an internationally-recognized, premier undergraduate engineering college. Its mission is to educate students for careers of service, leadership and distinction in engineering or other fields by using a participatory, learn by doing, "hands-on" approach.

State-of-the-art facilities and laboratories form the core of Engineering's project-centered curriculum. Ranging from the Aircraft Design Lab to the Rotor Dynamics Laboratory, these facilities offer advanced technological systems that allow students to link theory with practice. New college buildings also promote interdisciplinary project activities, including the Advanced Technology Laboratories, Bonderson Projects Center, and Engineering IV. With 19,000 square feet of space for individual and team-based projects, the Bonderson Center offers enriched opportunities for multidisciplinary projects and collaboration with industry. The newest facility, Engineering IV, concentrates many of the engineering programs in one area. The \$28 million, 104,000-square-foot building includes modern classrooms and laboratories for aerospace, mechanical, civil, environmental, industrial and manufacturing engineering programs.

The Accreditation Board for Engineering and Technology (ABET) defines engineering as "the profession in which a knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize economically the materials and forces of nature for the benefit of mankind."

Engineering and computer science programs at Cal Poly prepare graduates for practice in professional engineering and computer science. Attributes of engineering graduates include:

- (a) an ability to apply knowledge of mathematics, science, and engineering;
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data;



- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- (d) an ability to function on multidisciplinary teams;
- (e) an ability to identify, formulate, and solve engineering problems;
- (f) an understanding of professional and ethical responsibility;
- (g) an ability to communicate effectively;
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
- (i) a recognition of the need for, and an ability to engage in life-long learning;
- (j) a knowledge of contemporary issues; and
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. In addition, an engineering program must demonstrate that its students attain any additional outcomes articulated by the program to foster achievement of its education objectives.

### Multidisciplinary Requirement

Consistent with ABET's requirement (d) on multidisciplinary teams, most engineering programs have adopted an explicit graduation requirement in this area. This provides students an opportunity to practice team skills. Such experience is important for practicing engineers, with the ever increasing diversity of engineering science and applications. Required activities for students are defined by each individual program, and may include items such as:

- Team senior project
- CO-OP or internship employment
- Certain club activities
- Working with faculty on a sponsored project
- Project embedded in curriculum
- Taking certain technical electives
- Service learning project

Contact department for specific requirements, or the College of Engineering Advising Center.

Our curricula reflects a "learn by doing" philosophy via incorporation of numerous design-centered laboratories, integration of design, and inclusion of the senior design project capstone design experience.

The excellence of Cal Poly's undergraduate engineering and computer science programs provides the foundation for master's degree programs. Industry often considers the master's degree as an important requirement for the

design, development, applied research and analysis occupations in engineering and computer science. The master's degree allows entry into these occupations at higher levels of technical skills and responsibilities.

### ENGINEERING STUDENT AFFAIRS

Stacey Breitenbach, Assistant Dean  
Engineering South (40), Room 117  
(805) 756-1320  
[www.esa.calpoly.edu](http://www.esa.calpoly.edu)

The College of Engineering Student Affairs encompasses the Advising Center, International Exchange Program, Multicultural Engineering Program/MESA Schools Program, Outreach Services, and the Women's Engineering Program.

### Advising Center

Engineering South (40), Room 115  
(805) 756-1461  
[www.eadvise.calpoly.edu](http://www.eadvise.calpoly.edu)

The College of Engineering Advising Center serves undergraduate students with academic advising issues in conjunction with each student's faculty advisor.

The academic advising staff tracks the academic and administrative progress of each student based on the academic expectations outlined below.

### Academic Expectations

Students are expected to:

- maintain current, cumulative, higher education, *and* major grade point averages of a 2.0 or higher.
- complete a *minimum* of ~~36~~ 45 degree applicable units each academic year (an academic year runs from summer quarter through spring quarter). Students pursuing their degree on a part-time basis with acceptable reasons for doing so are expected to submit an academic plan to the Assistant Dean for review (all units on the plan should be degree applicable). *Change effective Summer 2009.*
- enroll and complete a *minimum* of six units of degree applicable major/support coursework each quarter with no more than four units that are not degree applicable.
- enroll and complete courses in one attempt.
- complete their lower-division math and science courses as early as possible.
- be enrolled in a math course each quarter until their sequence is completed.

All academically oriented student paperwork is processed through the Advising Center (for example, course substitution petitions, excess unit forms, late enrollment forms, withdrawal forms, change of major forms, technical elective forms, etc).



The majority of the general education questions and interpretation of transfer credit is handled in the Advising Center once the Evaluations Office has provided the initial evaluation.

The Advising Center maintains working folders on each student. These folders are used for general advising purposes. The Advising Center has past and present flowcharts for all engineering majors and major specific technical elective forms.

While the Advising Center is responsible for providing procedural advice, faculty advisors are responsible for providing academic content and technical advice. Student course scheduling, course content questions, and career planning are usually done by the faculty advisors. Although the Assistant Dean has signature authority for the advisor, Department Chair, and Dean, it is not uncommon for some forms to be routed for appropriate review. In order to process paperwork in a timely manner, it is important for students to submit paperwork to the Advising Center for initial review.

### **International Exchange Program**

Maria Sklar, IEP Advisor  
Engineering South (40), Room 115  
(805) 756-1461  
[www.eadvise.calpoly.edu](http://www.eadvise.calpoly.edu)

The College of Engineering has agreements with several overseas universities. These exchange programs differ from the University wide exchange programs in that they offer students the opportunity to attend overseas universities with an engineering focus, while paying Cal Poly tuition. The partner universities have been specifically selected by the College for their innovative technology and engineering coursework. Participation gives students the opportunity to gain a global engineering perspective while taking coursework that may be degree applicable. Students typically return with improved communication skills, a better understanding of other cultures, and a more marketable resume for industry. The current list of partner universities is located at [www.eadvise.calpoly.edu/iep/](http://www.eadvise.calpoly.edu/iep/).

### **Multicultural Engineering Program (MEP)/MESA Schools Program**

David Cantu, Director  
Engineering South (40), Room 117  
(805) 756-1433  
[www.calpoly.edu/~mep](http://www.calpoly.edu/~mep)

The MESA Engineering Program (MEP) is an academic support program designed to recruit, retain, and graduate educationally disadvantaged students in engineering and computer science disciplines. MEP builds an academic support community among students and provides the necessary bridges for students' academic and professional success.

MEP offers an orientation class in effective learning techniques. A study center is available for students so that they can overcome feelings of isolation, develop supportive academic peer groups, and share information about classes and scholarship opportunities. Tutoring is available for undergraduate technical courses. Group study workshops teach students complex technical concepts through group study and support. MEP fosters professional development by helping coordinate summer jobs, internship, and scholarship opportunities with companies who recognize the MEP as a valuable source for skilled future employees.

### **Outreach Services**

Teana Fredeen, Outreach Coordinator  
Engineering South (40), Room 119  
(805) 756-1324  
[outreach@calpoly.edu](mailto:outreach@calpoly.edu)

Outreach is an important part of the mission of Cal Poly's College of Engineering. The K-14 outreach programs stimulate student interest in engineering. Cal Poly attracts non-traditional and underrepresented students to engineering through the outreach activities of the Multicultural Engineering Program and the Women's Engineering Program. By partnering with K-12 schools and community colleges in the community, Cal Poly offers engineering projects and presentations in the classroom. For middle and high school students, schools are invited to visit Cal Poly labs to inspire students with the exciting hands-on opportunities in engineering. The schools are encouraged to implement an engineering curriculum and partner with Cal Poly for support, tutoring and curriculum development.

The Engineering Days summer camp provides a hands-on learning opportunity for high school students to explore engineering disciplines. The Exploring Engineering bi-lingual program brings parents and students from MESA schools programs and Parent Institute for Quality Education programs to campus during Open House to encourage students to pursue a college education.

Cal Poly students are encouraged to volunteer for outreach activities to increase their speaking abilities and share their experiences with aspiring young minds.

### **Women's Engineering Program (WEP)**

Karen Bangs, Director  
Engineering South (40), Room 119  
(805) 756-2350  
<http://ceng-web.calpoly.edu/wep.php>

The mission of the Women's Engineering Program (WEP) is to recruit and retain women engineering and computer science students by focusing on outreach, on-campus support and professional preparation objectives. To meet these objectives, WEP works closely with the Society of Women Engineers (SWE) Cal Poly student

section, one of the top student sections in the nation, in supporting a variety of programs directed at pre-college, undergraduate and graduate students.

Outreach activities are directed at students from kindergarten through community college. These programs are designed to encourage pre-university women and girls to consider engineering as a career choice. Outreach recruitment activities include: Engineering Summer Camp, Building an Engineer workshops, Shadow an Engineering Student day, Engineering Road Show, Girl Scout Engineering Badge day, elementary school workshops, and career fairs.

The Women's Engineering Program provides on-campus support to Cal Poly women engineering students through a variety of academic, leadership and social activities. These activities help students connect to their peers while concurrently assisting them in achieving their educational goals. On-campus support activities include: scholarships, academic counseling and referrals, pre-registration counseling, big sibling program, test files, teacher evaluations, SWE meetings, and community service activities.

Professional preparation activities are designed to prepare students for a productive career by facilitating networking with professionals and corporations. Professional preparation activities include: Shadow an Engineer, Evening With Industry banquet, Team Tech, Industry Tours, Resume Book, and MentorNet.

### **ENVIRONMENTAL STUDIES MINOR**

Please see the College of Science and Mathematics for more information on this interdisciplinary minor.

### **BA LIBERAL ARTS AND ENGINEERING STUDIES**

Please see University-Wide Programs, page 73, for more information on this interdisciplinary major.

**2009-11 Cal Poly Catalog****English Department****BA ENGLISH**

☐ 60 units upper division      ☐ GWR

☐ 2.0 GPA      ☐ USCP

\* = Required in Major; also satisfies GE

Note: No major, support courses may be taken as credit/no credit.

**MAJOR COURSES**

ENGL/HNRS 251 Great Books of World Literature: Classical and Ancient World (C1)* ....	4
ENGL 203 Core I: 450–1485 .....	4
ENGL 204 Core II: 1485–1660.....	4
ENGL 205 Core III: 1660–1789.....	4
ENGL 290 Introduction to Linguistics.....	4
ENGL 303 Core IV: 1789–1861 .....	4
ENGL 304 Core V: 1861–1914.....	4
ENGL 305 Core VI: 1914–Present.....	4
ENGL 461 Senior Project ( <i>in conjunction with a designated 400-level ENGL course</i> ) .....	1
ENGL 300-level electives .....	8
ENGL 400-level electives (minimum 12 units in literature) .....	20

Students may select a creative writing emphasis with their 28 upper division ENGL units:

***Fiction Writing Emphasis:***

- ENGL 387 Fiction Writing (4)
- ENGL 487 Adv. Creative Writing: Fiction (4) (4)
- One 400-level modern or contemporary ENGL literature course in fiction (4)
- ENGL 300-level elective (4)
- ENGL 400-level literature electives (8)
- Senior project in a work or works of fiction

***Poetry Writing Emphasis:***

- ENGL 388 Poetry Writing (4)
- ENGL 488 Adv. Creative Writing: Poetry (4) (4)
- One 400-level modern or contemporary ENGL literature course in poetry (4)
- ENGL 300-level elective (4)
- ENGL 400-level literature electives (8)
- Senior project in a work or works of poetry

**61****SUPPORT COURSES**

Foreign language (121 or 122 <b>or 201 or 202</b> ) or demonstration of a comparable level of proficiency ( <b>5/30/13</b> ) .....	4
	<b>4</b>

**GENERAL EDUCATION (GE)**

72 units required, 4 of which are specified in Major.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (20 units)**

B1 Mathematics/Statistics .....	8
B2 Life Science .....	4

B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	
B5 elective	
Area B elective (select one course from B1-B5) ...	4

**Area C Arts and Humanities (12 units)**

C1 Literature *4 units in Major .....	0
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective (not ENGL).....	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division)**

(4 units) .....	4
	<b>68</b>

**FREE ELECTIVES .....**

(minimum 7 units must be 300-400 level)

**180****Recommended Sequence for Major Courses**

Freshman Year		
Fall	Winter	Spring
ENGL 134	ENGL 145	ENGL 251
COMS 101/102		
Sophomore Year		
Fall	Winter	Spring
ENGL 203	ENGL 204	ENGL 205
	ENGL 290	
Junior Year		
Fall	Winter	Spring
ENGL 303	ENGL 304	ENGL 305
ENGL 300-level elective	ENGL 300-level elective	ENGL 400-level elective
Senior Year		
Fall	Winter	Spring
ENGL 400-level elective	ENGL 400-level elective	ENGL 400-level elective
ENGL 400-level elective		Senior Project

## 2009-11 Cal Poly Catalog

### College of Engineering

## ENGR—ENGINEERING

### ENGR 110 Engineering Science I (3)

Introduction to engineering and computer science. Graphical communication and visualization as well as engineering orientation. Cultural pluralism and gender issues. 3 lectures.

### ENGR 111 Engineering Science II (3)

Introduction to engineering and computer science. Computer-aided design (CAD) and manufacturing (CAM), and fabrication, as well as engineering orientation. Cultural pluralism and gender issues. 3 lectures.

### ENGR 112 Engineering Science III (3)

Introduction to engineering and computer science. Computer science and engineering orientation. Cultural pluralism and gender issues. 3 lectures.

### ENGR 141 Engineering Orientation—Freshman Seminar (2) (CR/NC)

College success skills for the technical student, including group study, time management, technical project, identification of campus resources. Academic, career and personal assessment as it relates to the educational process. Specifically for students enrolled through Student Academic Services and the MESA Engineering Program. Credit/No Credit grading only. 1 lecture, 1 activity.

### ENGR 142 Engineering Careers (2) (CR/NC)

Career investigation, resume writing, job search and interview skills, speakers from industry and time management. Specifically for students enrolled through Student Academic Services and the MESA Engineering Program. Credit/No Credit grading only. 1 lecture, 1 activity.

### ENGR 210 Technical Group Study Training (2) (CR/NC)

Approaches to facilitated small group study. Practice facilitating under supervision in the MEP Technical Study Center. Review academic and interactive group communication skills. Minimum two hour facilitated group lab. CRLA International Tutor Program Certification. Total credit limited to 6 units. Credit/No Credit grading only. 1 lecture, 1 laboratory. Prerequisite: Grade of B or better at Cal Poly in course student will be facilitating.

### ENGR 213 Bioengineering Fundamentals (2)

GE B2

Treatment of the engineering applications of biology. Genetic engineering and the industrial application of microbiology. Systems physiology with engineering applications. Structure and function relationships in biological systems. The impact of life on its environment. 2 lectures. For engineering students only. Prerequisite: MATH 142, CHEM 124. Corequisite: BIO 213. *Crosslisted as BRAE/ENGR 213.* Fulfills GE B2.

### ENGR 240 Additional Engineering Laboratory (2)

Special assignments undertaken by students who need or wish to acquire abilities supplementary to their standard pattern of courses. Assignments must be primarily shop or laboratory in nature. Work is done by the student with faculty supervision. Total credit limited to 4 units. 2 laboratories. Prerequisite: Consent of department head.

### ENGR 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### ENGR 302 Transportation and Manufacturing in the Twenty-First Century (4)

GE Area F

Role of transportation and manufacturing technology in the twenty-first century. Effects of technological change upon society, and the principles associated with the advancement of transportation and manufacturing technologies in the automotive industry and the industrial-military complex. Case studies of systems to compare alternative approaches to problem solving. 4 lectures. Prerequisite: Junior standing and completion of GE Area B, or consent of instructor. Fulfills GE Area F.

### ENGR 303 Professional Development (2) (CR/NC)

Integration of principles of engineering with industrial realities via professional problem solving modules. Research and field investigation at cooperating industry sites. Advanced learning systems. Specifically designed for transfer

students. Credit/No Credit grading only. 2 lectures. Prerequisite: Junior standing or consent of instructor.

### ENGR 322 The Learn By Doing Lab Teaching Practicum (2) (CR/NC)

Early teaching experience in an informal science/technology/engineering/mathematics (STEM) teaching and learning environment. Principles of inquiry-driven STEM education, lesson design, implementation and assessment. Intended for undergraduates exploring STEM teaching as a career. Total credit limited to 4 units. Credit/No Credit grading only. 1 seminar, 1 laboratory. Prerequisite: Completion of GE Area B and consent of instructor. *Crosslisted as ENGR 322/SCM 302. Effective Spring 2011.*

### ENGR 350 The Global Environment (4)

GE Area F

Interdisciplinary investigation of how human activities impact the Earth's environment on a global scale. Examination of population, resource use, climate change, and biodiversity from scientific/technical and social/economic/historical/political perspectives. Use of remote sensing maps. Sustainable solutions. 3 lectures, 1 activity. Prerequisite: Junior standing and completion of GE Areas A and B. *Crosslisted as AG/BUS/EDES/ENGR/HUM/SCM/UNIV 350.* Fulfills GE Area F.

### ENGR 400 Special Problems for Advanced Undergraduates (2–4)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units. Prerequisite: ME 212 or consent of department head.

### ENGR 451 Special Topics in Bioengineering (4)

Current topics in bioengineering, including medical applications and industrial applications. Total credit limited to 16 units, with a maximum of 4 units per quarter. The Schedule of Classes will list topic selected. 4 lectures. Prerequisite: MATH 242, ME 313 or consent of instructor.

### ENGR 462 Senior Project (4)

Selection and completion of project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results presented in a formal report. Minimum commitment of 150 hours. Prerequisite: ME 212, junior standing, and consent of instructor.

### ENGR 470 Selected Advanced Topics (1–4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

### ENGR 471 Selected Advanced Laboratory (1–4)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

### ENGR 481, 482 Senior Project Design Laboratory I, II (2) (2)

Selection, development, and completion of project by individuals or team which is typical of problems graduates must solve in their fields of employment or applied research. Project may involve, but is not limited to, physical modeling and testing of integrated design projects, costs, planning scheduling and research and may involve students from several disciplines. Formulation of outline, literature review, and project schedule. 2 laboratories. **ENGR 481** prerequisite: MATH 244, IME 314, ME 302 or consent of instructor. **ENGR 482** prerequisite: ENGR 481 or consent of instructor.

### ENGR 483 Senior Project Design Laboratory III (2)

Continuation of ENGR 482. Completion of project by individuals or team typical of problems graduates must solve in their fields of employment or applied research. Project may involve, but is not limited to, physical modeling and testing of integrated design projects, costs, planning, scheduling and research, and may involve students from several disciplines. Formulation of outline, literature review, and project schedule. 2 laboratories. Prerequisite: ENGR 482 or consent of instructor.

### ENGR 493 Cooperative Education Experience (2) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 6 units. Prerequisite: Sophomore standing and consent of instructor.

**ENGR 494 Cooperative Education Experience (6) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 18 units. Prerequisite: Sophomore standing and consent of instructor.

**ENGR 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units. Prerequisite: Sophomore standing and consent of instructor.

**ENGR 500 Individual Study (2-4)**

Advanced study planned and completed under the direction of faculty. Open to graduate students who have demonstrated the ability to do independent work. Total credit limited to 8 units. Prerequisite: Graduate standing and consent of Program Director.

**ENGR 551 Advanced Topics in Bioengineering (4)**

Current topic in bioengineering research/application in detail, including medical applications and industrial applications. Takes advantage of capabilities of resident or visiting faculty. Total credit limited to 16 units. The Schedule of Classes will list topic selected. 4 lectures. Prerequisite: ENGR 451 or consent of instructor.

**ENGR 563 Graduate Seminar (2)**

Selected topics of interest to engineering and other graduate students. Open to graduate students and selected seniors. A forum to share information about research and research tools; an opportunity to discuss topics of interest with professionals in the field, academics, and other graduate students. The Schedule of Classes will list topic selected. Total credit limited to 4 units. 1 seminar, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**ENGR 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Graduate standing or consent of instructor.

**ENGR 571 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Graduate standing or consent of instructor.

**ENGR 581 Biochemical Engineering I (4)**

Fundamentals of Biotechnology. Types of organisms and their structure. Unstructured and structured models for microbial growth. Theory of microbial competition. Stoichiometric and thermodynamic principles. Material and energy balances for aerobic and anaerobic growth. Kinetics of enzyme catalyzed reactions. 3 seminars, 1 laboratory. Prerequisite: MCRO 221 and CHEM 371, or consent of instructor.

**ENGR 582 Biochemical Engineering II (4)**

Kinetics of growth, product formation and cell death. Continuous culture. Cell recycle and immobilization. Air sterilization. Transport processes in bioreactors. Scale-up of bioprocesses. Biochemical processes. Biocatalysis. Recombinant DNA and non-microbial processes. 3 seminars, 1 laboratory. Prerequisite: ENGR 581 or consent of instructor.

**ENGR 583 Biochemical Engineering III (4)**

Biochemical separations. Biological materials. Removal of insoluble-centrifugation, filtration, cell disruption. Primary product isolation: extraction, ultrafiltration, adsorption, ion exchange, fixed and fluidized bed operation. Production purification: gel filtration, affinity chromatography, salt fractionation. Final isolation: drying, crystallization. Quality control. 3 seminars, 1 laboratory. Prerequisite: ENGR 582 or consent of instructor.

**ENGR 591 Thesis Project Design Laboratory (2)**

Selection and development of project, by individuals or team, typical of problems graduates must solve in their fields of employment or applied research. Project may involve, but is not limited to, physical modeling and testing of integrated design projects, costs, planning, scheduling and research. Formulation

of outline, literature review, and project schedule. 2 laboratories. Prerequisite: Graduate standing.

**ENGR 592 Thesis Project Design Laboratory (2)**

Continuation of ENGR 591. Completion of project by individuals or team which is typical of problems graduates must solve in their fields of employment or applied research. Project may involve, but is not limited to, physical modeling and testing of integrated design projects, costs, planning, scheduling and research. Formulation of outline, literature review, and project schedule. 2 laboratories. Prerequisite: ENGR 591 or consent of instructor.

**ENGR 593 Cooperative Education Experience (2) (CR/NC)**

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**ENGR 594 Cooperative Education Experience (6) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**ENGR 595 Cooperative Education Experience (12) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**ENGR 599 Design Project (Thesis) (1-9)**

Each individual or group will select, with faculty guidance and approval, a topic for independent research or investigation resulting in a thesis or project to be used to satisfy the degree requirement. An appropriate experimental or analytical thesis or project may be accepted. Prerequisite: Graduate standing.



## 2009-11 Cal Poly Catalog

### Civil & Environmental Engineering Department

## ENVE—ENVIRONMENTAL ENGINEERING

### ENVE 111 Introduction to the Environmental Engineering Profession (1) (CR/NC)

Overview of environmental engineering solutions to water pollution, air pollution, solid waste, and hazardous waste problems. Remediation of contaminated soil and groundwater. Environmental regulations. Careers in environmental engineering. Licensing and professional registration, professional code of ethics, professional engineering societies. Credit/No Credit grading only. 1 lecture.

### ENVE 200 Special Problems for Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

### ENVE 240 Additional Engineering Laboratory (1-2) (CR/NC)

Special assignments undertaken by students who need or wish to acquire abilities supplementary to their standard pattern of courses. Assignments must be primarily of shop or laboratory nature. Work done with minimum faculty supervision. Total credit limited to 6 units. Credit/No Credit grading only. 1-2 laboratories.

### ENVE 264 Environmental Fluid Mechanics (4)

Theory and application of fluid statics and fluid dynamics to environmental problems. Compressible and incompressible flow in pipes. Open channel flow. Flow measurement systems. 4 lectures. Prerequisite: MATH 241, PHYS 133, and ME 211.

### ENVE 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### ENVE 304 Process Thermodynamics (3)

First and second laws of thermodynamics, properties of gases, liquids and mixtures, vapor-liquid equilibria, solubility and absorption, equilibrium in chemical reactions, thermodynamic applications in environmental engineering. 3 lectures. Prerequisite or concurrent: CHEM 125, ENVE 331. Prerequisite: ME 302.

### ENVE 309 Noise and Vibration Control (3)

Behavior of sound waves, selection of instrumentation, practical measurements, criteria for noise and vibration control. Assessment of noise produced by transportation and other engineering facilities. 2 lectures, 1 laboratory. Prerequisite: ENGL 149, MATH 241, PHYS 133, and CSC 231.

### ENVE 324 Introduction to Air Pollution (4) GE Area F

Causes and effects of air pollution on the individual, the community and industry. Application of mathematics and chemistry to solve air pollution problems. For non-majors. 4 lectures. Prerequisite: Junior standing and completion of GE Area B. Fulfills GE Area F.

### ENVE 325 Environmental Air Quality (4)

Consideration of ambient air contamination inside and outside. Factors included in establishing, monitoring and maintaining air quality standards. Using engineering principles to understand, model, and predict air quality. 4 lectures. Prerequisite: CHEM 128, ENVE 264, and CSC 231 or consent of instructor.

### ENVE 330 Environmental Quality Control (4)

Application of scientific and engineering principles to control the development and use of air, water and land resources. Control of pollution of the environment. Disposal of wastes. Administrative and legal aspects. For non-Engineering majors. 4 lectures. Prerequisite: Completion of GE Area B and junior standing.

### ENVE 331 Introduction to Environmental Engineering (4)

Description and quantification of water and air quality characteristics important for water and wastewater treatment and air pollution control. Fundamentals of kinetics, reactor configurations, toxicity and dose-response relationship. Regulations governing ambient pollutant levels and discharges. Introduction to the modeling of pollutant fate and transport. Overview of solid waste management and global environmental issues. 4 lectures. Prerequisite: CHEM 125 or CHEM 128, MATH 242 or MATH 244 (or concurrent).

### ENVE 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

### ENVE 411 Air Pollution Control (3)

Theory, principles and practices related to the control of particulate emissions. Mechanical separations. Cost and design of control systems. 3 lectures. Prerequisite: ENVE 304, ME 341 or ENVE 264, ENVE 325, and ENVE 331.

### ENVE 421 Mass Transfer Operations (4)

Theory and practices related to using mass transfer principles to solve environmental problems. Design principles dealing with air and water pollution control and hazardous waste management. 4 lectures. Prerequisite: ENVE 304, ENVE 325, ENVE 331, and ME 341 or ENVE 264.

### ENVE 426 Air Quality Measurements (3)

Planning and conducting air quality measurements in the atmosphere, indoors, and at the source. Topics include both particulates, gases and meteorological measurements. 2 lectures, 1 laboratory. Prerequisite: ENVE 325, CHEM 212/312, ME 341 or ENVE 264, STAT 312, and ENGL 149.

### ENVE 434 Water Chemistry and Water Quality Measurements (4)

Aquatic environmental chemistry and water quality measurements. 3 lectures, 1 laboratory. Prerequisites: CHEM 129, ENVE 330 or ENVE 331, or consent of instructor.

### ENVE 436 Introduction to Hazardous Waste Management (4)

Overview of industrial processes that produce hazardous wastes. Principles of toxicology and review of state federal regulations for hazardous wastes, including RCRA, TSCA, and superfund laws. Storage, handling, and transport of hazardous wastes. Unit operations and processes treatment and reduction. Ultimate disposal including incineration and secure landfills. 4 lectures. Prerequisite: ENVE 325 and ENVE 331, and ENVE 421 or consent of instructor.

### ENVE 438 Water and Wastewater Treatment Design (3)

Theory and design of facilities for physical and chemical treatment of water and wastewater, biological treatment of wastewater, and treatment and disposal of sludge. 3 lectures. Prerequisite: ENVE 331 and ME 341 or ENVE 264.

### ENVE 439 Solid Waste Management (3)

Chemical and physical properties of municipal and industrial refuse. Landfill disposal, incineration, composting. Industrial and commercial solid waste disposal problems and treatment methods. Pyrolysis. Salvage and recycle operations. Economics of disposal methods. Interrelationship between water quality and landfill operations. 3 lectures. Prerequisite: ENVE 330 or ENVE 331, and senior standing.

### ENVE 443 Bioenvironmental Engineering I (4)

State-of-the-art bioremediation technologies for soil, groundwater and contaminated air stream remediation and pollution prevention. Introduction to engineering design combining biogenetics, reactor configuration, and basic biological and engineering principles. Various in-situ and ex-situ technologies. 3 lectures, 1 laboratory. Prerequisite: ENVE 331.

### ENVE 450 Industrial Pollution Prevention (4)

Theory and case studies of innovative industrial and hazardous waste treatment and waste minimization through principles of pollution prevention. 3 lectures, 1 laboratory. Prerequisite: ENVE 331.

### ENVE 455 Environmental Health and Safety (4)

Physical, chemical and biological hazards associated with industrial processes. Toxicology. Safety analysis and design. Causes and prevention of occupational and environmental hazards. Development and implementation of industrial hygiene programs. 4 lectures. Prerequisite: ENVE 331.

### ENVE 461, 462 Senior Project I, II (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum of 120 hours total time. Prerequisite: Senior standing.

### ENVE 466 Senior Project Design Laboratory I (2)

Selection and initial work on a project by individuals or team which is typical of problems graduates must solve in their fields of employment. Project involves, but is not limited to, physical modeling, testing and design. The project may include students/elements from other disciplines. Formulation of outline, literature review, project schedule, initial analyses and interim report. 2



laboratories. Prerequisite: Senior standing and consent of instructor. Note: although ENVE 466 substitutes for ENVE 461, students may not use repeat credit for the purpose of increasing GPA.

#### **ENVE 467 Senior Project Design Laboratory II (2)**

Continuation of ENVE 466. Continuation of research methodology: problem statement, method, results, analysis, synthesis, project design, construction (when feasible), and evaluation/conclusions. Project results are presented in formal written reports and formal oral reports. 2 laboratories. Prerequisite: ENVE 466.

#### **ENVE 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

#### **ENVE 471 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

#### **ENVE 493 Cooperative Education Experience (2) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 6 units. Prerequisite: Sophomore standing and consent of instructor.

#### **ENVE 494 Cooperative Education Experience (6) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 18 units. Prerequisite: Sophomore standing and consent of instructor.

#### **ENVE 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units. Prerequisite: Sophomore standing and consent of instructor.

#### **ENVE 500 Individual Study (1–3)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Total credit limited to 4 units. Prerequisite: Graduate standing and consent of department chair.

#### **ENVE 516 Advanced Environmental Modeling (4)**

Application, adaptation, and limitations of advanced computer models in environmental engineering. The Schedule of Classes will list topics selected. Total credit limited to 8 units. 4 lectures. Prerequisite: CE 251 or CSC 231, or graduate standing/consent of instructor.

#### **ENVE 535 Physico-Chemical Water and Wastewater Treatment (4)**

Physical and chemical processes used in potable water treatment and advanced wastewater treatment. Coagulation, flocculation, sedimentation, filtration, membrane separation, disinfection, and absorption. Wastewater recycling regulations. Integration of treatment processes. 4 lectures. Prerequisite: Graduate standing or consent of instructor.

#### **ENVE 536 Biological Wastewater Treatment Processes Engineering (3–4)**

Fundamentals of biological wastewater treatment. Suspended and attached growth bioreactors. Activated sludge, biotower, and anaerobic process design. Biological nutrient removal. ~~3~~ 4 lectures. Prerequisite: Graduate standing or consent of instructor. *Change effective Winter 2010.*

#### **ENVE 537 Decentralized Wastewater Management (4)**

Design and management of decentralized wastewater treatment systems. Description of wastewater characteristics, process analysis, and wastewater pretreatment. Design of treatment processes for septic tank effluent. Effluent disposal, septage management, and the management of decentralized systems. 4 lectures. Prerequisite: ENVE 438.

#### **ENVE 542 Sustainable Environmental Engineering (4)**

Critical analysis of environmental engineering practices such as solid waste management, recycling, and wastewater treatment from the viewpoint of energy efficiency, lifecycle cost, and sustainability. Both laboratory experiments and computer models to assess sustainability. 3 lectures, 1 laboratory. Prerequisite: Graduate or senior standing or consent of instructor.

#### **ENVE 551 Environmental Unit Operations (4)**

In-depth laboratory study of unit operations and processes used in environmental engineering. Performance tests on laboratory scale equipment. Computer simulations. 2 lectures, 2 laboratories. Prerequisite: ENVE 421 and graduate standing or consent of instructor.

#### **ENVE 552 Environmental Problems of the Semiconductor Industry (4)**

Introduction to the environmental, health, and safety issues of the semiconductor industry. Semiconductor manufacturing processes and their environmental emissions. Engineering and management options for pollution control and prevention. Management of environmental systems in the semiconductor industry. 4 lectures. Prerequisite: Graduate standing or consent of instructor.

#### **ENVE 570 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 seminars. Prerequisite: Graduate standing or consent of instructor.

#### **ENVE 571 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Consent of instructor.

#### **ENVE 593 Cooperative Education Experience (2) (CR/NC)**

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

#### **ENVE 594 Cooperative Education Experience (6) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

#### **ENVE 595 Cooperative Education Experience (12) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

#### **ENVE 599 Design Project (Thesis) (1-9)**

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis. Prerequisite: Graduate standing.

**2009-11 Cal Poly Catalog****Civil & Environmental Engineering Department****Flowchart****BS ENVIRONMENTAL ENGINEERING**

☐ 60 units upper division

☐ GWR

☐ 2.0 GPA

☐ USCP

\* = Required in Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

CE 113 Computer-Aided Drafting in Civ Engr .....	2
CE 201 or CE 204, 207 Mechanics of Materials .....	6
CE 336 Water Resources Engineering .....	4
CE 337 Hydraulics Laboratory .....	1
CE 381 Geotechnical Engineering .....	4
CE 434 Groundwater Hydraulics and Hydrology .....	4
ENVE 111 Intro to Env. Engineering Profession .....	1
ENVE 264 Environmental Fluid Mechanics .....	4
ENVE 304 Thermodynamics of Processes .....	3
ENVE 309 Noise and Vibration Control .....	3
ENVE 325 Environmental Air Quality .....	4
ENVE 331 Intro to Environmental Engineering .....	4
ENVE 411 Air Pollution Control .....	3
ENVE 421 Mass Transfer Operations .....	4
ENVE 426 Air Quality Measurements .....	3
ENVE 434 Water Chemistry and Water Quality Measurements .....	4
ENVE 436 Intro Hazardous Waste Management .....	4
ENVE 438 Water & Wastewater Treatment Design .....	3
<sup>4</sup> ENVE 439 Solid Waste Management .....	3
ENVE 450 Industrial Pollution Prevention .....	4
ENVE 455 Environmental Health and Safety .....	4
ENVE 466, 467 Senior Project Design Lab .....	2,2
<sup>1,2</sup> Technical electives .....	11
	<b>87</b>

**SUPPORT COURSES**

<sup>3</sup> CHEM 127 General Chemistry I (B3/B4)* .....	4
CHEM 128 General Chemistry II .....	4
CHEM 129 General Chemistry III .....	4
CHEM 312 Surv Org Chem .....	5
(trans equiv CHEM 212)	
CSC 231 Programming for Engineering Students ....	2
ENGL 149 Technical Writing for Engineers (A3)* .....	4
MATH 141, 142 Calculus I, II (B1)* .....	4,4
MATH 143 Calculus III (Add'l Area B)* .....	4
MATH 241 Calculus IV .....	4
MATH 244 Linear Analysis I .....	4
MCRO 221 Microbiology (B2)* or	
MCRO 224 General Microbiology I (4/7/09) .....	4
ME 211 Engineering Statics .....	3
ME 302 Thermodynamics I .....	3
PHYS 141 General Physics IA (Add'l Area B)* ....	4
PHYS 132, 133 General Physics II, III .....	4,4
STAT 312 Statistical Methods for Engineers (B6)* .....	4

**69****GENERAL EDUCATION (GE)**

72 units required, 32 of which are specified in Support.

→ See page 50 for complete GE course listing.

→ Minimum of 8 units required at the 300 level.

**Area A Communication (8 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing * 4 units in Support .....	0

**Area B Science and Mathematics (no add'l units required)**

B1 Mathematics/Statistics * 8 in Support .....	0
B2 Life Science * 4 units in Support .....	0
B3 Physical Science * 4 in Support .....	0
B4 One lab taken with either a B2 or B3 course	
B5 (requirement for Liberal Arts students only)	
B6 Upper-division Area B * 4 in Support .....	0
Additional Area B units* 8 in Support .....	0

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective (PHIL 340 or NR 360 recommended) .....	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4

**40****FREE ELECTIVES .....****0****196**

<sup>1</sup> To be selected in accordance with the A.B.E.T. 24-unit and Culminating Engineering Design requirement, in consultation with your academic advisor.

<sup>2</sup> No more than 4 units of ENVE 400 or CE 400 can be counted towards technical electives.

<sup>3</sup> CHEM 124, 125 substitute for CHEM 127, 128.

<sup>4</sup> An additional 3 units of technical electives may substitute. (1/6/14)

**2009-11 Cal Poly Catalog****Horticulture and Crop Science Department****BS ENVIRONMENTAL HORTICULTURAL SCIENCE**

☐ 60 units upper division ☐ GWR  
☐ 2.0 GPA ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major, support or concentration courses may be taken as credit/no credit.

**MAJOR COURSES**

HCS 110 Orientation to Horticulture/Crop Science	2
HCS 120 Principles of Horticulture/Crop Science	4
EHS 123 Landscape Installation and Maintenance	4
HCS 124 Plant Propagation	4
EHS 126 Environmental Horticulture Construction	2
EHS 231, EHS 232 Plant Materials I, II	4,4
PPSC 311 Agricultural Entomology	4
PPSC 321 Weed Biology and Management	4
HCS 327 Abiotic Plant Problems	3
PPSC 427 Diseases & Pest Control Systems for Ornamental Plants	4
BIO 435 Plant Physiology <i>or</i>	
HCS 410 Crop Physiology	4
HCS 461 Senior Project I	2
HCS 462 Senior Project II	2
<sup>3</sup> HCS 463 Senior Seminar	1
Concentration courses	42
	<b>90</b>

**SUPPORT COURSES**

BOT 121 General Botany (B2 & B4)*	4
BOT 323 Plant Pathology <i>or</i> BOT 324 Ornamental and Forest Pathology	4
BUS 207 Legal Responsibilities of Business	4
BUS 212 Financial Acctg for Nonbusiness Majors	4
CHEM 111 Survey of Chemistry (B3&B4)*	5
CHEM 312 Survey of Organic Chemistry ( <i>transfer equivalent CHEM 212</i> )	5
ECON 201 Survey of Economics (D2)*	4
MATH 118 Pre-Calculus Algebra (B1)*	4
( <i>MATH 116 &amp; MATH 117 substitute</i> )	
SPAN 111 Elementary Hispanic Language and Culture (USCP)	4
SS 121 Introductory Soil Science	4
SS 221 Fertilizers	4
STAT 218 Applied Statistics/Life Sciences (B1)*	4
	<b>50</b>

**GENERAL EDUCATION (GE)**

72 units required, 24 of which are specified in Support.  
→See page 50 for complete GE course listing.  
→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing	4
A2 Oral Communication	4
A3 Reasoning, Argumentation, and Writing	4

**Area B Science and Mathematics (no add'l units req'd)**

B1 Mathematics/Statistics * 8 units in Support	0
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B2 Life Science * 4 units in Support	0
B3 Physical Science * 4 units in Support	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature	4
C2 Philosophy	4
C3 Fine/Performing Arts	4
C4 Upper-division elective	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404)	4
D2 Political Economy * 4 units in Support	0
D3 Comparative Social Institutions	4
D4 Self Development (CSU Area E)	4
D5 Upper-division elective	4

**Area F Technology Elective (upper division)**

* 4 units in Concentrations	0
	<b>48</b>

<b>FREE ELECTIVES</b>	<b>0</b>
	<b>188</b>

**CONCENTRATIONS (select one)****Landscape Horticulture Concentration**

EHS 127 Introduction to Landscape Graphics	4
EHS 301 Principles of Landscape Design	4
EHS 331 Landscape Contracting	4
EHS 343 Turfgrass Management	4
EHS 421 Arboriculture	4
EHS 434 Landscape Management	4
BRAE 337 Landscape Irrigation	<del>3</del> 4
BRAE 340 Irrigation Water Management (Area F)*	4
<sup>1</sup> Approved electives	<del>4</del> 10
<i>Select 10 units from the following:</i>	
AGB 401;	
EHS 320, 321, 324, 381, 382, 422, 433;	
HCS 200 <sup>†</sup> , 339 <sup>†</sup> , 400 <sup>†</sup> ;	
PPSC 327, 405, 414, 421, 431, 441	
<i>Corrected effective Summer 2009</i>	<b>42</b>

**Nursery and Floriculture Production Concentration**

<sup>2</sup> EHS 128 Principles of Horticultural Design <i>or</i> EHS 127 (12/20/13)	3
EHS 245 Horticultural Production Techniques	3
HCS 340 Principles of Greenhouse Environment	4
EHS 342 Potted Plant Production	4
EHS 424 Nursery Crop Production	4

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>2</sup> If EHS 127 is taken for 4 units, the excess unit may be applied to approved electives in concentration. (12/20/13)

<sup>3</sup> May substitute 1 unit of any upper-division free elective. (12/11/14)

<sup>†</sup> HCS 200 and 400 up to 2 units each; HCS 339 up to 4 units.

EHS 210/EHS 310/HCS 339 Enterprise Project/ Internship .....	4
BRAE 340 Irrigation Water Management (Area F)* or any Area F course .....	4
<sup>1</sup> Approved electives. ....	16
<i>Select 16 units from the following:</i>	
AGB 401;	
BUS 310, 346, 409;	
CRSC 333;	
EHS 324, 325, 341, 381, 382, 402;	
HCS 421;	
PPSC 327, 405, 421, 431, 441	
	<hr/> 42

### **Turfgrass Management Concentration**

EHS 127 Introduction to Landscape Graphics .....	4
HCS 339 Internship .....	3
EHS 343 Turfgrass Management.....	4
EHS 433 Golf Course Management Operations .....	4
EHS 434 Landscape Management.....	4
BRAE 337 Landscape Irrigation .....	<del>3</del> 4
BRAE 340 Irrigation Water Management (Area F)*	4
BUS 384 Human Resource Management .....	4
<sup>1</sup> Approved electives. ....	<del>12</del> 11
<i>Select 11 units from the following:</i>	
BOT 326;	
CRSC 411;	
EHS 301, 324, 337, 381, 421;	
EHS/RPTA 430;	
HCS 200 <sup>†</sup> , 400 <sup>†</sup> ;	
PPSC 327, 421, 431, 441;	
SS 310, 322	
<i>Corrected effective Summer 2009</i>	<hr/> 42

### **Individualized Course of Study**

<sup>2</sup> EHS 128 Principles of Horticultural Design <i>or</i> EHS 127 (12/20/13) .....	3
BRAE 340 Irrigation Water Management (Area F)* or any Area F course .....	4
35 units, of which 16 must be EHS, 300-400 level. Course selection must be made before the student has finished 145 units toward the degree, and must be with the concurrence of the student's advisor and department head.	35
	<hr/> 42

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>2</sup> If EHS 127 is taken for 4 units, the excess unit may be applied to approved electives in concentration. (12/20/13)

<sup>†</sup> HCS 200 and 400 up to 2 units each; HCS 339 up to 4 units.

**2009-11 Cal Poly Catalog****Natural Resources Management Department****BS ENVIRONMENTAL MANAGEMENT AND PROTECTION**

□ 60 units upper division

□ GWR

□ 2.0 GPA

□ USCP

\* = Required in Major; also satisfies GE

Note: No major, support or concentration courses may be taken as credit/no credit.

**MAJOR COURSES**

NR 140 Careers in Forestry & Env. Mgmt.	1
NR 142 Environmental Management	3
NR 215 Land and Resource Measurements	2
NR/LA 318 Applications in GIS	3
NR 326 Natural Resources Econ. & Valuation	4
NR 335 Conflict Mgmt. in Natural Resources	4
<sup>1</sup> NR 402 Forest Health <i>or</i>	
NR 320 Watershed Mgmt & Restoration	4
NR/CRP 404 Environmental Law <i>or</i>	
NR/CRP 408 Water Law	3
NR 412 Forest and Natural Resources Senior Assessment Project <i>or</i> NR 461 Senior Project I	3
NR 416 Env. Impact Analysis and Mgmt	4
NR 425 Applied Resource Analysis	4
NR 465 Ecosystem Management	4
<sup>2</sup> ASCI 329/BIO 263/BIO 427	3-4
BOT 121/BIO 111/BIO 161 (B2&B4)*	4
BIO 115 <i>or</i> BIO 114/BIO 162/NR 208 (7/2/13)	4-5
BIO 325 General Ecology <i>or</i> NR 306 Ecology of Natural Resources & Habitat Mgmt.	4
BRAE/NR 247 Forest Surveying	2
BRAE 348 Energy for a Sustainable Society <i>or</i> ENVE 324 Intro to Air Pollution (Area F)*	4
CHEM 111 Survey of Chemistry <i>or</i> CHEM 127 General Chemistry (B3)*	4-5
CHEM 312 Survey of Organic Chemistry	5
ENVE 330 Environmental Quality Control	4
GEOL 201 Physical Geology	3
<sup>3</sup> MATH 161/221 (B1)*	4
PHYS 121 College Physics I (B3)*	4
PSY 201/202 Introduction to Psychology (D4)*	4
SS 121 Introductory Soil Science	4
STAT 217/218 Applied Statistics (B1)*	4
Concentration courses (see below)	36

**132****GENERAL EDUCATION (GE)**

72 units required, 24 of which are specified in Major.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing	4
A2 Oral Communication	4
A3 Reasoning, Argumentation, and Writing	4

**Area B Science and Mathematics (no additional units req'd)**

B1 Mathematics/Statistics * 8 units in Major	0
B2 Life Science * 4 units in Major	0
B3 Physical Science * 4 units in Major	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature	4
C2 Philosophy	4
C3 Fine/Performing Arts	4
C4 Upper-division elective	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404)	4
D2 Political Economy	4
D3 Comparative Social Institutions	4
D4 Self Development (CSU Area E) * 4 units in Major	0
D5 Upper-division elective	4

**Area F Technology Elective (upper division)**

(no additional units req'd) * 4 units in Major	0
	<b>48</b>

<b>FREE ELECTIVES</b>	<b>0</b>
	<b>180</b>

**CONCENTRATIONS (Select one)****Environmental Impact Mitigation Strategies****Concentration**

BIO 427 Wildlife Management	4
CRP/NR 404 Environmental Law <i>or</i> CRP/NR 408 Water Resource Law and Policy	3
NR/RPTA 311 Environmental Interpretation	4
ZOO 329 Vertebrate Field Zoology	4
<sup>4</sup> Approved electives	21
<i>Select 21 units from the following:</i>	
Any upper division BIO, CRP, LA, NR, SS <i>or</i> ZOO course	36

**Environmental Policy and Management Concentration**

CRP 212 Introduction to Urban Planning	4
CRP 420 Land Use Law <i>or</i> POLS 341 American Constitutional Law	4
ECON 431 Environmental Economics <i>or</i> POLS 230 Basic Concepts of Political Thought	4
NR 435 Natural Resources Policy Analysis	4
NR/CRP 404 Env. Law <i>or</i> NR/CRP 408 Water Law (4)	3

<sup>1</sup> Students following Track 1 of Watershed Management and Hydrology Concentration must take NR 320.<sup>2</sup> Students following Track 1 of Watershed Management and Hydrology Concentration must take PHYS 122 as a substitute.<sup>3</sup> Students following Track 1 of Watershed Management and Hydrology Concentration must take MATH 161.<sup>4</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.



<sup>1</sup> Approved electives. ....	17
<i>Select 17 units from the following:</i>	
<i>Pre-Environmental Law:</i> POLS 245, 334, 343, 344, NR 339, 400;	
<i>Other:</i>	
ECON 311, 432;	
NR 339, 400, 420; <a href="#">NR/ES 406 (6/30/13)</a>	
NR/RPTA 311;	
SS 433; UNIV 330;	
Any CRP or POLS course	
	<hr/> 36

### Watershed Management and Hydrology Concentration

NR 420 Advanced Watershed Hydrology .....	4
SS 321 Soil Morphology .....	4
<sup>2</sup> SS 440 Forest and Range Soils <i>or</i> <a href="#">ERSC 323</a> <a href="#">Geomorphology (8/24/10)</a> .....	4
<sup>1</sup> Approved electives ( <i>select one track</i> )..... <i>(Revised 8/20/10)</i>	24
<sup>3</sup> <i>Track 1:</i>	
(a) Select 4 units from: BRAE 435, NR/BIO/SS 421 <sup>†</sup> , or NR/HNRS 475	
(b) <a href="#">GEOL 241 Physical Geology Laboratory (1)</a>	
(c) Select 4 units from: ENVE 434, <a href="#">ERSC 323</a> , NR/BIO/SS 421 <sup>†</sup> , NR/HNRS 475, <a href="#">PHYS 107</a> , or SS 440	
(d) MATH 162 Calculus for Life Sciences II (4)	
(e) Select 11 units from: <a href="#">BRAE 345</a> , <a href="#">NR 315</a> , NR/HNRS 475 (1 unit max), <a href="#">NR 418</a> , STAT 313 <a href="#">CE 336</a> <a href="#">PHYS 122</a> , <a href="#">SS 321</a> ,	
<i>Track 2 – Select 24 units from:</i>	
BRAE 435, ENVE 434, GEOL 241, <a href="#">MATH 162</a> , NR 260, 339, <a href="#">418</a> , NR/BIO/SS 421, <a href="#">NR/CRP 408</a> , NR/HNRS 475 (9 units max), <a href="#">PHYS 107</a> , <a href="#">122</a> , STAT 313	
	<hr/> 36

### Individualized Course of Study

Select from the following: .....	36
NR 339 Internship/Forest and Natural Resources (1-12)	
Any course used in minor(s)	
	<hr/> 36

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>2</sup> If a course is taken to meet a requirement, it cannot be double-counted as an approved elective for the concentration.

<sup>3</sup> This track is designed to prepare students to become eligible for hydrology positions and meets the criteria for employment eligibility in the federal government (GS 1315).

<sup>†</sup> Course cannot be double-counted as an elective.



## 2009-11 Cal Poly Catalog

### Earth and Soil Sciences Department

## ERSC—EARTH SCIENCES

### ERSC 110 Orientation in Earth and Soil Sciences (1) (CR/NC)

Understanding the depth and breadth of earth and soil sciences. Examine potential career opportunities. Introduction to both student and professional organizations. Credit/No Credit grading only. 1 activity. *Crosslisted as ERSC/SS 110.*

### ERSC 144 Introduction to Earth Systems (4)

Survey of fundamental processes of Earth science. Application of systems thinking to understanding the dynamic interactions among geological, geographic, soils and human factors in shaping the Earth. 3 lectures, 1 activity.

### ERSC 202 Soil Erosion and Water Conservation (4)

Development of an erosion and sediment control plan using climate, topography, soils and land use in relation to soil and water quality. Evaluation of soil and water conservation plans and best management practices for agriculture, urban, riparian, and rangelands. 3 lectures, 1 activity. Prerequisite: SS 121 or consent of instructor.

### ERSC 223 Rocks and Minerals (4)

Origin, composition, identification and weathering of rocks, minerals, and clays important in the development of soils. Parent materials as related to the nature and properties of soils. 3 lectures, 1 laboratory. Prerequisite: SS 121, CHEM 111 or CHEM 128.

### ERSC 250 Physical Geography (4)

Addresses the origins and patterns of the earth's diverse assemblage of climates, landforms, biota and soils. A major focus on relationship between human cultures and these earthly environments. 4 lectures. *Crosslisted as ERSC/GEOG 250.*

### ERSC 323 Geomorphology (4)

Recognizing and identifying major landforms and their components by interpretation of aerial photographs and topographic maps, and observations. Emphasis on analyzing common landforms in the western United States for application in soil science, physical geography, hydrology, and geology. 2 lectures, 1 laboratory, 1 activity. Prerequisite: SS 121 and GEOL 201; or consent of instructor.

### ERSC 325 Climate and Humanity (4)

Geographic perspective on the interrelationships between climate and human cultures. Effects of people on climate and the influence of climate and weather upon human activities and behavior. Focus on global human conditions which are responsible for the alteration of climate and in turn are vulnerable to climate change. 4 lectures. Prerequisite: Junior standing or consent of instructor. *Crosslisted as ERSC/GEOG 325.*

### ERSC 333 Human Impact on the Earth (4)

Global assessment of the impact of humans on the earth's vegetation, animals, soil, water and atmosphere. Emphasis on problems stemming from the interactions of human attitudes, technologies, and population with natural resources. 4 lectures. *Crosslisted as ERSC/GEOG 333.*

### ERSC 401 Field-Geology Methods (4)

Collecting and interpreting field-geologic data. Description of sedimentary rocks and construction of stratigraphic columns. Mapping geologic structures in the field. Surficial geologic stratigraphy and surficial geologic mapping. Understanding geologic processes through field study. Communicating results of field study. 1 lecture, 3 activities. Prerequisite: GEOL 102 or GEOL 201, GEOL 241, ERSC 223, ERSC 323. *Crosslisted as ERSC/GEOL 401.*

### ERSC 402 Geologic Mapping (4)

Bedrock geologic mapping on topographic maps and aerial photos. Surficial geologic mapping on topographic maps and aerial photos. Correlating and defining surficial geologic map units on the basis of soil development. Understanding landscape evolution using soil development 4 activities. Prerequisite: ~~GEOL 102 or GEOL 201, GEOL 241, SS 223, SS 323,~~ ERSC/GEOL 401. *Crosslisted as ERSC/GEOL 402. Change effective Winter 2011.*

### ERSC 414 Global and Regional Climatology (4)

The earth's pattern of climates and the physical processes that account for them. Focus on interrelationships between climate and the physical/biological and cultural environments. Special emphasis on modern climate changes and their

consequences. 3 lectures, 1 laboratory. Prerequisite: GEOG 250 or consent of instructor. *Crosslisted as ERSC/GEOG 414.*

### ERSC 415 Applied Meteorology and Climatology (4)

Physical processes in the atmosphere that determine regional weather, climate and climate variability. Surface and satellite systems for weather observation, and weather/climate modeling. Dynamics of weather systems, including thunderstorms and hurricanes. Emphases on weather/climate affecting agriculture and other human activities. 3 lectures, 1 activity. Prerequisite: GEOG/ERSC 250 or consent of instructor. *Crosslisted as ERSC/GEOG 415.*

### ERSC 461 Senior Project I (1)

Senior project topic selection and contract development with project advisor. Statement of problems, subproblems, assumptions, objectives, hypothesis, methods of analysis and statistical design. Development of literature review and budget of time and finances. Proper format and presentation of tabular and graphic information. 1 activity. Prerequisite: MATH 118 or MATH 141 ~~434~~, STAT 211 or STAT 321 or CRSC 411. *Corrected 8/9/10.*

### ERSC 462 Senior Project II (3)

Implementation of materials and methods. Collection, analysis and interpretation of data. Completion of formal written report under advisor supervision. Minimum 90 hours. Prerequisite: ERSC 461.

### ERSC 463 Undergraduate Seminar (2)

Review of current research, experiments, and problems related to the student's major field of interest. Preparation and presentation of reports on problems or research activities. 2 seminars.

### ERSC 544 Earth Sciences for Educators (3)

An interdisciplinary earth sciences course which emphasizes the interactions of multiple systems of air, water, land, life, and human society. Designed for teachers and students seeking teaching credential. Incorporates scientific theory, learning resources, and applications in the field. 3 lectures. Prerequisite: Basic knowledge of earth sciences, graduate standing and consent of instructor. Not open to students in Soil Science specialization under MS Agriculture.

### ERSC 570 Selected Topics in Earth Science (1-4)

Directed group study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1 to 4 seminars. Prerequisite: Graduate standing or consent of instructor.

### ERSC 571 Selected Advanced Laboratory (1-4)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Graduate standing or consent of instructor.

## 2009-11 Cal Poly Catalog

### Ethnic Studies Department

## ES—ETHNIC STUDIES

### ES 112 Race, Culture and Politics in the United States (4) GE D1 USCP

Introductory and interdisciplinary study of the ways that race and ethnicity are created by both historical processes and American institutional formation – specifically social, political, economic, legal and cultural institutions. Special attention paid to the interlocking systems of race, class, gender and sexuality. 4 lectures. *Crosslisted as ES/HNRS 112*. Fulfills GE D1 and USCP.

### ES 114 Race in American Culture (4) USCP

The social practices, cultural representations, and public policies that construct race and racism in the development of American institutions, and their effect upon ethnic groups and women. The cultural discourses that reinforce racist ideology and pseudo-scientific conceptions of race. 4 lectures. Fulfills USCP.

### ES 200 Special Problems for Undergraduates (1–4)

Supervised investigation, including a written report, of a topic chosen with prior approval of instructor. Total credit limited to 4 units. Prerequisite: Consent of department chair.

### ES 212 Global Origins of United States Cultures (4) GE D3 USCP

How the global dispersal of Europeans, Asians, and Africans, the hemispheric dispersal of Latin Americans, and the forced internal migration of Native Americans have contributed to American cultural heritage and the struggles for ethnic, class and gender equality, and justice. 4 lectures. *Crosslisted as ES/HNRS 212*. Fulfills GE D3 and USCP.

### ES 215 Planning for and with Multiple Publics (4) USCP

How the social/spatial relationships among racial/ethnic and gender groups are expressed in terms of human settlement patterns, civic involvement and everyday negotiations. Ways in which segregation and marginalization are expressed in western and non-western contexts. 3 lectures, 1 activity. Prerequisite: Completion of GE Area D1. *Crosslisted as CRP/ES 215*. Fulfills USCP.

### ES 240 Latino Metropolis (4) USCP

Focus on strategic roles emerging Latino majorities play in such major urban centers as Los Angeles, New York, or Chicago, by exploring how Latinos establish and maintain distinctive social and cultural identities in the nation's cities. 4 lectures. Fulfills USCP.

### ES 241 Survey of Indigenous Studies (4) GE D3 USCP

A survey of the interdisciplinary field of indigenous studies and specifically the social, political, economic, legal, and cultural institutions of American Indian, Native Alaskan, and Native Hawaiian peoples within a transnational and global context. Special attention paid to the interlocking systems of race, class, gender, and sexuality, particularly within but not limited to the United States. 4 lectures. Fulfills GE D3 and USCP.

### ES 242 Survey of Africana Studies (4) GE D3 USCP

A survey of the interdisciplinary field of Africana Studies and specifically the social, political, economic, legal, and cultural institutions of African American, Afro-Caribbean, and African diasporic peoples within a transnational and global context. Special attention paid to the interlocking systems of race, class, gender, and sexuality, particularly within but not limited to the United States. 4 lectures. Fulfills GE D3 and USCP.

### ES 243 Survey of Latino/a Studies (4) GE D3 USCP

A survey of the interdisciplinary field of Latino/a Studies and specifically the social, political, economic, legal, and cultural institutions of Chicano/a and other Latino/a peoples within a transnational and global context. Special attention paid to the interlocking systems of race, class, gender, and sexuality, particularly within but not limited to the United States. 4 lectures. Fulfills GE D3 and USCP.

### ES 244 Survey of Asian American Studies (4) GE D3 USCP

A survey of the interdisciplinary field of Asian American Studies and specifically the social, political, economic, legal, and cultural institutions of West Asian, South Asian, Southeast Asian, and East Asian peoples in the United States within a transnational and global context. Special attention paid to the interlocking systems of race, class, gender, and sexuality, particularly within but not limited to the United States. 4 lectures. Fulfills GE D3 and USCP.

### ES 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### ES 300 Chicano/a Non-Fiction Literature (4) GE C4 USCP

Overview of contemporary Chicano/a non-fiction literature since 1848. Thematic concerns, literary criticism, literary techniques, historical and socio-cultural factors influencing non-fiction Chicano/a literary genres. Instructor reserves option to select non-fiction genres to be studied. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C1. Fulfills GE C4 except for Comparative Ethnic Studies majors. Fulfills USCP.

### ES 308 Fire and Society (4) GE D5

Prehistorical and historical record of human use of and attitude toward fire. Mythology and religion of fire. Traditional, cultural and ethnic variations and their influence on modern U.S. institutions involved in managing fire. 3 lectures, 1 activity. Prerequisite: Junior standing; completion of GE Areas A, D1 and D3. *Crosslisted as ES/NR 308*. Fulfills GE D5 except for Comparative Ethnic Studies majors.

### ES 310 Hip-Hop, Poetics and Politics (4) GE D5 USCP

Dynamics of hip-hop culture, its historical development, political significance, and social influence. How hip-hop exemplifies cross-cultural hybridization within not only Black communities nationally and internationally, but also amongst indigenous, Latino/a, and Asian peoples in the U.S. and beyond. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and two courses from D1, D2, D3 or D4. Fulfills GE D5 except for Comparative Ethnic Studies majors. Fulfills USCP.

### ES 320 African American Cultural Images (4) GE D5 USCP

Comparative study of the cultural representations of, and counter-representations by, American racial/ethnic groups in American popular opinion and consciousness, with particular emphasis on African Americans. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and two courses from Areas D1, D2, D3, D4. Recommended: ES 112 (D1) and/or ES 212 (D3). Fulfills GE D5 except for Comparative Ethnic Studies majors. Fulfills USCP.

### ES 321 Native American Cultural Images (4) GE D5 USCP

Comparative study of the cultural representations of, and counter-representations by racial/ethnic groups in American popular opinion and consciousness, with particular emphasis on Native Americans. The cultural images of Native peoples in the United States that have characterized relationships. 4 lectures. Prerequisite: Completion of GE Area A, and two courses from Area D, either D1, D2, D3, or D4. Junior standing, or consent of instructor. Fulfills GE D5 except for Comparative Ethnic Studies majors. Fulfills USCP.

### ES 322 Asian American Cultural Images (4) GE D5 USCP

Comparative study of the cultural representations of, and counter-representations by, American racial/ethnic groups in American popular opinion and consciousness, with particular emphasis on Asian-Americans. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and two courses from Areas D1, D2, D3, D4. Recommended: ES 112(D1) and/or ES 212 (D3). Fulfills GE D5 except for Comparative Ethnic Studies majors. Fulfills USCP.

### ES 323 Mexican American Cultural Images (4) GE D5 USCP

Comparative study of the cultural representations (racializing images and discourses) of, and counter-representations by, American cultural/ethnic groups in American popular opinion and consciousness, with particular emphasis on Mexican Americans/Latinos. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and two courses from Areas D1, D2, D3, D4 (Recommended: ES 112 or ES 212). Fulfills GE D5 except for Comparative Ethnic Studies majors. Fulfills USCP.

### ES 325 Sex and Gender in African American Communities (4) USCP

Gender and sexuality issues that influence the social, political, economic and cultural development of African-America. Special attention given to how racism affects the realization of standard gender conventions within black communities, as well as to myths of black sexuality, black feminism, and queer politics. 4 lectures. Prerequisite: ES 112 or ES 212. Fulfills USCP.

### ES 326 Native American Architecture and Place (4) GE C4 USCP

The role of culture and setting in the construction of spatial, material and landscape concepts and artifacts, through the introduction of selected North American cultures, with focus from 1300 AD through contemporary time. 4 lectures. Prerequisite: Junior standing; GE Areas A, C1 and C2. *Crosslisted as*

*ARCH/ES 326.* Fulfills GE C4 except for Comparative Ethnic Studies majors. Fulfills USCP.

**ES 330 The Chinese American Experience (4) GE D5 USCP**

History and current status of Chinese Americans, with emphasis on the international contexts, organizations and institutions of Chinese America, and on Chinese Americans' demographic compositions, spatial patterns, and cultural, socioeconomic, and political adaptation experiences. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and two courses from Areas D1, D2, D3, D4 (Recommended: ES 112 or ES 212). Fulfills GE D5 except for Comparative Ethnic Studies majors. Fulfills USCP.

**ES 335 The Filipina/o American Experience (4) GE D5 USCP**

An interdisciplinary examination of the historical development of Filipina/o American identities and communities. The social, cultural and political institutions that have influenced Filipina/o immigration, participatory citizenship, activism and cultural practices. 4 lectures. Prerequisite: Junior standing; completion of Area A and two lower division D courses; ES 112 (D1) and ES 212 (D3) preferred. Fulfills GE D5 except for Comparative Ethnic Studies majors. Fulfills USCP.

**ES 340 Cultural Production and Ethnicity (4) GE C4**

Culture and ethnicity as key factors in the production, perception, and interpretation of art and the humanities. Critical analysis of cultural attitudes and knowledge in expressive arts and cultural production, and of the contexts of cultural production as reflective of ethnicity. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 lectures. Prerequisite: Junior standing; completion of GE Area A, one lower division course Area C. Recommended completion of one Ethnic Studies course. Fulfills GE C4 except for Comparative Ethnic Studies majors.

**ES 350 Gender, Race, Science and Technology (4) GE Area F USCP**

*Interdisciplinary examination of the complex relationships between gender, race, science, and technology in educational, work, knowledge production, policy, and ethical contexts. Topics may include reproductive, medical, genetic, and emerging technologies and exploration of efforts to create more socially responsible science/technology. Applications and histories of reproductive technologies and the ways in which these technologies are linked to the science of the body. How these technologies help to construct and deconstruct race and gender in the United States.* 3 lectures, 1 activity. Prerequisite: Junior standing and Completion of GE Area B2 or B3, or consent of instructor. Recommended: Junior standing. *Crosslisted as ES/WGS 350.* Fulfills GE Area F and USCP. *Change effective Winter 2011.*

**ES 360 Ethnicity and the Land (4) GE C4 USCP**

Comparative study of how race and culture shape landscapes, and how social hierarchies allocate the use of natural resources and the burdens of environmental pollution. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and one course from Area C1, C2, or C3. Recommended: one lower division Ethnic Studies course and an introductory natural resources course. *Crosslisted as ES/NR 360.* Fulfills GE C4 except for Comparative Ethnic Studies majors. Fulfills USCP.

**ES 380 Critical Race Theory (4) GE D5 USCP**

History and evolution of the critical race theory movement. Defining issues of the field; in particular, the relationship between race, power and the law. 4 lectures. Prerequisite: Junior standing; completion of GE Area A, ES 112, ES 114 or consent of instructor. Fulfills GE D5 except for Comparative Ethnic Studies majors. Fulfills USCP.

**ES 381 The Social Construction of Whiteness (4) GE D5 USCP**

The investigation of the social construction of race in the United States through historicizing the category of "whiteness." Why "white" was invented as a racial category and how white privilege has been sustained through social, political, economic and legal practices. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and two courses from D1, D2, D3 or D4. Fulfills GE D5 except for Comparative Ethnic Studies majors. Fulfills USCP.

**ES 390 Research Methodology in Comparative Ethnic Studies (4)**

Theory and practice of research methodology in comparative ethnic studies. Topics include the scientific method, qualitative and quantitative methodologies, and ethical practices. Research report prepared from start to finish, including database searching, collecting pilot data, and proper formatting of a research report. Issues of race in research practice and use foregrounded throughout. 3 lectures, 1 activity. Prerequisite: Completion of Area A, STAT 217, ES 112 and three courses from ES 241, ES 242, ES 243, ES 244. Junior standing.

**ES 400 Special Problems for Advanced Undergraduates (1-4)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Junior standing and consent of department chair.

**ES 410 Advanced Topics in Comparative Ethnic Studies (4)**

Selected topics and issues in comparative ethnic studies. The Schedule of Classes will list topic selected. Repeatable for a maximum of 8 units. 4 seminars. Prerequisite: ES 390 or consent of instructor.

**ES 450 Fieldwork in Comparative Ethnic Studies (4)**

Supervised project based on fieldwork in comparative ethnic studies. 4 seminars. Prerequisite: ES 390 or consent of instructor.

**ES 461 Senior Project (4)**

Completion of a project under faculty supervision. Results presented in a formal paper or project. Prerequisite: ES 390 and departmental approval.

**ES 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: At least one course in Ethnic Studies and consent of instructor.

## 2009-11 Cal Poly Catalog

### Women's and Gender Studies Department

## WGS–WOMEN'S and GENDER STUDIES

### WGS 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### WGS 301 Introduction to Women's and Gender Studies (4) GE D5 USCP

Introduction to theories and research on gender and sexuality, gender stratification, and gender role development. Broad interdisciplinary examination of issues involving gender and sexuality, as well as race and ethnicity, with special emphasis on how these issues affect both women's and men's lives. Issues such as reproductive rights, gender and body image, the origins of patriarchy, gender and class. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and completion of two lower division Area D courses or consent of instructor. Fulfills GE D5 and USCP.

### WGS 311 Sociology of Gender (4)

Description and analysis of the impact of gender definitions on men and women in society. Special attention is given to the learning process; the creation and perpetuation of gender stereotypes and the way these affect individual life chances and social structure, explored in the areas of work, education, family and abusive relationships. Focus on media presentation of gender and effects of ethnicity and class. 4 lectures. Prerequisite: Junior standing. *Crosslisted as SOC/WGS 311.*

### WGS 314 Psychology of Women (4)

The lives of women from a psychological perspective. Topics include gender similarities and differences; masculinity, femininity, and androgyny; women's mental and physical health; female sexuality; women's roles in the workplace and the home; and harassment and violence against women. 4 lectures. Prerequisite: PSY 201 or PSY 202. *Crosslisted as PSY/WGS 314.*

### WGS 316 Women as Subject and Object in Art History (4)

Exploration of the role of women in the visual arts. Women as artists, women as portrayed in art, and feminist theory as it applies to the study of the visual arts and art history. 4 lectures. Prerequisite: ART 111, ART 112 or consent of instructor. *Crosslisted as ART/WGS 316.*

### WGS 320 Women in Global Perspective (4)

GE D5

Similarities and differences in women's lives internationally. Cultural influences such as class, ethnicity, and religion on women's status. Study of global feminism, reproductive rights, women's labor, women in development, women's politics. 4 lectures. Prerequisite: Junior standing; completion of GE Area A, and one course from D2 and one from D3 or consent of instructor. *Formerly WS 311.* Fulfills GE D5.

### WGS 340 Sexuality Studies (4)

GE D5

Sexuality in a cultural and historical context. Changing definitions of human subjectivity. The cultural and social regimes that control and create sexuality (including the "invention" of homo/heterosexuality and the social, legal and political systems that define sexual ab/normality). Contemporary issues of sexual orientation and topics of sexuality in relation to gender and race. 4 seminars. Prerequisite: Junior standing; completion of GE Area A and completion of two lower-division Area D courses. Completion of WGS 301 preferred. Fulfills GE D5.

### WGS 350 Gender, Race, Science and Technology (4) GE Area F USCP

Interdisciplinary examination of the complex relationships between gender, race, science, and technology in educational, work, knowledge production, policy, and ethical contexts. Topics may include reproductive, medical, genetic, and emerging technologies and exploration of efforts to create more socially responsible science/technology. Applications and histories of reproductive technologies and the ways in which these technologies are linked to the science of the body. How these technologies help to construct and deconstruct race and gender in the United States. 3 lectures, 1 activity. Prerequisite: Junior standing and Completion of GE Area B2 or B3, or consent of instructor. Recommended: Junior standing. *Crosslisted as ES/WGS 350.* Fulfills GE Area F and USCP. *Change effective Winter 2011.*

### WGS 370 Religion, Gender and Society (4)

GE C4 USCP

Critical examination of religious ideas and institutions in America in relation to gender, race and politics. Focus on women and religion, the religious experience of minorities, and on politics. 4 lectures. Prerequisite: Junior standing; completion of GE Area A, and PHIL 230 or PHIL 231; one Religious Studies course or consent of instructor. *Crosslisted as RELS/WGS 370.* Fulfills GE C4 and USCP.

### WGS 400 Special Problems for Advanced Undergraduates (1–4)

Individual investigation, research studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 4 units per quarter. Prerequisite: WGS 301 or consent of Women's and Gender Studies Chair.

### WGS 401 Seminar in Women's and Gender Studies (4)

Intensive study of a selected topic in Women's Studies (such as women and work, women and the law, women in the arts). The Schedule of Classes will list topic selected. Field experience may be required as appropriate. May be repeated for up to 8 units. 3 seminars and a research project. Prerequisite: WGS 301 or consent of instructor and upper division standing.

### WGS 434 American Women's History to 1870 (4)

Female ideology and experience from the colonial period through the American Civil War. Use of a variety of sources, including women's own writing, in order to understand the history of women as it both reflects and shapes American culture and society. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor. *Crosslisted as HIST/WGS 434.*

### WGS 435 American Women's History from 1870 (4)

USCP

The female past in the modern period of U.S. history. Considers how transformations in gender roles are reflective of other significant changes in American culture and society. Emphasis on class, race, and ethnic variations in women's experience. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor. *Crosslisted as HIST/WGS 435.* Fulfills USCP.

### WGS 450 Feminist Theory (4)

USCP

History and evolution of ideas about gender, race/ethnicity and sexual identity. Special attention as to how social, historical, and ideological forces, organized by the central, intertwined concepts of gender and race, shape both our critical thinking and our lives. 3 lectures, 1 activity. Prerequisite: WGS 301 or consent of instructor. Fulfills USCP.

### WGS 470 Selected Advanced Topics (1–4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.



## 2009-11 Cal Poly Catalog

### College of Engineering

#### **New Program Effective Fall 2010**

## **MS FIRE PROTECTION ENGINEERING**

### **General Characteristics**

The profession of Fire Protection Engineering is directed toward the identification, analysis and mitigation of fire hazards and risks across a broad spectrum of applications, including buildings, consumer products, industrial processes, transportation vehicles, infrastructure facilities and the wildland-urban interface.

A pilot program, the Master of Science in Fire Protection Engineering prepares individuals to assess and reduce the potential for property and human loss from fire in these and other settings. Students learn to analyze how buildings are used, how fires start, how fires grow, and how fire and smoke affect people, buildings and property. Fire protection engineers use the latest engineering and construction technologies to:

- Design systems that control fires, alert people to danger and provide means for escape;
- Evaluate buildings to identify fire risks of and the means to prevent or mitigate them;
- Conduct fire safety research on consumer products and construction materials; and
- Investigate fires to discover how fires start, how they spread, why protective measures fail, and how those measures could be designed more effectively.

To meet these program goals, the fire protection engineering curriculum requires that students successfully complete a total of 45 units including a fire protection engineering project as the culminating experience (FPE 596). The culminating experience will be innovative and require independent thinking. Typically, the students will perform a detailed fire and life safety evaluation of a selected building, the preparation of a comprehensive report documenting the results of this evaluation and the presentation of their analysis and findings in an oral defense to a review committee. Other innovative culminating experiences of similar scope and complexity may be submitted for approval.

### **Program Goals**

The Fire Protection Engineering program is designed to build on the skills, knowledge, and broad engineering principles students acquire in an undergraduate engineering program. The required and elective courses composing the Master of Science degree in Fire Protection Engineering

address the specific body of knowledge required by the fire protection engineering profession. Students completing the program will possess the technical knowledge, skills and tools required to practice fire protection engineering in a variety of local, national and international settings. Upon completion of this program, students should possess the necessary knowledge and skills to pursue professional certification and licensure in the fire protection engineering discipline. Furthermore, the program addresses unique fire challenges faced by California and other western states, including wildland-urban interface fires and post-earthquake fires. Upon completing the requirements for a Master of Science degree in Fire Protection Engineering, students should be able to:

- a) Identify relevant fire safety codes, standards and regulations, comprehend the fire safety performance objectives and criteria associated with these documents, and apply these fire safety objectives and criteria to a broad range of applications.
- b) Analyze the flammability characteristics of different materials, interpret the results of standard and non-standard fire test methods and evaluate the fire hazards associated with different materials in a range of anticipated settings.
- c) Analyze the dynamics of fires in and around buildings and other structures through the application of fundamental principles and the use of state-of-the-art computer-based fire simulation models.
- d) Understand how people interact with fire conditions in buildings and calculate evacuation times through the application of fundamental principles of people movement and the use of state-of-the-art computer-based evacuation models.
- e) Design fire detection and alarm systems, fire suppression systems, smoke management systems, egress systems and structural fire protection to achieve specified performance objectives.
- f) Perform comprehensive fire and life safety evaluations of buildings and other structures through application of the knowledge, skills and tools acquired in this program and effectively communicate the results and findings of such evaluations.

### **Prerequisites**

For admission as a classified graduate student, an applicant should hold a bachelor's degree in engineering or a closely related field from a regionally accredited institution, college, or university. An undergraduate grade point average of 3.0 is required. On occasion, where other credentials are exceptionally strong, a GPA in the 2.5-3.0 range may be accepted.

### **Tuition and Fees**

As a special session program through Continuing Education and University Outreach, the MS Fire Protection

Engineering program is administratively and academically completely self-supporting. As such, the program carries a separate tuition and fee schedule. Please refer to [www.fpe.calpoly.edu/cost.html](http://www.fpe.calpoly.edu/cost.html) for the current cost of the program.

## MS FIRE PROTECTION ENGINEERING

	<i>Units</i>
<b>Core Courses</b> .....	37
FPE 501 Fundamental Thermal Sciences (4)	
FPE 502 Fire Dynamics (4)	
FPE 503 Flammability Assessment Methods (4)	
FPE 504 Fire Modeling (4)	
FPE 521 Egress Analysis and Design (4)	
FPE 522 Fire Detection, Alarm and Communication Systems (4)	
FPE 523 Water-based Fire Suppression (4)	
FPE 524 Structural Fire Protection (4)	
<sup>1</sup> FPE 596 Culminating Experience in Fire Protection Engineering (5)	
<b>Technical electives</b> .....	8
<i>Select 8 units from the following:</i>	
FPE 551 Fire Safety Regulation and Management (4)	
FPE 552 Smoke Management and Special Hazards (4)	
FPE 554 Forensic Fire Analysis (4) (12/26/12)	
FPE 555 Fire Protection Management in the Wildland-Urban Interface (WUI) (4) (11/1/12)	
ME 541 Advanced Thermodynamics (4)	
ME 554 Computational Heat Transfer (4)	
NR 455 Wildland-Urban Interface Fire Protection (3)	

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<sup>1</sup> FPE 599 (9 units) may substitute for FPE 596 and 4 units of technical electives. (12/26/12)



**2009-11 Cal Poly Catalog****Food Science and Nutrition Department****BS FOOD SCIENCE**

□ 60 units upper division

□ GWR

□ 2.0 GPA

□ USCP

\* = Required in Major/Support; also satisfies GE

Note: No major, support or concentration courses may be taken as credit/no credit.

**MAJOR COURSES**

FSN 101 Orientation/Food Science & Nutrition .....	1
FSN 125 Introduction to Food Science .....	4
FSN 204 Food Processing Operations.....	4
FSN 210 Nutrition .....	4
FSN 250 Food/Nutrition: Customs/Culture (D4)* (USCP)	4
FSN 270 Food and Wine Plant Sanitation <i>or</i> FSN 370 Food Plant Sanitation & Prereq Progs .....	4
FSN 275 Principles of Food Safety & Hazard Anly <i>or</i> FSN 375 Food Safety .....	4
FSN 311 Sensory Evaluation of Food .....	4
FSN 330 Intro to Principles of Food Engineering ....	4
FSN 334 Food Packaging.....	3
FSN 335 Food Quality Assurance .....	4
FSN 364 Food Chemistry.....	4
FSN 368 Food Analysis.....	4
FSN 374 Food Laws and Regulations .....	4
FSN 408 Food Comp Science and Product Dev.....	4
FSN 461 Senior Project I .....	3
FSN 462 Senior Project II .....	3
Concentration courses (see below) .....	32
<b>8/17/13</b>	<b>94</b>

**SUPPORT COURSES**

AGB 214 Agribusiness Financial Accounting <i>or</i> BUS 212 Fin Acctg for Nonbusiness Majors.....	4
BIO 111 General Biology (B2 & B4)*.....	4
CHEM 127 General Chemistry I .....	4
CHEM 312 Survey of Organic Chemistry <i>or</i> CHEM 316 Organic Chemistry I .....	5
CHEM 313 Survey of Biochemistry and Biotech....	5
ECON 201 Survey of Economics (D2)*.....	4
MATH 118 Pre-Calculus Algebra (B1)*.....	4
MCRO 221 Microbiology .....	4
MCRO 421 Food Microbiology .....	4
PHYS 121 College Physics I.....	4
STAT 218 Applied Statistics/Life Sciences (B1)* .....	4
	<b>46</b>

**GENERAL EDUCATION (GE)**

72 units required, 24 of which are specified in Major/Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing.....	4

**Area B Science and Mathematics (no add'l units req'd)**

B1 Mathematics/Statistics * 8 units in Support ....	0
B2 Life Science * 4 units in Support .....	0
B3 Physical Science * 4 units in Concentrations	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective.....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (12 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy *4 units in Support .....	0
D3 Comparative Social Institutions .....	4
D4 Self Dev (CSU Area E) * 4 units in Major.....	0
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division) (4 units)**

	<b>48</b>
<b>FREE ELECTIVES</b> .....	<b>0</b>
	<b>188</b>

**CONCENTRATIONS (select one)****Advanced Food Science Concentration**

CHEM 128 General Chemistry .....	4
ENVE 330 Environmental Quality Control.....	4
FSN 444 Engrg Concepts in Food Processing .....	4
FSN 474 Advanced Food Processing .....	4
MATH 161 Calculus for Life Sciences I.....	4
MATH 162 Calculus for Life Sciences II .....	4
Advisor approved electives. Select from: .....	8
AGB 212, 301, 401;	
ASCI 211, 231, 384, 415;	
BUS 207, 384;	
CHEM 129, 217, 218, 317, 318, 319;	
CRSC 132;	
DSCI 223, 230, 231, 232, 401, 434, 435, 444;	
FRSC 210, 230, 311;	
FSN 121, 201, 244, 285, 304, 321, 341, 342, 343, 401, 410;	
HCS 421;	
IT 330, 341;	
MCRO 320, 342; POLS 333;	
PSY 201/202; WVIT 202	
one quarter of foreign language	
6/30/11; 10/10/11; 9/5/12	32

**Applied Food Technology Concentration**

FSN 410 Nutrit. Implications/Food Ind. Practices ...	4
FSN 444 Engrg Concepts in Food Processing .....	4
FSN 474 Advanced Food Processing .....	4
Advisor approved electives. Select from:.....	20
AGB 212, 301, 401;	
ASCI 211, 231, 384, 415;	
BUS 207, 384;	
CHEM 128, 129, 217, 218, 317, 318, 319;	
CRSC 132;	
DSCI 223, 230, 231, 232, 401, 434, 435, 444;	
FRSC 210, 230, 311;	
FSN 121, 201, 244, 285, 304, 321, 341, 342, 343, 344, 401;	
HCS 421;	
IT 330, 341	
MCRO 320, 342;	
POLS 333;	
PSY 201/202	

WVIT 202

one quarter of foreign language

6/30/11; 9/5/12

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32**Culinology® Culinary Concentration***name change effective Summer 2009*

AGB 301 Food/Fiber Marketing .....	4
FSN 121 Fundamentals of Food .....	4
FSN 304 Adv. Culinary Principles and Practice.....	4
FSN 321 Culinary Mgt: Principles and Practice.....	4
FSN 343 Institutional Foodservice I.....	3
FSN 344 Institutional Foodservice II .....	3
Advisor approved electives. Select from: .....	10

AGB 212, 401;

ASCI 211, 231, 384, 415;

BUS 207, 384;

CHEM 128, 129;

CRSC 132;

DSCI 223, 230, 231, 232, 401, 434, 435, 444;

FRSC 210, 230, 311;

FSN 201, 244, 285, 322, 341, 342, 401, 410,  
426, 444, 474;

HCS 421;

IT 330, 341;

MCRO 320, 342;

POLS 333;

PSY 201/202

WVIT 202

one quarter of foreign language

6/30/11

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## 2009-11 Cal Poly Catalog

### Food Science and Nutrition Department

#### FOOD SCIENCE MINOR

The minor is principally designed for students majoring in related academic disciplines who desire employment in the food industry. Students acquire the fundamental technical skills necessary to understand basic issues and concepts in food science such as food processing, food safety, and quality assurance.

#### Required core

FSN 125 Introduction to Food Science	
or FSN 230 Elements of Food Processing .....	4
FSN 204 Food Processing Operations .....	4
FSN 335 Food Quality Assurance .....	4

#### Emphasis area courses: ..... 16

*Select from the following courses (3 of which must be 300-400 level):*

ASCI 211, 384, 415;  
 FSN 244, 270 or 370, 275, 285, 311, 330, 341,  
 354, 364, 368, 374, 375, 408, 410, 444, 474;  
 DSCI 231; MCRO 421 (4/29/13)(8/17/13)

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**2009-11 Cal Poly Catalog****Natural Resources Management Department****BS FORESTRY AND NATURAL RESOURCES**

☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                      ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major, support or concentration courses  
may be taken as credit/no credit.

**MAJOR COURSES**

NR 140 Careers in Forestry and Environ. Mgmt.	1
NR 141 Introduction to Forest Ecosystem Mgmt.	3
NR 208 Dendrology .....	4
NR 215 Land and Resource Measurements .....	2
NR 260 Forest Practices and Environ. Protection	4
NR 306 Natural Resource Ecology & Habitat Mgt	4
NR 307 Fire Ecology .....	3
NR 315 Measurements & Sampling in Forested Env.	4
NR/LA 318 Applications in GIS .....	3
NR 320 Watershed Management .....	4
NR 326 Natural Resources Econ. & Valuation .....	4
NR 335 Conflict Mgmt. in Natural Resources .....	4
NR 365 Silviculture and Vegetation Management	4
NR 402 Forest Health .....	4
NR 412 Forest and Natural Resources Senior Assessment Project or NR 461 Sr. Project I .....	3
<sup>1</sup> NR 414 Sustainable Forest Management .....	4
NR 416 Environmental Impact Analysis & Mgmt.	4
NR 435 Natural Resources Policy Analysis .....	4
NR 465 Ecosystem Management .....	4
Concentration courses .....	32
	<b>99</b>

**SUPPORT**

AGB 212 Agricultural Economics .....	4
<sup>2</sup> ASCI 329 Principles of Range Mgmt. or BIO 427 Wildlife Management .....	3-4
BOT 121 General Botany (B2&B4)* .....	4
BRAE/NR 247 Forest Surveying .....	2
BRAE 345 Aerial Photogram. & Remote Sensing	3
CHEM 111 Survey of Chemistry (B3)* .....	5
<sup>3</sup> MATH 161 Calculus for the Life Sciences I or MATH 221 Calculus for Bus & Econ (B1)* .....	4
SS 121 Introductory Soil Science .....	4
STAT 217 or STAT 218 Statistics (B1)* .....	4
<sup>4</sup> Approved science course BOT 313, CHEM 312, or PHYS 121 .....	4-5
	<b>37</b>

**GENERAL EDUCATION (GE)**

72 units required, 16 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (no additional units req'd)**

B1 Mathematics/Statistics * 8 units in Support .....	0
B2 Life Science * 4 units in Support .....	0
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective (no NR course, except ES/NR 360) (3/2/15) .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective (no NR course, except ES/NR 308) (3/2/15) .....	4

**Area F Technology Elective (upper division) (4 units)**

	<b>56</b>
<b>FREE ELECTIVES</b> .....	<b>0</b>
	<b>192</b>

**CONCENTRATIONS (Select one)****Environmental Planning and Assessment****Concentration**

CRP 212 Introduction to Urban Planning .....	4
ENVE 330 Environmental Quality Control .....	4
NR 339 Internship .....	6
NR/CRP 404 Environmental Law or NR/CRP 408 Water Resource Law and Policy .....	3
NR 425 Applied Resource Analysis .....	4
<sup>5</sup> Approved electives .....	11
Select 11 units from the following:	
CRP 334, 420;	
ENVE 434;	
GEOG 301, 414, 415;	
NR/ES 406 (6/30/13)	
NR/RPTA 311; NR 400, 418, 420;	
SS 321, 440, 433	
	<b>32</b>

<sup>1</sup> Students following Track 1 of Watershed Management and Hydrology  
Concentration must take CHEM 312 as a substitute.

<sup>2</sup> Students following Track 1 of Watershed Management and Hydrology  
Concentration must take PHYS 122 as a substitute.

<sup>3</sup> Students following Track 1 of Watershed Management and Hydrology  
Concentration must take MATH 161.

<sup>4</sup> Students following Track 1 of Watershed Management and Hydrology  
Concentration must take PHYS 121.

<sup>5</sup> Consultation with advisor is recommended prior to selecting approved  
electives; bear in mind your selections may impact pursuit of post-  
baccalaureate studies and/or goals.

**Forest and Environmental Practices Concentration**

NR 339 Internship .....	6
NR 475 Sustainable Forest and Env. Practices.....	15
<sup>1</sup> Approved electives. ....	11
<i>Select 11 units from the following:</i>	
AG 360; AGB 315;	
BIO 435; BOT 238, 324;	
BRAE 133, 151, 340;	
CRP 212, 336, 420;	
EHS 382, 421, 422;	
JOUR 203, 205;	
MCRO 436;	
NR 204, NR/ES 308, NR 312, 340, 350,	
NR/ES 360, NR 400, NR/CRP 404, 408,	
NR 418, 420, NR/BIO/SS 421, NR 434, 450,	
455;	
SS 221, 321, 433, 440;	
PPSC 321, 327;	
any upper division BIO, BOT, ZOO, MCRO,	
CHEM, COMS, or JOUR course;	
any DMHS course	
	<hr/> 32

**Natural Resources Recreation Concentration**

NR/RPTA 311 Environmental Interpretation .....	4
NR 339 Internship .....	6
NR 350 Urban Forestry .....	3
RPTA 101 Intro Recreation Parks and Tourism.....	4
<sup>1</sup> Approved electives. ....	15
<i>Select 15 units from the following:</i>	
LA 363;	
NR/RPTA 203, NR 204; NR/CRP 404;	
any RPTA course	
	<hr/> 32

**Urban Forestry Concentration**

CRP 212 Introduction to Urban Planning.....	4
EHS 421 Arboriculture.....	4
EHS 422 Adv. Arboriculture or NR 311	
Environmental Interpretation .....	2/4
NR 339 Internship .....	6
NR 350 Urban Forestry .....	3
NR 450 Community Forestry .....	3
<sup>1</sup> Approved electives.....	8-10
<i>Select 8-10 units from the following:</i>	
EHS 230, 337, 381, 422;	
HCS 327;	
NR 204, 340, 400, 418, 455; NR/ES 406;	
NR/CRP 404;(6/30/13)	
SS 433	
	<hr/> 32

**Watershed Management and Hydrology Concentration**

NR 420 Advanced Watershed Hydrology .....	4
SS 321 Soil Morphology .....	4

<sup>2</sup> SS 440 Forest and Range Soils or ERSC 323	
Geomorphology (8/24/10) .....	4
<sup>1,2</sup> Approved electives. ( <i>select one track</i> ) .....	20
<i>(Revised 8/20/10)</i>	
<sup>3</sup> Track 1:	
(a) Select 4 units from: BRAE 435, NR/BIO/SS 421, or NR/HNRS 475	
(b) Select 8 units from: ENVE 434, ERSC 323, GEOL 201 and GEOL 241, NR/HNRS 475 (4 units max), PHYS 107; or SS 440	
(c) MATH 162 Calculus for Life Sciences II (4)	
(d) Select 4 units from: STAT 313 (4) or NR/HNRS 475 (max 1 unit) and NR 418 (3)	
CE 336; PHYS 122; SS 321	
Track 2 – Select 20 units from:	
BRAE 435, CHEM 312, ENVE 434, GEOL 201, 241, NR 339, NR/BIO/SS 421, NR/HNRS 475 (9 units max), PHYS 107, 121, STAT 313	
	<hr/> 32

**Wildland Fire and Fuels Management Concentration**

NR 204 Wildland Fire Control.....	3
NR 339 Internship .....	6
NR 340 Wildland Fire Management .....	3
NR 455 Wildland-Urban Interface Fire Protection	3
<sup>1</sup> Approved electives.....	17
<i>Select 17 units from the following:</i>	
BOT 326, 433;	
CRP 212, 336, 342, 458; CRP/NR 404, 408;	
EHS 230, 381, 421, 422;	
ERSC 415; JOUR 203, 205;	
KINE 280; LA 221;	
NR 203, NR/ES 308, 406, NR 312, 350, 418, 420, 425, 450, NR/HNRS 475; (6/30/13)	
PHYS 107; SS 321, 440;	
UNIV 339;	
any upper division COMS or JOUR course;	
any DMHS course;	
any CSU-transferable course recognized by Cal Regional Fire Academy;	
any CSU-transferable fire technology course;	
any CSU-transferable emergency medical technician course	
	<hr/> 32

**Individualized Course of Study**

NR 339 Internship in Forest and Natural Resources	6
4 units of NR coursework.....	4
Select any course used in minor(s) .....	22
	<hr/> 32

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>2</sup> If a course is taken to meet a requirement, it cannot be double-counted as an approved elective for the concentration.

<sup>3</sup> This track is designed to prepare students to become eligible for hydrology positions and meets the criteria for employment eligibility in the federal government (GS 1315).

## 2009-11 Cal Poly Catalog

### College of Engineering

### **New Courses, effective Fall 2010**

## **FPE–FIRE PROTECTION ENGINEERING**

### **FPE 501 Fundamental Thermal Sciences (4)**

Introduction to the thermal sciences, including thermodynamics, fluid dynamics and heat transfer, as they relate to fire protection engineering. Includes 1st and 2nd laws of thermodynamics, conservation relations, hydrostatics, internal and external flows, and heat transfer by conduction, convection and radiation. 4 lectures. Prerequisite: Graduate standing or consent of instructor.

### **FPE 502 Fire Dynamics (4)**

First exposure to fire dynamics phenomena. Includes fundamental fire and combustion topics such as thermodynamics of combustion, fire chemistry, premixed and diffusion flames, ignition, burning of liquids and solids, heat release rates, flame spread and fire plumes. 4 lectures. Prerequisite: FPE 501 or consent of instructor.

### **FPE 503 Flammability Assessment Methods (4)**

Characterization of flammability properties of gaseous, liquid and solid materials. Fire test methods for evaluating flammability properties of materials and burning characteristics of products. Overview of regulatory requirements for restricting the flammability of products and materials used in buildings. 4 lectures. Prerequisite: FPE 502.

### **FPE 504 Fire Modeling (4)**

Fire modeling techniques for fire safety assessment. Application of various engineering correlations and computer-based fire models, including zone models and computational fluid dynamics models, to representative fire problems. 4 lectures. Prerequisite: FPE 502, FPE 503.

### **FPE 521 Egress Analysis and Design (4)**

Regulatory requirements for egress systems in buildings, including occupancy classifications, occupant loads, means of egress components and exit capacities. Introduction to human behavior in fire and to methods for calculating people movement under emergency conditions, including computer-based evacuation models. 4 lectures. Prerequisite: Graduate standing or consent of instructor.

### **FPE 522 Fire Detection, Alarm and Communication Systems (4)**

Analysis of the operating characteristics of fire detection devices and alarm notification appliances. Introduction to modern fire alarm systems and components. Introduction to mass communication systems. Current installation and approval standards. 4 lectures. Prerequisite: Graduate standing or consent of instructor.

### **FPE 523 Water-based Fire Suppression (4)**

Analysis and design of water-based fire suppression systems, including water supply analysis and hydraulic calculations. Overview and design considerations for automatic sprinkler, water spray, water mist and foam suppression systems. Typical contemporary installations and current installation and approval standards. 4 lectures. Prerequisite: FPE 501 or consent of instructor.

### **FPE 524 Structural Fire Protection (4)**

Regulation and analysis procedures for structural components of wood, steel, concrete, composites. Structural capabilities, modifications under fire induced exposures. Calculation methods for predicting fire resistance of structural components. Definition of types of building construction. 4 lectures. Prerequisite: Graduate standing or consent of instructor.

### **FPE 551 Fire Safety Regulation and Management (4)**

Use of model building and fire codes, administrative regulation, retrospective codes, performance-based codes, and risk-based regulation to manage fire safety. Identification and application of different fire risk management tools and techniques. 4 lectures. Prerequisite: Graduate standing or consent of instructor.

### **FPE 552 Smoke Management and Special Hazards (4)**

Analysis and design of smoke management systems. Assessment of smoke hazards. Identification of special hazards. Analysis and design of fire suppression systems used for fire control of special hazards, including gaseous and chemical agents and systems. 4 lectures. Prerequisite: FPE 502 and FPE 504.

### **FPE 596 Culminating Experience in Fire Protection Engineering (2-5)**

Performance of comprehensive fire and life safety evaluations of buildings and other structures. Communication of the results and findings of such evaluations in written report and by oral presentation. Conducted under supervision of faculty. Total credit limited to 5 units. Prerequisite: FPE 504, advanced graduate standing, completion of, or concurrent enrollment in, engineering courses in program, and consent of instructor.



**2009-11 Cal Poly Catalog****Modern Languages & Literatures Department****FRENCH MINOR**

<b>Required courses</b>	<i>Units</i>
FR 122 Intermediate French <i>or</i> FR 202 (9/27/13)....	4
FR 233 Critical Reading in French Literature (C1)	4
<sup>1</sup> FR 301 Adv. French Composition and Grammar <i>or</i>	
<sup>1</sup> FR 302 Adv. French Conversation/Grammar.....	4
<b>Electives to be chosen from the following:.....</b>	<b>12</b>
FR 301 Adv. French Composition/Grammar (4)	
FR 302 Adv. French Conversation/Grammar (4)	
FR 305 Significant Writers in French (4) (C4)	
(repeatable to 8 units)	
FR/FSN 322 French Food in French (4)	
FR 350 French Lit. in English Translation (4) (C4)	
FR 470 Selected Advanced Topics (4)	
(repeatable to 8 units)	
HUM 310 Humanities in World Cultures	
(French) (4) (C4)	
MLL 400 Special Problems for Advanced	
Undergraduates (1-2) <i>Effective Summer 2009</i>	
	<hr/> 24

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<sup>1</sup> Not repeatable as elective units.

**2009-11 Cal Poly Catalog****Horticulture and Crop Science Department****BS FRUIT SCIENCE**

☐ 60 units upper division ☐ GWR

☐ 2.0 GPA ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

HCS 110 Orientation to Horticulture/Crop Science	2
HCS 120 Principles of Horticulture/Crop Science	4
FRSC 132, 133 Pomology I, II	4,4
FRSC 202/402 Enterprise Project Management	4,2
FRSC 231 Viticulture I	4
PPSC 311 Agricultural Entomology	4
PPSC 321 Weed Biology and Management	4
PPSC 327 Vertebrate Pest Management	4
FRSC 331 Viticulture II	4
FRSC 342 Citrus and Avocado Fruit Production	4
HCS 410 Crop Physiology or BIO 435 Plant Physiology	4
CRSC 411 Experimental Techniques/Analysis	4
HCS 421 Postharvest Tech. Horticultural Crops	4
FRSC 422 Tropical/Subtropical Crop & Fruit Prod.	4
HCS 461, 462 Senior Project I, II	2,2
<sup>2</sup> HCS 463 Undergraduate Seminar	1
<sup>1</sup> Approved electives	17
Select 17 units from the following. At least 8 units must be at the 300-400 level:	
AGB 301, 310, 315, 321, 360, 401, 443, 444;	
CRSC 333, 402, 445;	
FRSC 123, 402;	
HCS 200, 327, 339, 400, 450;	
PPSC 327, 405, 414, 421, 431, 441;	
SS 321, 322;	
VGSC 402, 423	

**11-30-11****82****SUPPORT COURSES**

BIO 303 Survey of Genetics	4
BOT 121 General Botany (B2 & B4)*	4
BOT 323 Plant Pathology	4
BRAE 340 Irrigation Water Management (Area F)*	4
BRAE 440 Agricultural Irrigation Systems	4
CHEM 111 Survey of Chemistry (B3&B4)*	5
CHEM 312 Survey of Organic Chemistry	5
MATH 118 Pre-Calculus Algebra (B1)*	4
(MATH 116 & 117 substitute)	
STAT 218 Applied Statistics/Life Sciences (B1)*	4
SS 121 Introductory Soil Science	4
VGSC 230 Introduction to Vegetable Science	4
	<b>46</b>

**GENERAL EDUCATION (GE)**

72 units required, 20 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing	4
A2 Oral Communication	4
A3 Reasoning, Argumentation, and Writing	4

**Area B Science and Mathematics (no addit'l units req'd)**

B1 Mathematics/Statistics * 8 units in Support	0
B2 Life Science * 4 units in Support	0
B3 Physical Science * 4 units in Support	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature	4
C2 Philosophy	4
C3 Fine/Performing Arts	4
C4 Upper-division elective	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404)	4
D2 Political Economy	4
D3 Comparative Social Institutions	4
D4 Self Development (CSU Area E)	4
D5 Upper-division elective	4

**Area F Technology Elective (upper division)**

* 4 units in Support	0
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**52****FREE ELECTIVES****0****180**

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>2</sup> May substitute 1 unit of any upper-division free elective. (12/11/14)

## 2009-11 Cal Poly Catalog

### Food Science and Nutrition Department

#### FSN–FOOD SCIENCE AND NUTRITION

##### FSN 101 Orientation to the Food Science and Nutrition Majors (1) (CR/NC)

Understanding the depth and breadth of the Food Science and Nutrition programs. Emphasis on academic and career planning. Students are required to complete this course within their first year in the major. Separate sections will be offered for each major. Credit/No Credit grading only. 1 lecture.

##### FSN 121 Fundamentals of Food (4)

Theoretical aspects and practical applications of the principles of culinary science and food preparation. 3 lectures, 1 laboratory.

##### FSN 125 Introduction to Food Science (4)

Basic principles of food science. Chemical, physical, and microbiological properties of foods. Ingredient properties, preservation, and processing. Overview of the commercial food processing industry at state and national levels. 3 lectures, 1 laboratory.

##### FSN 200 Special Problems for Undergraduates (1–4)

Individual investigation, research studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 4 units per quarter. Prerequisite: Consent of instructor.

##### FSN 201 Enterprise Project (1–4) (CR/NC)

Post-harvest processing of a high quality food product. Project participation is voluntary and subject to approval by the department head and the Cal Poly Corporation. Total degree credit for FSN 201 and FSN 401 combined limited to 12 units. Credit/No Credit grading only. Prerequisite: FSN 125 or FSN 230 or FSN 121 and consent of instructor.

##### FSN 204 Food Processing Operations (4)

Applied food manufacturing and processing technology emphasizing unit operations. Water removal in foods (dehydration, spray drying, vacuum concentration), heat removal (refrigeration, freezing), and osmotic preservation. Students produce processed foods in a pilot plant. 3 lectures, 1 laboratory. Prerequisite: FSN 125 or FSN 230.

##### FSN 210 Nutrition (4)

GE B5

Introduction to the science of human nutrition. Nutrient structure, metabolism, and function in body systems. Application of nutrition science principles to promote optimal health. 4 lectures. Fulfills GE B5.

##### FSN 230 Elements of Food Processing (4)

Principles of food processing operations covering thermal processing, freezing, dehydration, fermentation and raw material handling. Overview of food technology, food quality, spoilage, packaging and label requirements. For non-Food Science majors only. Field trip may be required. 3 lectures, 1 laboratory.

##### FSN 244 Cereal and Bakery Science (4)

Applied science of cereal-based products. Theory and practice underlying preparation of doughs, batters, fillings, and glazes. Chemistry of baking doughs and batters and storage of finished products. Marketing and product development of breads, cakes, cookies, and pastries. Comparative nutritional evaluation of flours, grains, and finished products. 3 lectures, 1 laboratory. Prerequisite: FSN 125 or FSN 230 or consent of instructor.

##### FSN 250 Food and Nutrition: Customs and Culture (4) GE D4 USCP

Anthropological perspective of traditional and contemporary food customs and culture. Major emphasis on U.S. cultures including Native American, Hispanic American, African American, and Asian American. Past and future developments in organic foods, junk foods and industrial foods. 4 lectures. Fulfills GE D4 and USCP.

##### FSN 264 Survey of Food Chemistry (4)

Basic application of chemistry to food products. Role of chemical components of food and beverage formulations with focus on grape, wine, fermented and distilled products as well as fruit, vegetable and cereal products. 4 lectures. Prerequisite: CHEM 111 or equivalent.

##### FSN 270 Food and Wine Plant Sanitation (4)

Operational management of a food and wine plant sanitation program. Chemical and physical control of insects, rodents, and birds. Microbial sanitation

operations. Government and legal issues affecting operations. Chemistry of detergents, surfactants and sanitizers. Design and construction of plants. Certified organic USDA requirements. 4 lectures. Prerequisite: FSN 125 or FSN 230, or consent of instructor.

##### FSN 275 Principles of Food Safety and Hazard Analysis (4)

Chemical, microbiological, and physical aspects of food safety are addressed especially with regard to establishment of safety programs for the food industry. In-depth coverage of hazard analysis and critical control points (HACCP). 3 lectures, 1 activity. Prerequisite: FSN 125 or FSN 230 and MCRO 221 or MCRO 224, or consent of instructor. *Change effective Spring 2010.*

##### FSN 285 Certified Organic Food Processing Operations (4)

Certification and legal requirements for the processing of fruit, vegetable, wine, cereal, beer, distilled spirits and muscle foods according to USDA, EU and JAS requirements. Basic principles of certified organic handling, process operations, ingredient sourcing and product development. 4 lectures. Prerequisite: FSN 125, FSN 230 or consent of instructor.

##### FSN 290 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### FSN 304 Advanced Culinary Principles and Practice (4)

Chemistry of starch, fat and proteins and its impact on texture, taste, flavor and appearance of food. Effects of microorganisms on changes of food during preparation and storage. Strong emphasis on baking technology. 3 lectures, 1 laboratory. Prerequisite: FSN 121, CHEM 127, or consent of instructor.

##### FSN 310 Maternal and Child Nutrition (4)

Nutritional needs and issues of women and children, including fertility, pregnancy and lactation; physical, nutritional, social growth and development from infancy through adolescence. Current nutrition issues in maternal and child nutrition. 4 lectures. Prerequisite: FSN 210; junior standing.

##### FSN 311 Sensory Evaluation of Food (4)

Designed to help the food scientist solve typical sensory problems occurring in the food industry by using simple difference and scaling test designs; select appropriate panelists for specific sensory tests; and conduct such tests, analyze, interpret the results and write a report. 3 lectures, 1 laboratory. Prerequisite: STAT 218; FSN 125 or FSN 230.

##### FSN 315 Nutrition in Aging (4)

Nutrition issues in the middle and later years. Changes in organ systems, nutrient needs, functional status, and food preferences as adults age. Nutrition and chronic disease. Nutritional assessment and screening. Nutrition-related health care and social services. 4 lectures. Prerequisite: FSN 210; junior standing.

##### FSN 319 Food Technology for the Consumer (4)

GE Area F

Overview of the science and technology used to produce the foods consumed on a daily basis. Food science, biotechnology, food law, processing, preservation, ingredient functionality, package label information, and food safety information. 4–3 lectures, 1 activity. Prerequisite: Junior standing and completion of GE Area B. Fulfills GE Area F. *Change effective Winter 2011.*

##### FSN 321 Culinary Management: Principles and Practice (4)

Principles involved in the choice, purchase, and preparation of foods in a variety of settings. Application of culinary management principles in the use of time, energy and money. Planning, preparing, and serving meals with emphasis on nutritional, aesthetic, economic and cultural aspects of food. 3 lectures, 1 laboratory. Prerequisite: FSN 121, FSN 210, sophomore standing.

##### FSN 322 French Food in French (4)

Blend of French language, culture, food preparation techniques, and basic food chemistry and nutrition. Total immersion in language and cooking: preparation of French food while interacting in French with classmates and instructors in lectures, discussion, and laboratory. 3 lectures, 1 laboratory. Prerequisite: FR 103 or consent of instructor. *Crosslisted as FR/FSN 322.*

##### FSN 328 Nutrient Metabolism I (4)

Metabolism of carbohydrates, fats and proteins as it applies to human nutrition. Integration of metabolic pathways. 4 lectures. Prerequisite: FSN 210, CHEM 313/371, BIO 111/161, junior standing.

**FSN 329 Nutrient Metabolism II (4)**

Continuation of FSN 328. Biochemical, molecular, and physiological functions of vitamins and minerals and their interaction with other nutrients. 3 lectures, 1 laboratory. Prerequisite: FSN 328.

**FSN 330 Introduction to Principles of Food Engineering (4)**

Introduction to principles of food engineering and basic calculations needed for food plant operations. Unit conversions, material balance, heat balance, steam heating, psychrometry, vacuum and pressure. Field trip may be required. 3 lectures, 1 laboratory. Prerequisite: FSN 125, MATH 118 or equivalent, and PHYS 121; or consent of instructor.

**FSN 334 Food Packaging (3)**

Function of food packaging in food processing and preservation. Packaging materials and forms. Regulations and testing of food packaging material. Oral presentation required. 3 lectures. Prerequisite: FSN 125 and FSN 204.

**FSN 335 Food Quality Assurance (4)**

Chemical, microbiological, and physical methods of analyses of foods used in food quality assurance and product development laboratories. Organization and management of quality assurance programs utilizing basic statistical control. Development of food production standards and interpretation of specifications. Packaging and container evaluation. 3 lectures, 1 laboratory. Prerequisite: FSN 125 or FSN 230, junior standing or consent of instructor.

**FSN 341 Wines and Fermented Foods (4)**

Processing, manufacturing, historical and bio-technical applications of fermentation technology for the production of food products focusing on wine. Wines of the world, distilled beverages, beers, fermented dairy, vegetable and meat products important to the post-harvest economy of California. 4 lectures. Prerequisite: Junior standing and completion of GE Area B.

**FSN 342 Sensory Evaluation of Wine (4)**

Evaluation of wines using the techniques in sensory evaluation. Difference and rating tests; descriptive analysis and pairing of wine and food. 3 lectures, 1 laboratory. Prerequisite: WVIT 202, STAT 218 or STAT 221, age 21 or older. *Crosslisted as FSN/WVIT 342.*

**FSN 343 Institutional Foodservice I (3)**

Principles of equipment selection and floor planning with emphasis on sanitation and safety. 2 lectures, 1 laboratory. Prerequisite: FSN 121 and junior standing.

**FSN 344 Institutional Foodservice II (3)**

Economic principles and problems involved in planning and preparing food using institutional equipment to meet specific product standards for large groups. 2 lectures, 1 laboratory. Prerequisite: FSN 321, FSN 343.

**FSN 354 Packaging Function in Food Processing (3)**

Basic food spoilage and preservation mechanisms. The role of food packaging in food processing. Package and food compatibility. For non-Food Science majors. 3 lectures. Prerequisite: Junior standing.

**FSN 364 Food Chemistry (4)**

Chemical and biochemical properties of food components. Basic principles of food enzymology and the chemical and biochemical changes occurring in food systems as a function of different food processing conditions. Mechanisms of reactions affecting food quality and nutritional value. Laboratory focus on assessment of food chemical systems. 3 lectures, 1 laboratory. Prerequisite: FSN 125 or FSN 230, CHEM 313.

**FSN 365 Wine Analysis and Amelioration (4)**

Winery laboratory practices. Basic principles, techniques, and interpretation of common analyses for sugars, acidity, nitrogen, alcohol, volatile acidity, sulfur dioxide, phenols and color; wine and must amelioration, amendment effects, usage, calculations and procedures of addition. 3 lectures, 1 laboratory. Prerequisite: WVIT 202. *Formerly FSN 464.*

**FSN 368 Food Analysis (4)**

Principles of chemical and biochemical methods and techniques for measuring food protein, carbohydrates, lipids, water, vitamins, minerals and other components of foods, wine analysis. Application of AOAC approved methods for determining nutrients as they relate to nutritional labeling legal requirements. 3 lectures, 1 laboratory. Prerequisite: FSN 364.

**FSN 374 Food Laws and Regulations (4)**

Federal, state, and local laws and regulations affecting the production, processing, packaging, marketing, and distribution of food. Emphasis on FDA, USDA and California codes. 4 lectures. Prerequisite: FSN 125 or FSN 230.

**FSN 400 Special Problems for Advanced Undergraduates (1–4)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 4 units per quarter. Prerequisite: Consent of instructor.

**FSN 401 Advanced Enterprise Project (1–4) (CR/NC)**

Leadership responsibility on enterprise projects. Lead students, under the supervision of instructor, will be accountable for all phases of the project: scheduling times, securing raw product, record keeping, and marketing of the product. Total degree credit for FSN 201 and FSN 401 combined limited to 12 units. **Credit/No-Credit-grading-only.** Prerequisite: FSN 201 and junior standing and consent of instructor. *Change effective Winter 2011.*

**FSN 408 Food Composition Science and Product Development (4)**

Chemical and physical properties of food ingredients. Functionality of water, carbohydrates, proteins, lipids, additives and other food ingredients used in the formulation, development, and processing of foods. Product development processes from idea generation to marketing. 3 lectures, 1 laboratory. Prerequisite: FSN 311, FSN 364, CHEM 313, senior standing or consent of instructor.

**FSN 410 Nutritional Implications of Food Industry Practices (4)**

Methods for assessing nutritional quality of foods/diets. Nutrient databases for raw and processed foods. Effects of food industry practices (e.g., processing, fortification, new product development, biotechnology) on nutritional quality of foods/diets. Evolution of public policy. 4 seminars. Prerequisite: FSN 210; FSN 230 or one course in food processing; senior standing; or consent of instructor.

**FSN 415 Nutrition Education and Communications (4)**

Application of appropriate behavior and learning theories in nutrition education and communications across diverse population groups. Effective use of techniques, materials, and computer-based technology to enhance communications. Includes community-based learning projects. 4 lectures. Prerequisite: FSN 328 and senior standing, or consent of instructor.

**FSN 416 Community Nutrition (4)**

Federal, state and local nutrition assessment activities and program services for at-risk populations. Emphasis on health promotion and disease prevention concepts. Develop skills in assessing community nutrition problems and planning service interventions. 4 lectures. Prerequisite: Senior standing, FSN 328, or consent of instructor. Recommended: FSN 310, FSN 315, FSN 415.

**FSN 417 Nutrition Counseling (4)**

Communication, behavioral, and counseling theories as they relate to nutrition counseling. Emphasis on development of skills to promote healthy eating behaviors. Examination of eating disorders and obesity, including preventative and therapeutic interventions. 4 lectures. Prerequisite: Senior standing, PSY 201/202. Prerequisite or concurrent: FSN 329, FSN 415.

**FSN 420 Critical Evaluation of Nutrition Research (4)**

Nutrition research terminology and methods, including the strengths and weaknesses of *in vitro*, animal, human observational, and human intervention studies. Critical evaluation and interpretation of nutrition research. Case studies of research supporting or refuting diet/health links. 4 seminars. Prerequisite: FSN 329, STAT 218, and senior standing; or consent of instructor.

**FSN 426 Food Systems Management (4)**

Principles of successful organization and management with their application to the effective operation of food service. Administrative responsibilities of the food service manager. Management theories and practice. Labor relations. Discipline and performance appraisal. 4 lectures. Prerequisite: FSN 344, or consent of instructor.

**FSN 429 Clinical Nutrition I (4)**

Application of the nutritional care process to physiological disorders which may alter nutritional requirements or require dietary modifications. Anthropometric, biochemical, clinical, and dietary assessment. GI disorders, diabetes mellitus, electrolytes, acid-base balance, hydration and enteral and parenteral nutrition. 3 lectures, 1 laboratory. Prerequisite: ZOO 331, 332 (*transfer equivalent ZOO 231, 232*) and senior standing. Prerequisite or concurrent: FSN 329.

**FSN 430 Clinical Nutrition II (4)**

Application of the nutritional care process to physiological and metabolic disorders which may alter nutritional requirements or require dietary modifications. Respiratory diseases, burns, cancer, inborn errors of metabolism, pregnancy, cardiovascular disease, liver disease, AIDS, renal disease, and bariatric surgery. **4 lectures-3 lectures, 1 laboratory.** Prerequisite: FSN 429. *Changed effective Fall 2009.*

**FSN 440 Internship in Food Science or Nutrition (1–12)**

Career experience with private or public agencies. Total credit limited to 12 units. Maximum of 6 units may be applied toward degree requirements. Prerequisite: Junior standing and consent of instructor.

**FSN 444 Engineering Concepts in Food Processing (4)**

Engineering concepts relevant to food processing. Heat transfer, evaporation, dehydration and refrigeration calculation principles. 4 lectures. Prerequisite: FSN 330, FSN 204; FSN 230 for non-Food Science majors.

**FSN 461, 462 Senior Project I, II (2-3) (2-3)**

Selection of scientific research topic in major area. Development of literature review, research questions in Senior Project I. Research design, data collection, and analysis in Senior Project II. Project requires a formal report which must follow departmental guidelines. Minimum of 60-90 hours per quarter. Prerequisite: Completion of GE Area A3, STAT 218, and senior standing. Also prerequisite or concurrent for Nutrition majors: FSN 329; recommended: FSN 420.

**FSN 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Senior standing.

**FSN 471 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Senior standing.

**FSN 474 Advanced Food Processing (4)**

Advanced topics in processing operations with emphasis on thermal processing. Non-traditional processing technology such as microwave, ionizing radiation, and Pascalization. Oral presentation required. 3 lectures, 1 laboratory. Prerequisite: FSN 444 and senior standing.

**FSN 480 Policy Arguments in Food and Nutrition (2)**

Analysis and evaluation of law and policy in foods, nutrition, and related healthcare issues. Planning and presentation of successful arguments supporting or refuting key food and health policies. Critical assessment of advocacy processes and determination of best approaches to achieving legislative and policy goals. 2 seminars. Prerequisite: FSN 374, junior standing.

**FSN 485 Cooperative Education Experience in Food Science and Nutrition (6) (CR/NC)**

Part-time work experience with an approved Food Science or Nutrition firm engaged in production or related business, industry or governmental agency. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 12 units. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**FSN 495 Cooperative Education Experience in Food Science and Nutrition (12) (CR/NC)**

Full time work experience with an approved Food Science or Nutrition firm engaged in production or related business, industry or governmental agency. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 12 units. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**FSN 500 Individual Study (1–6)**

Advanced independent study planned and completed under the direction of a member of the department faculty. Total credit limited to 6 units. Prerequisite: Graduate standing, consent of supervising faculty member and graduate advisor.

**FSN 501 Lipid Metabolism and Nutrition (3)**

Digestion, absorption and metabolism of lipids with emphasis on lipoprotein metabolism, regulation of lipid metabolism, essential fatty acid requirements and functions. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**FSN 540 Dietetic Internship Supervised Practice (10) (CR/NC)**

Supervised practice at various nutrition therapy, foodservice management, and community nutrition sites. Total credit limited to 30 units, with a maximum of 10 units per quarter. Credit/No Credit grading only. Prerequisite: Acceptance into the Cal Poly, San Luis Obispo Dietetic Internship, a special session program in Continuing Education.

**FSN 541 Dietetic Internship Seminar (2) (CR/NC)**

A forum for dietetic interns to make presentations and share their experiences in their supervised practice. Total credit limited to 6 units. Credit/No Credit grading only. 2 seminars. Prerequisite: Acceptance into the Cal Poly, San Luis Obispo Dietetic Internship, a special session program in Continuing Education.

**FSN 542 Dietetic Internship: Current and Emerging Issues (2) (CR/NC)**

Presentation of various hot topics and emerging issues in nutrition therapy, foodservice management and community nutrition for enrichment of the internship experience. Credit/No Credit grading only. 2 lectures. Total credit limited to 6 units, with a maximum of 2 units per quarter. Prerequisite: Acceptance into the Cal Poly, San Luis Obispo Dietetic Internship, a special session program in Continuing Education.

**FSN 570 Selected Topics in Food Science and Nutrition (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1 to 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**FSN 571 Selected Advanced Laboratory in Food Science and Nutrition (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Consent of instructor.

**FSN 581 Graduate Seminar in Food Science and Nutrition (3)**

Current findings and research problems in the field and their application to food science and nutrition. The Schedule of Classes will list topic selected. Total credit limited to 6 units with approval of advisor. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**FSN 599 Thesis (1–6)**

Individual research in food science and nutrition under faculty supervision leading to a graduate thesis of suitable quality. Total credit limited to 6 units. Prerequisite: Graduate standing and consent of instructor.

## General Education

### General Education Program

#### Program Goals

Consistent with E.O. 1033, Cal Poly's General Education Program is designed to assure graduates have made noteworthy progress toward becoming truly educated persons and to provide means whereby graduates have:

- The ability to think clearly and logically, to find information and examine it critically, to communicate orally and in writing, and to reason quantitatively;
- Appreciable knowledge about their own bodies and minds, about how human society has developed and how it now functions, about the physical world in which they live, about the other forms of life with which they share the world, and about the cultural endeavors and legacies of their civilizations;
- An understanding and appreciation of the principles, methodologies, value systems, and thought processes employed in human inquiries.

#### Foundational Courses

Students are expected to complete GE Area A classes during their freshman year. The three-course Communications sequence provides instruction and practice in the kinds of skills in writing, speaking, and critical thinking that students will need in their later courses. Completion of Area A is a prerequisite for many other GE classes. Students are also encouraged to complete their lower-division foundational GE classes in Areas B, C, and D (Science and Math, Arts and Humanities, and Society and the Individual) by the end of their sophomore year to give them the skills and knowledge to succeed in all their upper-division classes.

#### Technology Elective (Area F)

Most majors are required to take this upper-division elective which is integrative in nature, requiring the application and generalization of basic scientific and mathematical knowledge from foundation GE courses. Particular technologies are critically examined from multiple perspectives, which may include ethical, social, ecological, political, or economic viewpoints.

#### Advising

Some support courses fulfill both GE and major requirements and are listed on the program curriculum displays. Students should consult academic advisors during their freshman year for clarification on these GE/major support courses. GE course offerings are updated online each quarter in PASS.

#### Double-Counting

Courses from the student's Major department may not be used to fulfill GE Area C4 or D5.

#### GE Course Substitutions

Students are expected to complete the GE courses published for their degree program. Cal Poly GE courses must be selected from the approved GE list. Substitutions are not permitted except in extraordinary circumstances. Students requesting exceptions must follow petition procedures, outlined on the GE web site. This process may take several weeks.

#### GE Study Abroad

Students are strongly encouraged to submit a GE Study Abroad petition before going abroad in order to determine which study abroad courses will be granted GE credit.

#### Transfer Credit

Transfer credit for GE courses is accepted from California institutions, as approved by the CSU Chancellor's office. The GE Area letters and numbers at Cal Poly (e.g., GE A1, D4) may be different at other colleges. Some Cal Poly programs specify particular GE courses for major or support; these courses must be met with articulated equivalencies. Refer to [www.assist.org](http://www.assist.org) for California Community College CSU GE lists and articulation agreements.



## GE Requirements

[www.ge.calpoly.edu/](http://www.ge.calpoly.edu/)

**Most Majors**=Colleges of Agriculture, Food & Environmental Sciences, Architecture & Environmental Design, Business, Science & Mathematics. **CLA, LS & LAES**=College of Liberal Arts, Liberal Studies and LAES majors. **ENGR**=Engineering Programs.

Some programs indicate specific GE courses to fulfill Major and Support course requirements.

Courses from student's Major department may not be used to fulfill Areas C4 or D5.

✓ non-unit requirement

All GE courses are 4 units unless otherwise indicated.

	Most Majors	CLA, LS & LAES	ENGR only
<b>GE Units Taken in Residence</b>	12	12	12
<b>GE Upper Division Units Required</b>	12	12	8
<b>AREA A COMMUNICATION</b>	12	12	12
<b>A1 Expository Writing</b>	4	4	4
<b>A2 Oral Communication</b>	4	4	4
<b>A3 Reasoning, Argumentation, and Writing</b>	4	4	4
<b>AREA B SCIENCE &amp; MATH</b>	16	20	28
<b>B1 Mathematics/Statistics</b>	8	8	8
<b>B2 Life Science</b>	4	4	4
<b>B3 Physical Science</b>	4	4	4
<b>B4 One lab taken with B2 or B3 course</b>	✓	✓	✓
<b>B5 elective (for CLA, LS &amp; LAES students only)</b> CLA, LS & LAES students may take B5, or any course from B1-B4		4	
<b>B6 Upper-division (Engineering)</b>			4
<b>Engineering: Additional Area B</b>			8
<b>AREA C ARTS AND HUMANITIES</b>	20	16	16
<b>C1 Literature</b>	4	4	4
<b>C2 Philosophy</b>	4	4	4
<b>C3 Fine and Performing Arts</b>	4	4	4
<b>C4 Upper-division elective</b>	4	4	4
<b>Area C Elective (One from C1-C4)</b>	4		
<b>AREA D/E SOCIETY/INDIVIDUAL</b>	20	20	16
<b>D1 The American Experience (40404)</b>	4	4	4
<b>D2 Political Economy</b>	4	4	4
<b>D3 Comparative Social Institutions</b>	4	4	4
<b>D4 Self Development (CSU Area E)</b>	4	4	4
<b>D5 Upper-division elective</b>	4	4	
<b>AREA F TECHNOLOGY (upper-div)</b>	4	4	
<b>TOTAL GE UNITS</b>	<b>72</b>	<b>72</b>	<b>72</b>

## General Education Courses

	Most Majors	CLA, LS & LAES	ENGR only
<b>AREA A: COMMUNICATION</b>	<b>12</b>	<b>12</b>	<b>12</b>
<b>A1 Expository Writing</b>	<b>4</b>	<b>4</b>	<b>4</b>
ENGL 133 Writing and Rhetoric for ESL Students ENGL 134 Writing and Rhetoric			
<b>A2 Oral Communication</b>	<b>4</b>	<b>4</b>	<b>4</b>
COMS 101 Public Speaking COMS 102 Principles of Oral Communication HNRS 101 Public Speaking			
<b>A3 Reasoning, Argumentation, and Writing</b>	<b>4</b>	<b>4</b>	<b>4</b>
COMS 126 Argument and Advocacy COMS 145 Reasoning, Argumentation and Writing ENGL 145 Reasoning, Argumentation, and Writing ENGL 148 Reasoning, Argumentation, and Professional Writing ENGL 149 Technical Writing for Engineers HNRS 145 Reasoning, Argumentation, and Writing HNRS 148 Reasoning, Argumentation, and Professional Writing HNRS 149 Technical Writing for Engineers PHIL 126 Logic and Argumentative Writing			
	Most Majors	CLA, LS & LAES	ENGR only
<b>AREA B: SCIENCE &amp; MATH</b>	<b>16</b>	<b>20</b>	<b>28</b>
<b>B1 Mathematics/Statistics</b>	<b>8</b>	<b>8</b>	<b>8</b>
HNRS 141 Calculus I HNRS 142 Calculus II HNRS 143 Calculus III MATH 112 Nature of Modern Math MATH 117 Pre-Calculus Algebra II MATH 118 Pre-Calculus Algebra MATH 119 Pre-Calculus Trigonometry MATH 141 Calculus I MATH 142 Calculus II MATH 143 Calculus III MATH 161 Calculus for the Life Sciences I MATH 162 Calculus for the Life Sciences II MATH 182 Calculus for Architecture and Construction Mgmt MATH 221 Calculus for Business and Economics MATH 227 Mathematics for Elementary Teaching I STAT 130 Intro Statistical Reasoning STAT 217 Intro to Statistical Concepts and Methods STAT 218 Applied Statistics for the Life Sciences STAT 221 Intro Probability and Statistics STAT 251 Statistical Inference for Management I (5) STAT 252 Statistical Inference for Management II (5) STAT 313 Applied Experimental Design and Regression Models			
<b>B2 Life Science (B2&amp;4=lab course)</b>	<b>4</b>	<b>4</b>	<b>4</b>
ANT 250 Biological Anthropology ASCI 112 Principles of Animal Science BIO 111 General Biology (B2&4) BIO 113 Animal Diversity and Ecology (B2&4) BIO 114 Plant Diversity and Ecology (B2&4) BIO 115 Animal/Human Structure and Function (B2&4) BIO 161 Introduction to Cell and Molecular Biology (B2&4)			

BIO 227 Wildlife Conservation Biology BOT 121 General Botany (B2&4) MCRO 221 Surv Microbiology (B2&4) MCRO 224 Gen Microbiology I (5) (B2&4) PPSC 110 Peoples, Pests and Plagues (B2&B4) <i>For Engineering students only; concurrent enrollment required:</i> BIO 213 Life Science for Engineers (2) and ENGR/BRAE 213 Bioengineering Fundamentals (2)			
<b>B3 Physical Science (B3&amp;4=lab course)</b>	<b>4</b>	<b>4</b>	<b>4</b>
ASTR 101 Intro to the Solar System ASTR 102 Intro to Stars and Galaxies ASTR 112 Introduction to the Stars and Galaxies (B3&4) CHEM 110 World of Chemistry (B3&4) CHEM 111 Survey of Chemistry (5) (B3&4) CHEM 124 General Chemistry for Engineers I (B3&4) CHEM 125 General Chemistry for Engineers II (B3&4) CHEM 127 General Chemistry I (B3&4) GEOL 102 Introduction to Geology GEOL 205 Earthquakes HNRS 131 General Physics I (B3&4) HNRS 132 General Physics II (B3&4) HNRS 134 General Physics IA PHYS 104 Introductory Physics PHYS 107 Introduction to Meteorology PHYS 111 Contemporary Physics for Nonscientists PHYS 115 Physics of Sound and Music PHYS 121 College Physics I (B3&4) PHYS 122 College Physics II (B3&4) PHYS 131 General Physics I (B3&4) PHYS 132 General Physics II (B3&4) PHYS 133 General Physics III (B3&4) PHYS 141 General Physics IA PSC 101 Physical Environment: Matter and Energy (B3&4) PSC 103 Physical Environment: Earth and Universe			
<b>B4 One lab taken with B2 or B3 course</b>	✓	✓	✓
<b>B5 elective (GE option for College of Liberal Arts, Liberal Studies &amp; LAES students)</b>	--	--	--
<b>CLA, LS &amp; LAES: (Select one from B1-B5)</b>	<b>0</b>	<b>4</b>	<b>0</b>
BIO 112 Conservation Biology and Environmental Science BIO 302 Human Genetics BIO 305 Biology of Cancer BOT 311 Plants, People and Civilization FSN 210 Nutrition GEOL 203 Fossils and History of Life HNRS 319 Natural Resource Ecology, Theories and Applications MATH 326 Mathematics and Visual Art NR 319 Natural Resource Ecology, Theories and Applications PSC 201 Intro to Physical Oceanography PSY 340 Biopsychology SS 121 Intro to Soil Science			
<b>B6 Upper-division Area B (ENGR only)</b>	<b>0</b>	<b>0</b>	<b>4</b>
CHEM 305 Physical Chemistry for Engineers CSC 341 Numerical Engineering Analysis GEOL 305 Fundamentals Seismology MATH 304 Vector Analysis MATH 344 Linear Analysis II MATH 408 Complex Analysis I PHYS 412 & 452 Solid State Physics & Lab PHYS 417 Nonlinear Dynamical Systems STAT 312 Statistical Methods for Engineers STAT 321 Probability and Statistics for Engineers and Scientists STAT 350 Probability and Random Processes for Engineers			

<b>Engineering: Additional Area B</b>	<b>0</b>	<b>0</b>	<b>8</b>
	<b>Most Majors</b>	<b>CLA, LS &amp; LAES</b>	<b>ENGR only</b>
<b>AREA C: ARTS AND HUMANITIES</b>	<b>20</b>	<b>16</b>	<b>16</b>
<b>C1 Literature</b>	<b>4</b>	<b>4</b>	<b>4</b>
ENGL 230 Masterworks British Literature through 18 <sup>th</sup> Century ENGL 231 Masterworks British Lit: Late 18 <sup>th</sup> Century – Present ENGL 240 American Tradition in Literature ENGL 251 Great Books I: Ancient and Classical World ENGL 252 Great Books II: Emergence of Europe ENGL 253 Great Books III: Age of Revolution FR 233 Critical Readings in French Literature GER 233 Critical Readings in German Literature HNRS 251 Great Books I: Ancient and Classical World SPAN 233 Introduction to Hispanic Readings			
<b>C2 Philosophy</b>	<b>4</b>	<b>4</b>	<b>4</b>
HNRS 230 Philosophical Classics: <del>Metaphysics &amp; Epistemology</del> <b>Knowledge and Reality (effective Spring 2010)</b> HNRS 231 Philosophical Classics: Ethics and Political Philosophy PHIL 230 Philosophical Classics: <del>Metaphysics &amp; Epistemology</del> <b>Knowledge and Reality (effective Spring 2010)</b> PHIL 231 Philosophical Classics: Ethics and Political Philosophy			
<b>C3 Fine and Performing Arts</b>	<b>4</b>	<b>4</b>	<b>4</b>
ARCH 217 History of Architecture ARCH 218 History of Architecture ARCH 219 History of Architecture ART 101 The Fundamentals of Drawing ART 111 Introduction to Art ART 112 Survey of Western Art ART 148 Sculpture COMS 208 Performance of Literature DANC 221 Dance Appreciation LA 211 History of Landscape Arch: Ancient Civs – Col America LA 212 History of Modern and Contemporary Landscape Arch MU 101 Introduction to Music Theory MU 120 Music Appreciation MU 221 Jazz Styles (USCP) MU 229 Music of the 60's: War and Peace (USCP) TH 210 Introduction to Theatre TH 227 Theatre History: Classical TH 228 Theatre History: 18 <sup>th</sup> Century to Contemporary			
<b>C4 Upper-division elective</b>	<b>4</b>	<b>4</b>	<b>4</b>
<i>Courses from student's Major Dept do not receive C4 credit</i> ARCH 320 Topics in Architectural History ARCH 326 Native American Architecture and Place (USCP) ART 311 Art History – Nineteenth Century Art ART 314 History of Photography ART 318 Asian Art: National, Religion and Intel Movements ART 370 Michelangelo ART 371 Topics in Renaissance Art COMS 308 Group Performance of Literature DANC 311 Dance in American Musical Theatre DANC 321 Cultural Influences on Dance in America (USCP) ENGL 330 Brit Lit: Age of Belief to 1485 ENGL 331 Brit Lit: Age of Discovery, 1485-1600 ENGL 332 Brit Lit: Age of Enlightenment, 1660-1798 ENGL 333 Brit Lit: Age of Romanticism, 1798-1832 ENGL 334 Brit Lit: Age of Industrialism, 1832-1914 ENGL 335 Brit Lit: Age of Modernism: 1914-Present			

ENGL 338 Intro Shakespeare: London
ENGL 339 Intro Shakespeare
ENGL 340 Literary Sources American Character: 1600-1865
ENGL 341 Literary Sources American Character: 1865-1914
ENGL 342 Literary Sources American Character: 1914-1956
ENGL 343 Multiple Voices Contemp Amer Lit: 1956 – Present
ENGL 345 Women Writers of 20 <sup>th</sup> Century ( <i>USCP</i> )
ENGL 346 Ethnic American Lit ( <i>USCP</i> )
ENGL 347 African American Literature ( <i>USCP</i> )
ENGL 349 Gender in 20 <sup>th</sup> -Century Literature ( <i>USCP</i> )
ENGL 350 Modern Novel
ENGL 351 Modern Poetry
ENGL 352 Modern Drama
ENGL 353 Drama in London
ENGL 354 Bible as Literature and in Literature and the Arts
ENGL 370 World Cinema
ENGL 371 Film Styles and Genres
ENGL 372 Film Directors
ENGL 380 Literary Themes
ENGL 381 Diversity in 20 <sup>th</sup> -Century American Lit ( <i>USCP</i> )
ENGL 382 LGBT Literature and Media ( <i>USCP</i> )
ENGL 386 Creative Nonfiction
ENGL 387 Fiction Writing
ENGL 388 Poetry Writing
ES 300 Chicano/a Non-Fiction Literature ( <i>USCP</i> )
ES 326 Native American Architecture and Place ( <i>USCP</i> )
ES 340 Cultural Production and Ethnicity
ES 360 Ethnicity and the Land ( <i>USCP</i> )
FR 305 Significant Writers in French
FR 350 French Literature in English Translation
GER 305 Significant Writers in German
GER 350 German Literature-English Translation
HNRS 304 Values and Technology
HNRS 320 Values, Media, Culture
HNRS 332 Brit Lit: Age of Enlightenment, 1660-1798 ( <i>Fall '10</i> )
HNRS 380 Literary Themes
HUM 303 Values and Technology
HUM 310 World Cultures
HUM 312 Chicano/a Culture ( <i>USCP</i> )
HUM 320 Values, Media, Culture
HUM 361 Modernism
MU 324 Music and Society
MU 328 Women in Music
NR 360 Ethnicity and the Land ( <i>USCP</i> )
PHIL 311 Greek Philosophy
PHIL 312 Medieval Philosophy
PHIL 313 Early Modern Rationalism
PHIL 314 Early Modern Empiricism
PHIL 315 Kant and 19 <sup>th</sup> Century European Philosophy
PHIL 316 20 <sup>th</sup> Century European Philosophy
PHIL 317 History of Analytic Philosophy
PHIL 320 Asian Philosophy
PHIL 321 Philosophy of Science
PHIL 322 Philosophy of Technology
PHIL 331 Ethics
PHIL 332 History of Ethics
PHIL 333 Political Philosophy
PHIL 334 Philosophy of Law

PHIL 335 Social Ethics (USCP)			
PHIL 336 Feminist Ethics, Gender and Society (USCP)			
PHIL 337 Business Ethics			
PHIL 338 Ethics and Education			
PHIL 339 Biomedical Ethics			
PHIL 340 Environmental Ethics			
PHIL 341 Professional Ethics			
PHIL 342 Philosophy of Religion			
PHIL 350 Aesthetics			
RELS 301 Religions of Asia			
RELS 302 Monotheisms: Judaism, Christianity, and Islam			
RELS 304 Judaism			
RELS 306 Hinduism			
RELS 307 Buddhism			
RELS 310 Christianity			
RELS 311 Islam			
RELS 370 Religion, Gender and Society (USCP)			
RELS 372 Spiritual Extremism: Asceticism, Mysticism, Madness			
RELS 374 Religion and Violence			
RELS 378 Religion and Contemporary Values			
SPAN 305 Significant Writers in Spanish			
SPAN 340 Chicano/a Authors (USCP)			
SPAN 350 Hispanic Literature in English Translation			
SPAN 351 Latino/a Writers in U. S. (USCP)			
TH 310 Women's Theatre			
TH 320 Black Theatre (USCP)			
TH 360 Theatre in the United States			
TH 390 World Drama			
UNIV 361 Modernism			
WGS 370 Religion, Gender and Society (USCP)			
Area C Elective (one course from C1-C4)	4	0	0
	Most Majors	CLA, LS & LAES	ENGR only
AREA D/E: SOCIETY & INDIVIDUAL	20	20	16
D1 The American Experience (40404)	4	4	4
ES 112 Race, Culture, Politics in the U.S. (USCP)			
HIST 206 American Cultures (USCP)			
HIST 207 Freedom and Equality in American History (USCP)			
HNRS 112 Race, Culture, Politics in the U.S. (USCP)			
POLS 112 American and California Government			
D2 Political Economy	4	4	4
ECON 201 Survey of Economics			
ECON 222 Macroeconomics			
HIST 213 Modern Political Economy			
HIST 214 Political Economy of Latin America and Middle East			
HNRS 201 Survey of Economics			
SOC 218 International Political Economy			
D3 Comparative Social Institutions	4	4	4
ANT 201 Cultural Anthropology			
ANT 202 World Prehistory			
ES 212 Global Origins of U.S. Cultures (USCP)			
ES 241 Survey of Indigenous Studies (USCP)			
ES 242 Survey of Africana Studies (USCP)			
ES 243 Survey of Latino/a Studies (USCP)			
ES 244 Survey of Asian American Studies (USCP)			
GEOG 150 Intro to Cultural Geography			
HIST 210 World History I (5000 B.C.E. to 1789)			
HIST 216 Comparative Social Movements			
HIST 221 World History, Beginnings to 1000			
HIST 222 World History, 1000-1800			

HIST 223 World History, 1800 to Present HNRS 212 Global Origins of U.S. Cultures (USCP) HNRS 223 World History, 1800 to Present RELS 201 Religion, Dialogue and Society SOC 110 Comparative Societies			
<b>D4 Self Development (CSU Area E)</b>	<b>4</b>	<b>4</b>	<b>4</b>
FSN 250 Food and Nutrition: Customs and Culture (USCP) KINE 250 Healthy Living KINE 255 Personal Health: A Multicultural Approach (USCP) KINE 260 Women's Health Issues (USCP) PSY 201 General Psychology PSY 202 General Psychology			
<b>D5 Upper-division elective</b>	<b>4</b>	<b>4</b>	<b>0</b>
<i>Courses from student's Major Dept do not receive D5 credit</i> ANT 325 Precolumbian Mesoamerica ANT 330 Indigenous South Americans ANT 344 Sex, Death and Human Nature ANT 345 Human Behavioral Ecology ANT 360 Human Cultural Adaptations BUS 311 Managing Technology International Legal Environ CRP 334 Cities in a Global World ECON 303 Econ of Poverty Discrimination Immigration (USCP) ECON 304 Comparative Econ Systems ECON 322 Economic History of the Advanced World ES 308 Fire and Society ES 310 Hip-Hop, Poetics and Politics (USCP) ES 320 African American Cultural Images (USCP) ES 321 Native American Cultural Images (USCP) ES 322 Asian American Cultural Images (USCP) ES 323 Mexican American Cultural Images (USCP) ES 330 Chinese American Experience (USCP) ES 335 Filipina/o American Experience (USCP) ES 380 Critical Race Theory (USCP) ES 381 The Social Construction of Whiteness (USCP) GEOG 300 Geography of United States GEOG 301 Geography of Resource Utilization GEOG 308 Global Geography GEOG 370 Geography of Latin America HIST 306 The Witch-Hunt in Europe, 1400-1800 HIST 307 European Thought, 1800-2000 HIST 308 The Trans-Atlantic Slave Trade HIST 309 Cultures of West Africa and the African Diaspora HIST 310 East Asian Culture and Civilization HIST 316 Modern East Asia HIST 317 The Lure of the Sea HIST 318 The City in the Modern World HIST 319 Modern South and Southeast Asia HIST 320 Colonial and Revolutionary America HIST 321 Civil War America HIST 322 Modern America HIST 323 Versions of the Past: Novels, Comics and Movies HIST 324 The Historical Novel in the U.S., '60's to Present HIST 336 Britain at War: 1939-1945 HNRS 303 Econ of Poverty Discrimination Immigration (USCP) HNRS 324 The Historical Novel in the U.S., '60's to Present HNRS 391 Appropriate Tech/World's People: Development HUM 315 Critical Issues in Latin American Studies HUM 316 London: From Roman Colony to World Capitol KINE 323 Sport and Gender (USCP) KINE 324 Sport, Media and American Popular Culture (USCP) NR 308 Fire and Society			

NR 323 Human Dimensions Natural Resource Management POLS 325 Global Political Issues POLS 338 Critical Issues American Politics POLS 339 Comparative Political Regimes POLS 348 Early American Political Thought (Spring 2010) POLS 349 Contemporary American Political Thought (Spg '10) PSY 311 Environmental Psychology PSY 318 Psychology of Aging PSY 352 Conflict Resolution: Violent and Nonviolent RELS 344 Religious Studies: The Making of a Discipline SOC 315 Global Race and Ethnic Relations SOC 326 Sociology of the Life Cycle SOC 377 Sociology of Religion UNIV 391 Appropriate Tech/World's People: Development WGS 301 Introduction to Women's and Gender Studies (USCP) WGS 320 Women in Global Perspective WGS 340 Sexuality Studies			
	<b>Most Majors</b>	<b>CLA, LS &amp; LAES</b>	<b>ENGR only</b>
<b>AREA F: TECHNOLOGY ELECTIVE (upper division)</b>	<b>4</b>	<b>4</b>	<b>0</b>
AERO 310 Air and Space AG 315 Organic Agriculture AG 330 Cal Poly Land: Nature, Technology and Society AG 350 The Global Environment AG 360 Holistic Management ASTR 324 Longitude, Navigation, and Timekeeping BIO 307 World Aquaculture: Applics, Methods and Trends BOT 329 Plants, Food, and Biotechnology BRAE 340 Irrigation Water Mgmt BRAE 348 Energy for a Sustainable Society BUS 350 The Global Environment CHEM 349 Chemical and Biological Warfare CRP 338 Digital Cities CSC 302 Computers and Society CSC 310 Computers for Poets EDES 350 The Global Environment ENGR 302 Transportation and Manufacturing in 21 <sup>st</sup> Century ENGR 350 The Global Environment ENVE 324 Introduction to Air Pollution ES 350 Gender, Race, Science and Technology (USCP) FSN 319 Food Technology/Consumer GEOG 317 The World of Spatial Data/Geographic Info Tech GRC 377 Desktop Publishing for Print and World Wide Web HCS 329 Plants, Food, and Biotechnology HIST 354 History Network Technology HIST 358 Cloning HIST 359 Living in the Material World HNRS 310 Air and Space HNRS 311 Computers for Poets HNRS 392 Appropriate Tech for the World's People: Design HUM 302 Human Values in Agriculture HUM 330 Cal Poly Land: Nature, Technology and Society HUM 350 The Global Environment IME 320 Human Factors and Technology IT 330 Issues of Packaging IT 336 Textile Technology IT 341 Plastics Processes and Applications LA 317 The World of Spatial Data/Geographic Info Tech MATE 359 Living in the Material World ME 320 Consumer Energy Guide			

ME 321 Solar Energy			
NR 312 Technology of Wildland Fire Management			
NR 317 The World of Spatial Data/Geographic Info Tech			
NR 321 Water Systems Technology, Issues and Impacts			
POLS 333 World Food Systems			
PSC 307 Nuclear Weapons in Post 9/11 World			
PSC 320 Energy, Society and the Environment			
SCM 320 Technology in London			
SCM 325 Genetic Engineering Technology			
SCM 330 Ocean Discovery through Technology			
SCM 335 Nuclear Science and Society			
SCM 350 The Global Environment			
UNIV 330 Cal Poly Land: Nature, Technology and Society			
UNIV 333 World Food Systems			
UNIV 339 Disaster-Resistant Sustainable Communities			
UNIV 350 The Global Environment			
UNIV 392 Appropriate Tech/World's People: Design			
WGS 350 Gender, Race, Science and Technology ( <i>USCP</i> )			
<b>Total GE Units</b>	<b>72</b>	<b>72</b>	<b>72</b>



**2009-11 Cal Poly Catalog****Biomedical & General Engineering Department****BS GENERAL ENGINEERING** **Flowchart**

☐ 60 units upper division ☐ GWR

☐ 2.0 GPA ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major, support or concentration courses may be taken as credit/no credit.

**MAJOR COURSES**

CE 204 Mechanics of Materials I.....	3
CSC 234/CSC 101 .....	3
EE 201 Electric Circuit Theory .....	3
<sup>1</sup> ENGR 110,111,112 Engineering Science I,II,III .....	3,3,3
IME 314 Engineering Economics .....	3
MATE 210 Materials Engineering and	
MATE 215 Materials Laboratory I .....	3,1
ME 211 Engineering Statics.....	3
ME 212 Engineering Dynamics .....	3
ME 302 Thermodynamics I .....	3
ME 341 Fluid Mechanics I.....	3
ME 343 Heat Transfer .....	4
ENGR 481 (2) and 482 (2) Sr. Project Design Lab	
I, II or ENGR 462 (4) or Sr. Project-	
appropriate engineering discipline (1/16/15).....	4
<sup>2</sup> Concentration or individual course of study.....	46
	<b>91</b>

**SUPPORT COURSES**

BIO 213 and ENGR/BRAE 213 (B2)*.....	2,2
CHEM 124 Gen Chem for Engrg I (B3/B4)* and	
CHEM 125 Gen Chem for Engrg II (Add'l Area	
B)* or CHEM 127, 128 Gen Chem I, II.....	4,4
ENGL 149 Technical Writing for Engineers (A3)* .....	4
MATH 141,142 Calculus I, II (B1)*.....	4,4
MATH 143 Calculus III (Add'l Area B)*.....	4
MATH 241 Calculus IV.....	4
MATH 244 Linear Analysis I .....	4
Select one of the following: MATH 344; STAT	
312, 321, 350 (B6)*.....	4
PHYS 141 General Physics IA .....	4
PHYS 132, 133 General Physics.....	4,4
Physical science electives .....	4,4
	<b>60</b>

**GENERAL EDUCATION (GE)**

72 units required, 32 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 8 units required at the 300 level.

**Area A Communication (8 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing * 4	
units in Support .....	0

**Area B Science and Mathematics (no add'l units req'd)**

B1 Mathematics/Statistics * 8 units in Support .....	0
B2 Life Science *4 units in Support .....	0
B3 Physical Science* 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	
B5 (requirement for Liberal Arts students only)	
B6 Upper-division Area B * 4 units in Support....	0
Additional Area B units * 8 units in Support.....	0

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4

**40****FREE ELECTIVES .....****0****191****CONCENTRATIONS OR INDIVIDUALIZED COURSE OF STUDY (select one)****Bioengineering Concentration**

CSC 341 Numerical Engineering Analysis .....	4
ENGR <del>450</del> 451 Special Topics in Bioengineering .....	4
IME 144 Introduction to Design and Manufacturing .....	4
MATH 344 Linear Analysis II .....	4
ME 326 Intermediate Dynamics .....	4
Select 12 units from the following:.....	12
BIO 361, 432, 442; CHEM 305, 371; CSC 471;	
EE 336, 419; ENVE 304, 331, 421, 443; MATE	
330; ME 328, 329, 401, 428, 445; STAT 312, 321,	
350	
Advisor approved electives.....	14
	<b>46</b>

*Corrected (10-31-11)*<sup>1</sup> BMED 212 may be substituted for ENGR 112.<sup>2</sup> A minimum of 35 units at 300-400 level must be completed, in a concentration, individual course of study or free electives, in addition to those required in Major, Support and General Education, for a total of 60 upper division units.



**Biomedical Engineering Concentration**

CHEM 312 Survey of Organic Chemistry .....	4
CHEM 313 Survey of Biochemistry and Biotechnology	5
ENGR <del>450</del> 451 Special Topics in Bioengineering .....	4
IME 144 Introduction to Design and Manufacturing	4
MATE 425 Corrosion Engineering .....	4
Select 12 units from the following:.....	12
BIO 361, 432; BOT 426; CHEM 305, 306, 371, 473, 475, CSC 473, 474; ENVE 304, 331; MATE 446; MATH 344; IME 319, 437; ME 326, 401, 422, 423, 445; PHYS 315, 323; STAT 312, 321, 350	
Advisor approved electives .....	13
	<hr/> 46
<b>Individualized Course of Study</b> .....	46

Technical electives. A minimum of 35 units must  
be at 300-400 level.

*Corrected (10-31-11)*

## GEOGRAPHIC INFORMATION SYSTEMS FOR AGRICULTURE MINOR

BioResource and Agricultural Engineering  
Bldg. 08, Room 101, (805) 756-2378

### Coordinator: Tom Mastin

An interdisciplinary program sponsored by three departments in CAFES: BioResource and Agricultural Engineering, Natural Resources Management, and Horticulture and Crop Science. New technologies of geographic information systems (GIS), global positioning systems (GPS), and orthophotography (uniform scale aerial photographs) are revolutionizing the management of resources. There are great employment opportunities for those who understand these technologies. Students interested in this minor may come from the following majors: forestry and natural resources, crop science, soil science, landscape architecture, agricultural systems management, bioresource and agricultural engineering, animal science or earth sciences.

### Required Courses

BRAE 133 Engineering Design Graphics (1 or 2) and BRAE 151 CAD for Agric. Engr. (1); or CE 114 Intro. CAD Civil & Environ. Engr (4); or LA 111 3-D Graphics/Landscape Arch (4) and LA 310 Intro Computing/Landscape Arch (2) or CE 112 Design Principles in Civil Engr (2) and CE 113 Computer Aided Drafting in Civil Engr (2) ..	2/3/4/6
BRAE 239 Engineering Surveying.....	4
BRAE 345 Aerial Photogrammetry/Remote Sensing	3
NR/LA 318 Applications in GIS .....	3
NR 418 Applied GIS or BRAE/LA/HCS 470 Selected Adv. Topics .....	3
<b>Emphasis areas</b> (select one) .....	12
<i>Environmental Information Emphasis</i>	
BRAE 447 Adv Surveying-GIS Applications (4) NR 306 Natural Res Ecology/Habitat Mgt (4) or BIO 325 General Ecology (4) NR 416 Environmental Impact Analysis/Mgmt (4)	
<i>Precision Agriculture Emphasis</i>	
CRSC 244 Precision Farming (4) Select two of the following (8): BRAE 447; CRSC 421, 445; HCS 410; PPSC 405, 431; SS 433; VGSC 423	
(6/30/14)	<del>28</del> 27-31

**2009-11 Cal Poly Catalog****Modern Languages & Literatures Department****GERMAN MINOR**

<b>Required courses</b>	<i>Units</i>
GER 122 Intermediate German <i>or</i> GER 202 (9/27/13) .....	4
GER 233 Critical Reading-German Literature (C1)	4
<sup>1</sup> GER 301 Adv. German Composition/Grammar <i>or</i>	
<sup>1</sup> GER 302 Adv. German Conversation/Grammar	4
<b>Electives to be chosen from the following:.....</b>	<b>12</b>
GER 301 Adv. German Composition/Grammar (4)	
GER 302 Adv. German Conversation/Grammar (4)	
GER 305 Significant Writers in German (4) (C4)	
(repeatable to 8 units)	
GER 350 German Literature in English Translation	
(4) (C4)	
GER 470 Selected Advanced Topics (4)	
(repeatable to 8 units)	
HUM 310 Humanities in World Cultures	
(German) (4) (C4)	
MLL 400 Special Problems for Advanced	
Undergraduates (1-2) <i>Effective Summer 2009</i>	
	<hr/> 24

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<sup>1</sup> Not repeatable as elective units.

**2009-11 Cal Poly Catalog****Psychology and Child Development****Department****GERONTOLOGY MINOR AND CERTIFICATE PROGRAM**

An interdisciplinary minor that prepares students in various majors whose careers will be directly or indirectly related to gerontology. The certificate program is available to upgrade the skills and increase the knowledge of persons already in the field of gerontology. Coursework includes the psychological, biological, and social aspects of aging; changing roles; stress-related problems; and an understanding of the impact of an aging population on social, economic, and political institutions. *Among the requirements for admission to the program is a minimum GPA of 3.00. All applicants are reviewed by the program coordinator.*

<b>Required core</b>	<i>Units</i>
KINE 408 Exercise/Health Promotion for Sr Adults	4
PSY 318 Psychology of Aging (D5) .....	4
SOC 326 Sociology of the Life Cycle .....	4
FSN 315 Nutrition in Aging .....	4
<b>Advisor approved electives (choose two) .....</b>	<b>8</b>
May be selected from: ANT 344; BIO 302, 305; COMS 418; FSN 210 or PSY 256; PHIL 339; PSY 310, 317, 459	
<b>Gerontology-related Fieldwork .....</b>	<b>4</b>
<b>PSY 401 or advisor approved course.</b> May be fulfilled as an elective in the student's major or may be challenged due to previous work. (9/26/11)	

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# Graduate Programs

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Accounting .....	<a href="#"><u>MS</u></a>
Business Administration.....	<a href="#"><u>MBA</u></a>
Business and Technology .....	<a href="#"><u>MS</u></a>
Economics .....	<a href="#"><u>MS</u></a>
Engineering Management.....	<a href="#"><u>MBA/MS</u></a>

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## Master of Business Administration

Chris Carr, Associate Dean of Graduate Programs  
and Faculty Development  
Business Bldg. (03), Room 409  
805 756-2637

[mba@calpoly.edu](mailto:mba@calpoly.edu)

[www.cob.calpoly.edu/gradProgram](http://www.cob.calpoly.edu/gradProgram)

### Programs of Study/Specializations Available

MBA – General Management Specialization

MBA – Agribusiness Specialization

MBA – Graphic Communication Document Systems  
Management Specialization

MBA – Architectural Management Track

MBA – Landscape Architectural Management Track

### General Characteristics

Cal Poly's MBA programs are designed to prepare students to enter successful management positions in industry, government, and not-for-profit organizations. The programs give graduates a broad management background. Cal Poly's MBA programs are 60 to 64 units in length, depending on specialization, and consist of required courses and advanced elective courses.

The learning goals of the MBA programs are for students to be able to:

- Demonstrate an understanding of and ability to integrate general business concepts, theories, strategies, perspectives.
- Recognize issues and solutions using an approach that reflects ethical and sustainable values.
- Apply analytics to decision-making.
- Demonstrate knowledge of the issues involved in conducting business in a diverse, global environment.
- Recognize leadership skills and link them to leadership theory, demonstrate effective written communication and oral communication and presentation skills, and recognize and explain effective team behavior.

### Prerequisites

Students are required to possess a bachelor's degree from an accredited program. The MBA program is specifically designed to provide the essential business knowledge to students without prior business background. Therefore, no specific prerequisite courses are required, but a basic knowledge of statistics is highly recommended.

### Admission/Acceptance Requirements

Admission to the MBA programs is based upon:

- successful completion of an accredited undergraduate program of study
- prior academic performance with particular emphasis placed on the last 90 quarter units (60 semester units)
- achievement on the Graduate Management Admission Test (GMAT), with particular emphasis placed on performance on the quantitative portion of the GMAT
- prior work experience (desirable).

### Culminating Experience

In order to satisfy the culminating experience requirement, students must satisfactorily complete a comprehensive examination at the end of GSB 562 or GSB 567. Other courses and/or options may be available, but must be approved in advance by the Associate Dean of Graduate Programs.

## PROGRAMS OF STUDY

### MBA – General Management

This program allows students to take electives of particular interest that fit their specific needs or career objectives. The program consists of 36-quarter-units of required courses with the remaining elective units selected from a focused group of advanced courses.

*Units*

<b>MBA Common Required Courses .....</b>	<b>36</b>
GSB 511 Accounting for Managers (4)	
GSB 512 Quantitative Analysis (4)	
GSB 513 Organization Behavior (4)	
GSB 523 Managerial Economics (4)	
GSB 524 Marketing Management (4) <i>or</i>	
<b>GSB 573 Marketing Research (4) (8/29/12)</b>	
GSB 531 Managerial Finance (4)	
GSB 533 Aggregate Economic Analysis and Policy (4)	
GSB 534 Production and Operations Mgmt (4)	
GSB 562 Seminar in General Mgmt & Strategy (4)	
<i>or</i> GSB 567 Adv Sem International Business Mgmt (4) <i>or</i> other approved culminating experience	
<b>Advisor approved electives.....</b>	<b>24</b>
	<b>60</b>

**MBA – Agribusiness Specialization**

This specialization is offered in conjunction with the Agribusiness Department in the College of Agriculture, Food and Environmental Sciences. The program is designed for those interested in agribusiness management careers. Graduates are prepared for large farm and ranch management as well as for positions in supporting agribusiness industries such as commodity marketing or food processing.

	<i>Units</i>
<b>MBA Common Required Courses</b> .....	36
GSB 511 Accounting for Managers (4)	
GSB 512 Quantitative Analysis (4)	
GSB 513 Organization Behavior (4)	
GSB 523 Managerial Economics (4)	
GSB 524 Marketing Management (4) <i>or</i> GSB 573 Marketing Research (4) (8/29/12)	
GSB 531 Managerial Finance (4)	
GSB 533 Aggregate Economic Analysis and Policy (4)	
GSB 534 Production and Operations Mgmt (4)	
GSB 562 Seminar in General Mgmt & Strategy (4) <i>or</i> GSB 567 Adv Sem International Business Mgmt (4) <i>or</i> other approved culminating experience	
<b>Specialization Required Courses</b> .....	20
AGB 514 Agribusiness Managerial Leadership (4)	
AGB 539 Graduate Internship in Agriculture (4)	
AGB 543 Agribusiness Policy/Program Analysis (4)	
AGB 554 Food System Marketing (4)	
AGB 555 Technological and Economic Change in Agribusiness (4)	
<b>Advisor approved electives</b> .....	8
	64

**MBA – Graphic Communication Document Systems Management Specialization**

This specialization is offered in conjunction with the Graphic Communication Department in the College of Liberal Arts, and is designed for those interested in graphic communication-related management careers. The program, focused on document systems management, contains a strong research component, including research assignments relevant to an individual company and the document industry as a whole. Students participate in research and development projects for the Graphic Communication Institute at Cal Poly.

	<i>Units</i>
<b>MBA Common Required Courses</b> .....	36
GSB 511 Accounting for Managers (4)	
GSB 512 Quantitative Analysis (4)	
GSB 513 Organization Behavior (4)	
GSB 523 Managerial Economics (4)	
GSB 524 Marketing Management (4) <i>or</i> GSB 573 Marketing Research (4) (8/29/12)	

- GSB 531 Managerial Finance (4)  
 GSB 533 Aggregate Economic Analysis and Policy (4)  
 GSB 534 Production and Operations Mgmt (4)  
 GSB 562 Seminar in General Mgmt & Strategy (4)  
*or* GSB 567 Adv Sem International Business Mgmt (4) *or* other approved culminating experience

<b>Specialization Required Courses</b> .....	16
GRC 595 Internship/Co-Op Experiential Education (8)	
GRC 500 Special Problems in GRC (8)	
<b>Advisor approved electives</b> .....	12
	64

**MBA – Architectural Management Track**

This program is available only to those students who are enrolled in Cal Poly's Bachelor of Architecture (BArch) program. During the fifth/final year of the architecture program, students may request permission to enroll in MBA courses. See page 134 for additional information.

**MBA – Landscape Architecture Management Track**

This program is available only to those students who are currently enrolled in Cal Poly's Bachelor of Landscape Architecture (BLA) program. During the fifth/final year of the landscape architecture program, students may request permission to enroll in MBA courses. See page 143 for additional information.

**Option to Concurrently Pursue MBA & Another Master's Degree**

The Orfalea College of Business permits students to develop an individualized program of study that incorporates the required elements of two distinct Cal Poly graduate degree programs. This option offers graduate students the opportunity to simultaneously pursue an MBA degree in the Orfalea College of Business and an MA or MS degree in one of Cal Poly's other colleges.

To participate in this option, students must apply to, meet the qualifications for, and be accepted into each program separately. Students must first apply for formal admission to one specific Cal Poly graduate program such as the MBA program. After enrollment in a specific graduate program, the student must apply to, meet the qualifications for, and be accepted into the second program. The two degrees must be awarded in the same quarter.

Depending upon the combination of degrees pursued, students may be permitted to substitute courses in the other graduate degree program for similar courses in the MBA program, thereby reducing the overall number of units. Such substitutions must be approved in advance by the OCOB Associate Dean of Graduate Programs and generally are limited to a maximum of three courses.



**2009-11 Cal Poly Catalog****Graphic Communication Department****BS GRAPHIC COMMUNICATION [Flowchart](#)**

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                      ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major, support or concentration courses may be taken as credit/no credit.

**MAJOR COURSES**

GRC 101 Introduction to Graphic Communication..	3
GRC 201 Digital Publishing Systems .....	3
GRC 202 Digital Photography .....	3
GRC 203 Digital File Preparation and Workflow ....	3
GRC 211 Substrates, Inks and Toners.....	4
GRC 218 Digital Typography .....	4
GRC 316 Flexographic Printing Technology .....	3
GRC 320 Managing Quality in Graphic Comm .....	4
GRC 324 Binding, Finishing and Distrib Processes	3
GRC 328 Sheetfed Printing Technology .....	4
GRC 329 Web Offset and Gravure Printing Tech....	3
GRC 338 Digtl Content Mgmt/Variable Data Pub...	4
GRC 361 Marketing and Sales Management for Print/Digital Media .....	4
GRC 402 Digital Printing and Emerging Technologies in Graphic Communication .....	3
GRC 403 Estimating for Print/Digital Media.....	4
GRC 411 Strategic Trends and Costing Issues in Print and Digital Media .....	4
GRC 421 Production Mgt for Print/Digital Media...	4
GRC 422 Human Resource Management Issues for Print/Digital Media .....	4
GRC 460 Research Methods in Graphic Comm .....	2
GRC 461 Senior Project.....	3
GRC 472/GRC 473/GRC 485 .....	4
Concentration courses (see below) .....	29

**102****SUPPORT COURSES**

PSC 101/PHYS 104/PHYS 121 (Area B)* .....	4
CHEM 110 World of Chemistry <i>or</i> CHEM 111 Survey of Chemistry (B3&B4)* .....	4/5
MATH 118 Pre-Calculus Algebra .....	4
(MATH 116 & MATH 117 substitute)	
STAT 217 Intro to Stat Concepts/Methods (B1)* ...	4

**16/17****GENERAL EDUCATION (GE)**

72 units required, 16 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (4 units)**

B1 Mathematics/Statistics * 8 units in Support....	0
B2 Life Science .....	4
B3 Physical Science * 4 units in Support.....	0

B4 One lab taken with B3 course

B5 elective

Area B elective (select one course from B1-B5) \*

4 units in Support..... 0

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division) (4 units)**

(Not GRC) 4/13/09 ..... 4

**56**

**FREE ELECTIVES** ..... **5-6**

**180****CONCENTRATIONS (select one)****Design Reproduction Technology Concentration**

ART 105 Foundation: Color Theory .....	4
ART 106 Foundation: 2-Dimensional Design .....	4
GRC 337 Consumer Packaging .....	3
GRC 339 Web Design and Production .....	4
GRC 439 Book Design Technology .....	4
GRC 440 Magazine and Newspaper Design Tech...	4
Select 6 units from the following .....	6
GRC 322 Advanced Digital Typography (3)	
GRC 331 Color Management and Quality Analysis (4)	
GRC 429 Digital Media (3)	
GRC 451 Mgmt Topics in Graphic Comm. (3)	
GRC 452 Emerging Digital Topics in Graphic Communication (3)	
GRC 453 Design Reproduction Topics in Graphic Communication (3)	
Other courses as approved by academic advisor	

**29****Graphics for Packaging Concentration**

GRC 204 Introduction to Contemporary Print Management and Manufacturing .....	4
GRC 331 Color Management & Quality Analysis ..	4
GRC 337 Consumer Packaging .....	3
GRC 357 Specialty Printing Technologies .....	3
FSN 230 Elements of Food Processing .....	4
FSN 354 Packaging Function in Food Processing...	3
IT 330 Fundamentals of Packaging .....	4
Approved elective. <i>Select one course from:</i> .....	4
FSN 335 Food Quality Assurance (4)	
IT 341 Plastic Processes and Applications (4)	
IT 408 Paper and Paperboard Packaging (4)	
IT 409 Machinery for Packaging (4)	
IT 435 Package Development (4)	

IT 457 Radio Frequency Identification (4)	
IT 475 Packaging Performance Testing (4)	
	29

### Graphic Communication Management Concentration

GRC 204 Introduction to Contemporary Print Management and Manufacturing .....	4
BUS 207 Legal Responsibilities of Business .....	4
BUS 212 Financial Accounting for Non-business Majors.....	4
BUS 382 Organizations, People and Technology ....	4
COMS 213 Organizational Communication .....	4
Select 9 units from the following: .....	9
GRC 337 Consumer Packaging (3)	
GRC 451 Management Topics in Graphic Communication (3)	
GRC 452 Emerging Digital Topics in Graphic Communication (3)	
BUS 303 Intro to International Business (4)	
BUS 310 Introduction to Entrepreneurship (4)	
Other courses as approved by academic advisor	
	29

### Web and Digital Media Concentration

CSC 171 Introduction to Interactive Entertainment	4
GRC 331 Color Management & Quality Analysis...	4
GRC 339 Web Design and Production.....	4
GRC 429 Digital Media .....	3
Approved electives Set 1 .....	6
<i>Select 6 units from the following:</i>	
CSC courses (any, up to 6 units)	
GRC 400 Special Probs/Adv Undergrads (1-2)	
GRC 451 Management Topics in GRC (3)	
GRC 452 Emerging Digital Topics in GRC (3)	
GRC 453 Design Repro Topics in GRC (3)	
Approved electives Set 2 .....	8
<i>Select 8 units from the following:</i>	
ART 121 Basic Digital Photography (4)	
ART 383 Digital Video (4)	
ART 388 Web Design (4)	
ART 484, Animation, Video, and Interactive Design (4)	
ART 488 Advanced Web Design (4)	
ENGL 411 New Media Arts I (4)	
ENGL 412 New Media Arts II (4)	
MU 311 Sound Design: Technologies (4)	
MU 312 Sound Design: Recording (4)	
	29

### Individualized Course of Study

A minimum of 18 units must be upper division and a minimum of 8 units must be Graphic Communication. The student selects the courses in consultation with concentration coordinator and department head, and provide written justification for the courses and the way they constitute a cohesive, integrated program of study.....	29
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**2009-11 Cal Poly Catalog****[Cal Poly Continuing Education](#)****GS—GRADUATE STUDIES****GS 597 Continued Graduate Study (1-15) (CR/NC)**

Activities other than regular coursework that are needed to complete the requirements for the degree. Analysis of data, thesis and project report writing, oral defense of the thesis/project, preparation for the comprehensive exam, and other activities related to the culminating experience for the student's program. Can be used to fulfill the continuous enrollment requirement for graduate students. Units earned in this course may not be used toward degree completion. Credit/No Credit grading only. Total credit limited to 15 units; repeatable in same term. Prerequisite: Must be in good standing in a graduate program at Cal Poly. *New course, effective Fall 2009.*

## 2009-11 Cal Poly Catalog

### Graduate Programs, Orfalea College of Business

#### GSA—GRADUATE STUDIES—ACCOUNTING

##### GSA 535 Legal Aspects of Commercial Transactions (4)

Relation of the legal, regulatory, and ethical environment to commercial transactions. Examination of the law of competitive torts and unfair competition, property, sales, commercial paper, secured transactions, bankruptcy, securities regulation, and environmental regulation, with an emphasis on the Uniform Commercial Code. Case studies. 4 seminars. Prerequisite: Graduate standing or approval from the program director.

##### GSA 536 Taxation of Trusts, Estates, and Transfer Taxes (4)

Income taxation of trusts and estates as flow-through entities; transfer taxation of gifts and estates, including generation-skipping transfers. 4 lectures. Prerequisite: Graduate standing or approval from the program director.

##### GSA 537 State and Local Taxation (4)

Multi-state income and franchise taxation; property taxes; sales and use taxes; and the constitutional authority for the imposition of state taxes. 4 lectures. Prerequisite: Graduate standing or approval from the program director.

##### GSA 538 Current Developments in Taxation (4)

Current developments in income taxation of individuals, trusts and estates and business entities; transfer taxation of gifts and estates; and ethics and professional responsibility in taxation. 4 lectures. Prerequisite: Graduate standing or approval from the program director.

##### GSA 539 Clinical Tax Education Internship (9) (CR/NC)

Accounting internship that allows graduate level accounting students the opportunity to apply skills and competencies to an employment opportunity. Placement in a full-time supervised work experience at a public accounting firm or in an accounting or internal audit department of a private enterprise or government agency. **Credit/No Credit grading only.** Prerequisite: Graduate standing in Specialization in Tax, MS Accounting program. *Corrected; change effective Winter 2008.*

##### GSA 540 Taxation of Corporations and Partnerships (4)

Comparative study of the taxation of C corporations and flow-through tax entities, including S corporations, partnerships and limited liability companies. Not open to students with credit in BUS 417. 4 lectures. Prerequisite: Graduate standing or approval from the program director.

##### GSA 541 Advanced Financial Reporting Issues I (4)

Comprehensive coverage of selected advanced financial accounting and reporting topics. Topics include ~~software costs, compensation plans, earnings per share, accounting changes and errors, leases, pensions and other post-retirement plans~~ employment benefits, income taxes, ~~dollar-value LIFO inventories~~ and consolidated financial statements. 4 seminars. Prerequisite: ~~BUS 321 and BUS 322 or consent of instructor.~~ Graduate standing or approval from the Associate Dean of OCOB Graduate Programs. *Change effective Fall 2010.*

##### GSA 542 Auditing (4)

Survey of the ethical, regulatory and legal environment in which audits occur. An appreciation of how audit risk is assessed, how auditors evaluate clients' internal control structures, the role of evidence in an audit, and the audit reporting requirements. 4 seminars. Prerequisite: ~~BUS 321, BUS 322, graduate standing.~~ Graduate standing or approval from the Associate Dean of OCOB Graduate Programs. *Change effective Winter 2011.*

##### GSA 543 Advanced Financial Reporting Issues II (4)

Comprehensive coverage of selected advanced financial accounting and reporting topics. Topics include restructuring charges, segments, foreign currency transactions and derivatives, interim accounting disclosures, and advanced consolidated statement topics. 4 seminars. Prerequisite: GSA 541.

##### GSA 544 Advanced Enterprise Wide Business Processes (4)

Study of various transactions in order to understand the underlying business processes and information flows between various business units, in order for a transaction to occur and be properly reported, and the information determined that is critical for the information system to capture. Emphasis of role of information systems in controlling the authorization of transactions, access to information, access to assets, preparation of accounting records and reports. 3

seminars, 1 activity. Prerequisite: ~~BUS 429.~~ Graduate standing or approval from the Associate Dean of OCOB Graduate Programs. *Change effective Winter 2011.*

##### GSA 545 Applied Research and Communications (4)

Advanced use of authoritative accounting and auditing data bases and actual filings by public companies. Frequent writing and speaking exercises. Real world accounting and auditing issues facing public and private enterprises. In-depth coverage of federal and state regulation of securities transactions. Prerequisite: ~~BUS 543.~~ Graduate standing or approval from the Associate Dean of OCOB Graduate Programs. *Change effective Winter 2011.*

##### GSA 546 Tax Research and Administrative Procedures (4)

Research techniques applicable to tax issues including the communication of research results. Administrative procedures necessary for tax compliance with the various tax jurisdictions with primary emphasis on IRS practices. 2 seminars, 2 activities. Prerequisite: Graduate standing or approval from the program director.

##### GSA 547 Corporate Taxation (4)

Income tax treatment of regular C corporations and their shareholders. The creation, operation, and liquidation of such organizations. 4 seminars. Prerequisite: GSA 546.

##### GSA 548 Advanced Individual Taxation and Tax Planning (4)

Advanced concepts concerning the impact of taxes on individuals. Introduction to transfer taxes imposed on individuals. Financial, estate and compensation tax planning issues. 4 seminars. Prerequisite: Graduate standing or approval from the program director.

##### GSA 549 Advanced Taxation of Flow-Through Entities (4)

Advanced and special topics related to the income tax treatment of partnerships, limited liability companies, trusts and S corporations and their owners and beneficiaries. Creation, operation, liquidation and sale of such organizations. Culminating experience for Taxation Specialization. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

##### GSA 550 Advanced Corporate Taxation (4)

Advanced and special topics related to the income tax treatment of regular corporations and their shareholders. Mergers and acquisitions, tax accounting methods and periods, cross-boundary topics, and current issues. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

##### GSA 551 International Taxation (4)

Fundamental tax concepts of inbound and outbound investments of U.S. taxpayers, controlled foreign corporations, Subpart F, the foreign tax credit, transfer pricing and contracting country treaties. 4 lectures. Prerequisite: Two courses in federal taxation, including BUS 417 and BUS 320 or equivalent or consent of instructor. *New course, effective Winter 2010.*

##### GSA 570 Selected Advanced Topics (1-4)

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Graduate standing or consent of instructor.

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### Graduate Programs, Orfalea College of Business

## GSB–GRADUATE STUDIES–BUSINESS

### GSB 500 Independent Study (1-4)

Advanced study planned and completed under the direction of the Director of Graduate Programs. Open only to graduate students who have demonstrated ability to do independent work. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. Prerequisite: OCOB graduate standing and formal petition with approval from the Associate Dean of OCOB Graduate Programs.

### GSB 501 Individual Research (1-4)

Advanced individual research planned and completed under the direction of a member of the college faculty. Designed to meet the needs of qualified students who wish to pursue investigations which cannot be followed effectively in regularly offered elective courses. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. Prerequisite: OCOB graduate standing and formal petition with approval from the Associate Dean of OCOB Graduate Programs.

### GSB 503 Collaborative Industry Project (1-8)

Collaborative business project with a client organization that allows graduate level students the opportunity to apply knowledge, skills and competencies to address a business problem. Small teams work in collaboration with a client organization and a faculty advisor. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. The project may last up to one year. Prerequisite: OCOB graduate standing and formal petition with approval from the Associate Dean of OCOB Graduate Programs.

### GSB 511 Accounting for Managers (4)

Emphasis on development of the ability to read and interpret public and internal financial reports. Public reporting responsibilities of companies and management's responsibilities for developing and maintaining effective internal control systems. 3 lectures, 1 activity. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

### GSB 512 Quantitative Analysis (4)

Focus on a variety of statistical techniques that help to transform data into useful information that can be used to make informed business predictions and decisions. 3 seminars, 1 laboratory. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

### GSB 513 Organizational Behavior (4)

Application of behavioral, social and organizational science concepts to management. Individual, team and organizational levels of analysis, including such topics as expectations, perception, motivation, communications, creativity, leadership, cultural and ethical behavior, group dynamics, team effectiveness, work design, organization change and development. 4 seminars. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

### GSB 514 The Legal and Regulatory Environment of Business (4)

Legal and regulatory environment in which business operates. Consideration of historical, societal, and global perspectives reflecting political, social and/or economic beliefs and values. Strong emphasis on fundamental concepts of law and analytical tools to understand interaction between law, ethics and management decisions. 4 seminars. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

### GSB 522 Advanced Management Information Systems (4)

Analysis of the challenges, successes, and failures managers face when planning for and implementing information system initiatives, particularly enterprise systems such as supply chain management, customer relationship management and enterprise resource planning systems. Focus on the strategic and operational impact of emerging information technologies in modern day business management. Design and development of knowledge worker applications including database and decision support systems. ~~Set of tools to ensure understanding of the strategies, tactics, and operations employed by managers to assimilate technology across their firms. Critical topics include alignment, partnership, technology, human resources, governance, communications, and metrics.~~ 3 lectures, 1 activity.

Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs. *Change effective Winter 2011.*

### GSB 523 Managerial Economics (4)

Managerial economics, or microeconomics, focuses on private markets. Choices made by firms and consumers within topics that include demand, supply, efficiency, marketing structure, and government intervention. Development of an analytical framework for analyzing how these topics are important for managers. 4 lectures. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

### GSB 524 Marketing Management (4)

Introduction to marketing management. Concepts and principles necessary to plan, direct and control the product, promotion, distribution and pricing strategies of the firm. 4 lectures. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

### GSB 525 Project Management (4)

Focus on project management tools and processes required to establish priorities for and management of projects within normal and abnormal scope, money and time constraints. Planning, organizational and resource challenges common to a variety of project types. Product life cycle, normal operational, new product introduction and profit oriented product family projects reviewed in service and production environments. 3 lectures, 1 laboratory. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

### GSB 526 Knowledge Management and Business Intelligence (4)

Relationships among knowledge management (KM), knowledge organizations and knowledge workers. Mapping of the field of knowledge management and exploration of the nature and key features of KM. Discussion of knowledge management and business intelligence central themes using case studies; alternative ways to design, implement and improve KM systems in organizations; business intelligence, decision support systems and data warehousing. Integration of querying, reporting, OLAP, data mining and data warehousing functions. 3 lectures, 1 activity. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

### GSB 527 Management of Information Security (4)

Topics of information security and the need for security from a managerial perspective. Legal, ethical and professional information security issues. Planning for security and contingency considerations. Business policies and programs for organizational security. Risk management and control as mechanisms for protection. Examples of information security issues and practices implemented in today's business environment. 3 lectures, 1 activity. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

### GSB 528 Commercial Development of Innovative Technologies (4)

Conceptual business frameworks for commercialization of new and innovative products and technologies. Business aspects of innovative technologies as they relate to core functional areas such as finance, accounting, marketing, operations, and business and intellectual property law. 4 lectures. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

### GSB 529 Effective Communication Skills for Managers (4)

Enhancement of business writing and oral presentation skills, organized around two areas: 1) preparing written business documents and reports, and 2) professional oral presentation skills. Preparation of a variety of business reports and documents. Multiple business presentations. 4 lectures. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

### GSB 531 Managerial Finance (4)

Theories, practices and tools of corporate financial decision making. Topics include valuation of fixed income securities and stocks, capital budgeting, capital structure, dividends, and an overview of financial markets and institutions. Introduction to valuation of derivative securities, market efficiency, and agency costs. 4 seminars. Prerequisite: GSB 511 and OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

### GSB 533 Aggregate Economics Analysis and Policy (4)

Development of the theoretical and empirical framework of the macroeconomy in which businesses must operate. Topics include GDP, inflation, unemployment, interest rates and monetary and fiscal policies. The dynamics of the macroeconomic environment over time. 4 lectures. Prerequisite: GSB 523



and OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 534 Production and Operations Management (4)**

Introduction to the operations function and its interaction with other areas in an organization. Emphasis on strategic and tactical decisions to achieve competitive advantage in cost, delivery speed and reliability, quality, flexibility, and product innovation through manufacturing and services. 4 seminars. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 537 Corporate Governance in Ethical Organizations (4)**

Coverage of mechanisms, at the firm level, that contribute to more effective corporate governance and ethical climate at publicly traded corporations. Topics include role of boards of directors, audit committees, structures and systems that affect ethical climate in organizations. 4 lectures. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 538 Emerging Issues in Business (4)**

Focus on one or more developing, cutting-edge issues facing contemporary managers within a specific business discipline. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 seminars. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 539 Graduate Internship in Business (2-8) (CR/NC)**

Correlation of experience and academic knowledge. Placement in a supervised business or public organization. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. Credit/No Credit grading only. Prerequisite: OCOB graduate standing and formal petition with approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 541 Federal Income Tax for Business (4)**

An introduction to the principles of business taxation. Emphasis of the role taxes play in financial and managerial decision making and how taxes motivate people and institutions to engage in certain transactions and activities. 4 lectures. Prerequisite: GSB 511 and OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 555 Negotiation for Managers (4)**

Negotiation concepts and practice in two-party and multiple-party situations faced by practicing managers. 4 seminars. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 556 Entrepreneurship and New Venture Small-Business Management (4)**

Exploration of entrepreneurship with emphasis on the formation and management of new business ventures. Analysis of typical operating problems of these firms and application of appropriate techniques for their solution. 4 seminars. Prerequisite: OCOB graduate standing or approval from the OCOB Graduate Programs Director. *Change effective Winter 2010.*

#### **GSB 560 Derivative Markets and Instruments (4)**

Introduction to derivative markets and their key instruments. Application of financial theory to the problems of valuing derivative securities and the management of business risks with derivative instruments. Principal securities considered include forwards, futures, options, and swaps. 4 lectures. Prerequisite: GSB 531 and OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 562 Seminar in General Management and Strategy (4)**

Application of interdisciplinary skills to business and corporate strategy formulation and implementation. Analysis of interdependence between external environments and internal systems. Focus on responsibilities, tasks, and skills of general managers. Case studies, group problem solving. Integrating course of MBA core curriculum. Course satisfies comprehensive examination requirement. 4 seminars. Prerequisite: OCOB graduate standing and GSB 511, GSB 513, GSB 523, GSB 524, GSB 531, GSB 533 and either GSB 512 or IME 503 and either GSB 534 or IME 580 or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 563 International Business Tour (4)**

Business tour exposure to different management systems and their operating environments. Pre-trip and on-the-road meetings, readings, case studies and discussions. Tours of firms, government offices, ministries, etc; interviews of managers and government officials. Conducted in English. Passport required. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 2

seminars, 2 activities. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 564 Entrepreneurial Finance (4)**

The process of financing new and fast-growing firms. Preparation of pro forma financial statements for a new venture. Readings on the venture capital process, from seed capital through the initial public offering (IPO). Valuation of firms seeking venture capital, and those planning their IPO. Valuing convertible securities. Real options valuation. 4 lectures. Prerequisite: GSB 531 and OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 567 Advanced Seminar in International Business Management (4)**

Integration of management concepts within complex multinational organizations. Interdisciplinary approach to identifying and assessing multinational and global competitive environments and strategies; structuring and managing interdependent multinational operations; addressing conflicts between domestic and international policies and practices in multinational enterprises. Case studies, simulations, group analysis and problem solving. Course satisfies the culminating experience through the comprehensive examination option. 4 seminars. Prerequisite: OCOB graduate standing and GSB 511, GSB 513, GSB 523, GSB 524, GSB 531, GSB 533 and either GSB 512 or IME 503 and either GSB 534 or IME 580 or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 569 Managing Technology in the International Legal Environment (4)**

Practical legal decisions required to conduct business for or with high technology companies. Methods to protect high technology developments in international markets, including copyrights, patents, trade secrets, trademarks and contracts. 4 seminars. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Total credit limited to 8 units. The Schedule of Classes will list title selected. 1-4 seminars. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 573 Marketing Research (4)**

Preparation to become competent users and creators of marketing research information. Focus on collecting customer information as well as analyzing, interpreting and presenting information to be used in executive decision making. 4 lectures. Prerequisite: OCOB graduate standing and GSB 524 and either GSB 512 or IME 503 or approval from the Associate Dean. *New course, effective Spring 2011.*

#### **GSB 574 Seminar in Labor-Management Relations (4)**

The impact of unionized labor on management practice. Three challenges to management; namely, the organizing challenge, the negotiation challenge, and the grievance/arbitration challenge. 4 seminars. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 576 Seminar in Quality and Performance Management (4)**

Principles and techniques of quality and performance management as applied to organizations in the private and public sector. Emphasis on competitive implications, integration of fundamental management techniques, quality management tools, and new management technologies focused on continuous organizational improvement. 4 seminars. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 577 Advanced Quantitative Business Analysis (4)**

The necessary conceptual framework of operations research techniques for solving key problems encountered while managing an enterprise. Concepts of linear programming, simulations, network models, inventory models, PERT/CPM, and forecasting techniques. 3 seminars, 1 laboratory. Prerequisite: GSB 512 and OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

#### **GSB 578 International Business Management (4)**

Managerial concepts and techniques appropriate for analysis and decision making within international businesses. Environmental and organizational factors influencing multinational operations. Assessing international market opportunities and entry modes. Complexities of multinational management strategy, structure and systems. 4 seminars. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.



**GSB 579 Manufacturing Strategy (4)**

Strategic role of manufacturing in the overall corporate competitive strategy. Matching manufacturing capabilities and marketing needs, capacity planning, matching process technology with product requirements. Developing flexible capabilities, central to developing and implementing an effective manufacturing strategy. 4 seminars. Prerequisite: GSB 534 and OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 583 Management of Human Resources (4)**

An overview of the major functional and support activities in the personnel/human resource field, including strategic human resource planning, job analysis, recruitment, selection, performance appraisal, compensation, employee rights, and employee safety and health. 4 seminars. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 584 Corporate Financial Policy (4)**

An overview of the factors that affect corporate financial decisions, including firms' financing, investment and hedging policies. Factors included: taxes, transaction costs, contracting (between managers and shareholders, and between shareholders and other claimholders such as bondholders), and asymmetric information. 3 seminars, 1 activity. Prerequisite: GSB 531 and OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 585 Investments and Portfolio Management (4)**

The application of financial theory to the problems of investment management. Topics cover the valuation of basic financial instruments, portfolio optimization, risk management, asset allocation, the CAPM, and market efficiency. Required use of optimization software and writing spreadsheet programs. 4 seminars. Prerequisite: GSB 531 and OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 586 Financial Markets and Instruments (4)**

The form and function of major types of financial institutions and markets. Exposure of financial institutions to a wide variety of risks, the successful management of which is important for the growth and survival of these institutions (liquidity risk, interest rate risk, market risk, credit risk, off-balance-sheet risk, and operating risk). In-depth exploration of the measurement and management of these risks. 4 seminars. Prerequisite: GSB 531 and OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 587 International Financial Management (4)**

The international aspects of corporate finance and investing. Balance of payments, foreign exchange with emphasis on exchange rate determination, exchange risk, hedging, and interest arbitrage, international money and capital markets, international financing, and international banking. 4 seminars. Prerequisite: GSB 531 and OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 589 Accounting Policy (4)**

Role of management in establishing and directing accounting policy. Coverage includes the impact of management decisions on external reporting and taxes and the impact of financial reporting requirements on management decisions. 4 seminars. Prerequisite: GSB 511 and OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 595 Managing Change (4)**

The knowledge and the elementary skills/competencies needed to intervene in an organization in order to improve its effectiveness. Design and use of action to improve organizational effectiveness. 4 seminars. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 596 Economic Forecasting (4)**

Applications to business planning of selected economic forecasting techniques. Classical time series analysis, Box-Jenkins (ARIMA) models, leading indicators and input-output analysis. 3 seminars, 1 laboratory. Prerequisite: GSB 523, GSB 533 and OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 597 Seminar in Selected Economic Problems (4)**

Selected economic problems analyzed at an advanced level in a particular field, such as international trade, public finance, urban, industrial organization or transportation. 4 seminars. Prerequisite: GSB 533 and OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

## 2009-11 Cal Poly Catalog

### Horticulture and Crop Science Department

## HCS—HORTICULTURE AND CROP SCIENCE

### HCS 110 Orientation to Horticulture and Crop Science (2) (CR/NC)

Understanding the depth and breadth of horticultural and field crops, and plant protection. Examination of curricula within the department, including potential career opportunities. Introduction to both student and professional organizations and affiliations. Agricultural equipment and chemical safety. Required of all Horticulture and Crop Science students. Credit/No Credit grading only. 2 activities.

### HCS 120 Principles of Horticulture and Crop Science (4)

Introduction to horticulture and crop science. Basic plant processes, classification, anatomy, physiology, and biotechnology. Effect of environment on plants and how we control it. Introduction to plant growth including propagation, media, irrigation, nutrition, management, harvest, and post harvest handling. People's use of plants. Field trip required. 3 lectures, 1 laboratory.

### HCS 124 Plant Propagation (4)

Plant propagation practices with emphasis on understanding why practices are used, how they work, and how they are applied in commercial horticulture. Field trip required. 3 lectures, 1 laboratory. Prerequisite: HCS 110, HCS 120, and BOT 121.

### HCS 200 Special Problems for Undergraduates (1–4)

Individual investigation, research, studies, or surveys of selected problems. Total graduation credit limited to 4 units, with a maximum of 4 units per quarter. Report required. Prerequisite: Consent of department head.

### HCS 231 Commercial Seed Production (4)

Production of field and vegetable seed. Seed technology, germination, quality control, seed enhancement, storage and handling of seed, and seed laws. Field trip to a seed conditioning/seed enhancement facility required. 3 lectures, 1 laboratory. Prerequisite: HCS 120, ~~CRSC 230~~ or VGSC 230, or consent of instructor. *Corrected effective Summer 2009.*

### HCS 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### HCS 304 Plant Breeding (4)

Principles and techniques used to develop new plant varieties. Sexual reproduction, inheritance, selection and biotechnology methods useful in breeding of plants. Field trip required. 3 lectures, 1 laboratory. Prerequisite: BIO 303, CRSC 132, HCS 120.

### HCS 327 Abiotic Plant Problems (3)

Diagnosis of physiological disorders associated with environmental and nutritional factors. Particular emphasis on the systematic inquiry process. Case histories, multimedia use. 2 lectures, 1 laboratory. Prerequisite: HCS 120, ~~EHS 423~~, HCS 124, ~~EHS 231~~, ~~EHS 232~~, BOT 121, CHEM 111, SS 121. *Changed effective Fall 2009.*

### HCS 329 Plants, Food and Biotechnology (4)

GE Area F

Agriculture as applied biology and its impact on civilization. Application of technology to increase the efficiency of food production. Genetics and biotechnology; culminating in an assessment of genetically engineered foods, the myths, the controversy, the science. 3 lectures, 1 laboratory. Prerequisite: Junior standing, completion of GE Area B, and one of the following: BIO 111, BIO 161, BOT 121, HCS 120. *Crosslisted as BOT/HCS 329.* Fulfills GE Area F.

### HCS 339 Internship in Horticulture and Crop Science (1–12) (CR/NC)

Selected Horticulture and Crop Science students will spend up to 12 weeks with an approved agricultural/horticultural firm engaged in production or related business. Time will be spent applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Consent of internship instructor prior to initiation of internship.

### HCS 340 Principles of Greenhouse Environment (4)

Analysis of problems and practices affecting the contemporary commercial horticulturist. Analysis and operation of greenhouses and related equipment

stressing the effect of environment on plant growth. Field trip required. 3 lectures, 1 laboratory. Prerequisite: HCS 120, EHS 245, or consent of instructor. *Formerly EHS 340.*

### HCS 400 Special Problems for Advanced Undergraduates (1–4)

Individual investigation, research, studies, or surveys of selected problems. Total degree credit limited to 4 units, with a maximum of 4 units per quarter. Report required. Prerequisite: Junior status or consent of department head.

### HCS 410 Crop Physiology (4)

Ecological and physiological interactions associated with the production of crop plants. Physiological and biochemical processes that elucidate the mechanism of whole plant performance and responses to the environment. 3 lectures, 1 laboratory. Prerequisite: HCS 120; BOT 121, or BIO 162; and CHEM 312 or consent of instructor.

### HCS 421 Postharvest Technology of Horticultural Crops (4)

Respiration, ethylene, ripening and senescence; modified atmosphere packaging, controlled atmosphere storage, packinghouses and transportation; survey of postharvest techniques to maximize commodity shelf-life. Field trip required. 3 lectures, 1 laboratory. Prerequisite: One production class in fruits, vegetables or ornamentals, or consent of instructor.

### HCS 450 Plant Biotechnology Laboratory (2)

Application of genetic engineering technology to plants; methods of plant tissue culture and transformation. 2 laboratories. Prerequisite: BIO 303 or BIO 351 or CHEM 373. *Crosslisted as BOT/HCS 450.*

### HCS 461 Senior Project I (2)

Selection of a project under faculty advisor approval. Initial research and data gathering period for project information. Projects typical of problems which graduates must solve in their fields of study or employment. Project results are presented in a formal written report completed in HCS 462. Contract drawn up with approval of advisor. Minimum 60 hours. Prerequisite: All 100–200 level courses in curriculum; 135 units; ENGL 134, completion of GE Area A.

### HCS 462 Senior Project II (2)

Continuation of Senior Project development. Write-up of rough draft and formal draft of project. Completion of formal written report under advisor supervision. Minimum 60 hours. Prerequisite: Completion of HCS 461 with a grade of C or better.

### HCS 463 Senior Seminar (1)

Oral presentations by students on their senior projects, critical thinking assignment. Preparation for entry into the business world. Guest speakers. 1 activity. Prerequisite: HCS 461.

### HCS 470 Selected Advanced Topics (1–4)

Directed group study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

### HCS 471 Selected Advanced Laboratory (1–4)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

### HCS 500 Individual Study in Horticulture and Crop Science (1–6)

Advanced independent study planned and completed under the direction of a member of the Horticulture and Crop Science faculty. Total credit limited to 6 units; may be repeated in same term. Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

### HCS 511 Ecological Biometrics (4)

General survey of current analytical methodology available to ecological researchers to evaluate effects and assess the underlying mechanisms that drive natural and cultivated ecosystems. Methodology includes general linear models, ordination, survival analysis, multivariate analyses, and computer simulations. Student research used as a basis for instruction. Total credit limited to 8 units. 3 seminars, 1 activity. Prerequisite: Any one of the following statistical methods courses: CRSC 411, STAT 212, STAT 218, STAT 313, STAT 512, STAT 513 or consent of instructor. *Crosslisted as HCS/PPSC 511.*

### HCS 539 Graduate Internship in Horticulture and Crop Science (1–9)

Application of theory to the solution of problems of agricultural production or related business in the fields of horticulture and crop science. Analyze specific management problems and perform general management assignments detailed in a contract between the student, the firm or organization, and the faculty advisor

before the internship commences. Degree credit limited to 6 units. Prerequisite: Consent of internship instructor.

**HCS 570 Selected Topics in Horticulture and Crop Science (1-4)**

Directed group study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 12 units; may be repeated in same term. 1-4 seminars. Prerequisite: Graduate standing or consent of instructor.

**HCS 571 Selected Topics Laboratory in Horticulture and Crop Science (1-4)**

Directed group laboratory of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 12 units; may be repeated in same term. 1-4 laboratories. Prerequisite: Graduate standing or consent of instructor.

**HCS 575 Postharvest Instrumentation and Experimentation (3)**

Hands-on instruction in the instrumentation available to conduct postharvest research, including discussions of the scientific methods and typical postharvest studies. Implementation and dissemination of a personalized postharvest experiment required, both as a slide presentation and a poster. Independent research. 3 laboratories Prerequisite: STAT 218 and senior or graduate standing.

## 2009-11 Cal Poly Catalog

### [History Department](#)

## HIST–HISTORY

### HIST 100 Introduction to the Study of History (2)

Introduction to the study of history, focusing on methods, topics, skills in the History major at Cal Poly, and internship and career opportunities. To be taken in the first year of study. 2 seminars. *New, effective Fall 2009.*

### HIST 110 Western Civilization: Ancient to Renaissance (4)

Beginnings of western civilization from the river valley societies of the Middle East, circa 3,000 BCE to the Renaissance in Western Europe to 1550 CE. Political, economic, social, intellectual, and artistic development of that period. 4 lectures.

### HIST 111 Western Civilization: Reformation to the Present (4)

Development of western civilization from 1550 CE to the present. Comparison of liberal modernization of the West with the conservative modernization in Central, East and Southeast Europe. Political, economic, social, intellectual, and artistic developments of that period. Particular attention to understanding dynamics that produce pluralistic mass societies such as Great Britain and France, and authoritarian mass societies such as Nazi Germany and the Soviet Union. 4 lectures.

### HIST 200 Special Problems for Undergraduates (1–4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department chair.

### HIST 206 American Cultures (4)

GE D1 USCP

The social, cultural, constitutional, and political history of African American, Asian American, Native American, European American, and Latino/a men and women. 4 lectures. Fulfills GE D1 and USCP.

### HIST 207 Freedom and Equality in American History (4) GE D1 USCP

The multiple and conflicting ways in which various Americans (defined in terms of race, class and gender) have struggled to formulate and promote their own understandings of freedom and equality, from the pre-conquest era to the present. 4 lectures. *Crosslisted as HIST/HNRS 207.* Fulfills GE D1 and USCP.

### HIST 208 Survey of California History (4)

USCP

Survey of California history from the pre-Columbian period to the present. Native American culture, Spanish imperialism, the Mexican War, gold rush, immigration, dominance of the Southern Pacific Railroad, progressivism, growth of Los Angeles, and California's impact on national and world economy and politics. 4 lectures. Fulfills USCP.

### HIST 210 World History I (4)

GE D3

Global history from the beginnings of organized agriculture to the Industrial Revolution. Focus on causation, using geography and cultural creation to high-light economic, political, social, and intellectual developments of the major civilizations of earth. 4 lectures. Open to Liberal Studies majors only. Fulfills GE D3.

### HIST 213 Modern Political Economy (4)

GE D2

The relationship between states and economies in the modern period. Themes of modernization, industrialization, and colonial expansion. The major theories of political economy, especially liberalism and socialism. 4 lectures. Fulfills GE D2.

### HIST 214 Political Economy of Latin America and the Middle East (4)

GE D2

Comparative examination of socio-economic structures of the Middle East and Latin America in the framework of global economy. Analysis of the historical context of integration of these two regions in the international economic system and the local reactions to the effects of global forces on national structures. 4 lectures. Fulfills GE D2.

### HIST 216 Comparative Social Movements (4)

GE D3

History of global social movements from the late nineteenth century to the present. May include, but not limited to: socialism, nationalism, feminism, fascism and communism, pacifism, life reform, gay liberation, indigenous peoples' movements, and environmentalism. Includes a service learning component. 4 lectures. *Crosslisted as HIST/HNRS 216.* Fulfills GE D3. *Change effective Spring 2010.*

### HIST 221 World History, Beginnings to 1000 (4)

GE D3

History of world societies in comparative global perspective. Cross-cultural exchange, interaction, and conflict in the making of the world to 1000, concentrating on the rise of earliest human communities, growth of states, economic, political, and cultural transformations. 4 lectures. Fulfills GE D3.

### HIST 222 World History, 1000-1800 (4)

GE D3

History of world societies in comparative global perspective. Cross-cultural exchange, interaction, and conflict in the making of the world to 1800, concentrating on the global interaction and integration, cultural and ecological exchange, economic, political, and cultural transformations. 4 lectures. Fulfills GE D3.

### HIST 223 World History, 1800 to Present (4)

GE D3

Comparative history of Western and non-Western societies in global perspective. Cross-cultural exchange, interaction, and conflict in the making of the modern world, with focus on the economic, political, and cultural transformations that facilitated and emerged from imperialism. 4 lectures. *Crosslisted as HIST/HNRS 223. Formerly HIST/HNRS 215.* Fulfills GE D3.

### HIST 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### HIST 300 Junior Seminar (4)

Historical analysis of selected problems and topics for undergraduates. Seminar format, intense discussion of readings and issues. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 seminars. Prerequisite: Completion of GE Area A. Completion of two courses in lower-division Area D (preferably D2 and D3). Junior standing or consent of instructor.

### HIST 303 Research and Writing Seminar in History (5)

Designed to develop student's ability to research and write an interpretive paper on a specific topic. Seminar participants practice the skills of library research, historical and historiographical analysis, and writing and revising. Paper in lieu of final examination. The Schedule of Classes will list topic selected. 4 lectures and research project. Prerequisite: Completion of GE Areas A1 and A3, and junior standing or consent of instructor.

### HIST 304 Historiography (4)

Theoretical approaches used to study the past, including scholarship on history and memory, the influence of interdisciplinary studies, the significance of race and gender as categories of analysis, and the place of history and the historian in contemporary society. 3 seminar meetings and research project. Prerequisite: HIST 303; junior standing or consent of instructor; and History major.

### HIST 306 The Witch-Hunt in Europe, 1400-1800 (4)

GE D5

A history of the development of witchcraft ideas, persecutions, and skepticism in the western world from 1400 to 1800, focusing on the legal, economic, social, and intellectual currents that produced, fired, and eventually ended the phenomenon. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and two courses from Areas D1, D2, D3, D4. Fulfills GE D5 except for History majors.

### HIST 307 European Thought, 1800-2000 (4)

GE D5

Intellectual and cultural history of Europe from the nineteenth century to the present. Liberalism, radical thought, feminism, evolutionary theory, psycho-analysis, structuralism, existentialism, and postmodernism. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and two courses from Areas D1, D2, D3, D4. Fulfills GE D5 except for History majors.

### HIST 308 The Trans-Atlantic Slave Trade (4)

GE D5

The African, Islam and Euro-American dimensions of the trans-Atlantic slave trade, with focus on its varying roots, organization and impact on cross-cultural and global levels. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and two courses from Areas D1, D2, D3. Fulfills GE D5 except for History majors.

### HIST 309 Cultures of West Africa and the African Diaspora (4)

GE D5

The cultures of West African and the African Diaspora, with special attention to the intersection of Animist, Islamic and Western cultures, and the survival of African cultures in the Americas as manifested in the artistic, religious, literary, and other humanistic legacies of the African Diaspora. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A, D1 and D3. Fulfills GE D5 except for History majors.

### HIST 310 East Asian Culture and Civilization (4)

GE D5

The pre-modern and modern histories of China and Japan. Focus on the traditional era, the transition to modernity, cultural uniqueness within East Asian civilization, and western images of Asia. 4 lectures. Prerequisite: Junior

standing; completion of GE Area A and two courses from Areas D1, D2, D3, D4. Fulfills GE D5 except for History majors.

#### **HIST 314 The Middle East (4)**

Political, social, and economic development of the Middle Eastern countries in the context of regional history and international politics since the birth of Islam. Particular attention to the resurgence of religious movements and their connection with nationalism and anti-colonialism in the region. 3 lectures and research project. Prerequisite: Junior standing.

#### **HIST 316 Modern East Asia (4) GE D5**

Modern histories of China, Japan and Korea: great disruptions of modernity that have transformed these societies, common characteristics of modernity in East Asia, great differences between Chinese, Japanese and Korean histories, and the mutually constitutive nature of these East Asian histories. 4 lectures. Prerequisite: Junior standing. Completion of GE Area A. Completion of two courses in lower-division Area D (preferably D2 and D3), or consent of instructor. Fulfills GE D5 except for History majors.

#### **HIST 317 The Lure of the Sea (4) GE D5**

The history of the sea, people who travel across it, live alongside or in the midst of it, or simply seek it out. Topics include imperialism, maritime commerce, port cities, littoral societies, piracy, tourism, popular culture. 4 lectures. Prerequisite: Junior standing; completion of all Area A GE requirements and any two courses in lower division Area D. Fulfills GE D5 except for History majors.

#### **HIST 318 The City in the Modern World, c. 1800-2000 (4) GE D5**

Comparative history of social, economic, political, and cultural changes in urban life during the nineteenth and twentieth centuries. Topics may include but are not limited to: commerce and labor; disease and death; conservation and preservation; gender and sexuality; race and ethnicity. 4 lectures. Prerequisite: Junior standing; completion of all Area A and at least two lower-level Area D GE requirements. Junior standing or consent of instructor. Fulfills GE D5 except for History majors.

#### **HIST 319 Modern South and Southeast Asia (4) GE D5**

Modern histories of South and Southeast Asia: traditional empires and cultures, spread of modern capitalism, Western and Japanese colonialism, decolonization and independence, ethnic and religious tensions, roles in contemporary economy and geopolitics. 4 lectures. Prerequisite: Junior standing. Completion of GE Area A. Completion of two courses in lower-division Area D (preferably D2 and D3), or consent of instructor. Fulfills GE D5 except for History majors.

#### **HIST 320 Colonial and Revolutionary America (4) GE D5**

Settlement and evolution of British America, background to the imperial dispute, events leading to the Revolution, Articles of Confederation, Constitution, the national economy, roles of and impact on African-Americans, women, Native Americans and Loyalists. 4 lectures. Prerequisite: Junior standing; completion of GE Area A, D1 and one course from D2, D3, or D4. Fulfills GE D5 except for History majors.

#### **HIST 321 Civil War America (4) GE D5**

The experiences of nineteenth-century Americans. Focus on industrialization, antebellum reform, slavery, the Civil War battlefield and homefront, Reconstruction, and the creation of a New South. 4 lectures. Prerequisite: Junior standing; completion of GE Area A, D1 and one course from D2, D3, or D4. Fulfills GE D5 except for History majors.

#### **HIST 322 Modern America (4) GE D5**

American history since 1900. Focus on domestic and foreign policy interactions, struggle of disenfranchised groups for social and political equality, and changes in culture and identity. 4 lectures. Prerequisite: Junior standing; completion of GE Area A, D1 and completion of Area D2, Area D3, or Area D4. Fulfills GE D5 except for History majors.

#### **HIST 323 Versions of the Past: Novels, Comics and Movies (4) GE D5**

An introduction to historical novels, comics, movies, memoirs and autobiographies as forms of historical representation in the contemporary U.S. Exploration of the vision of American history that each work presents and the truth-claims made for that particular vision. 4 lectures. Prerequisite: Junior standing; completion of GE Area A, D1 and one course from D2, D3, or D4; junior standing or consent of instructor. Fulfills GE D5 except for History majors.

#### **HIST 324 The Historical Novel in the United States, 1960s to the Present (4) GE D5**

An introduction to the historical novel as it has developed in the United States since the 1960s. Exploration of how historical novels typically represent the past and the ways in which they change our notion of what counts as "history." 4

lectures. Prerequisite: Junior standing; completion of GE Area A, D1 and any other lower-division Area D course. *Crosslisted as HIST/HNRS 324.* Fulfills GE D5 except for History majors.

#### **HIST 336 Britain at War: The British, the Americans and the Struggle for Freedom, 1939-1945 (4) GE D5**

Historical examination of Great Britain's challenge to its sovereignty and freedom by the regime of Nazi Germany from 1939-1945. An account of how Britain formed an alliance with the United States, and how that partnership forged a successful campaign that culminated in the survival of Britain and destruction of the Nazi regime. 3 lectures, 1 activity. Prerequisite: Limited to London Study students; junior standing; completion of GE Area A; completion of two courses in lower-division Area D courses; junior standing or permission of the instructor. Fulfills GE D5 except for History majors.

#### **HIST 339 History of Colonial Latin America (4)**

Survey of Latin American history in the colonial period from 1492 to the early nineteenth century. Special attention to the indigenous cultures, the Iberian civilization, and the evolving relationship between them. 3 lectures and research project. Prerequisite: Junior standing.

#### **HIST 340 History of Modern Latin America (4)**

Social and political history of South America, Mexico, and Cuba during the nineteenth and twentieth centuries. Historical development of economic structure and socio-political and cultural institutions in the region. 3 lectures and research project. Prerequisite: Junior standing.

#### **HIST 341 History of Modern Central America (4)**

Political, social, and economic development of Central American countries in the context of regional history and international politics during the nineteenth and twentieth centuries. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

#### **HIST 354 History of Network Technology (4) GE Area F**

History of computer network technology from the Cold War to the present. Origins of the Internet, development of TCP/IP, growth of network democracy, encryption, race and gender in cyberspace, Usenet and hypertext. 4 lectures. Prerequisite: Junior standing and Completion of GE Area B. Fulfills GE Area F.

#### **HIST 358 Cloning (4) GE Area F**

An integrative and multidisciplinary approach to the study of cloning, to better understand its history, scientific techniques, and their applications. The ethical, social, legal and other issues raised by cloning will also be discussed. 4 lectures. Prerequisite: Junior standing and Completion of GE Area B. Fulfills GE Area F.

#### **HIST 359 Living in a Material World (4) GE Area F**

Evolution of materials (ceramics, metals, polymers, composites, semiconductors) in the context of history. Traces the link between historical and technological developments enabled by materials from the Stone Age to the Electronic Age. 4 lectures. Prerequisite: Junior standing and Completion of GE Area B. *Crosslisted as HIST/MATE 359.* Fulfills GE Area F.

#### **HIST 400 Special Problems for Advanced Undergraduates (1-4)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department chair.

#### **HIST 401 Early America (4)**

Age of exploration. European powers in eastern North America. English settlements, development of the English colonies, with emphasis on Virginia and Massachusetts. Proprietary interests, growth of internal control, and colonial conflicts. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

#### **HIST 402 American Revolution and the New Nation (4)**

Background to the imperial dispute, events leading to the Revolution, Articles of Confederation, Constitution, impact on the national economy, women, African-Americans, Loyalists, Native Americans. The Schedule of Classes will list topic selected. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

#### **HIST 404 The Era of Civil War and Reconstruction (4)**

Exploration of the different patterns of life in the United States, in order to comprehend the emergence of sectionalism, the violent struggle of the Civil War, and the readjustments of the Reconstruction years. Emphasis on the experiences of ordinary Americans. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 405 African-American History to 1865 (4)**

History of African Americans from the colonial period to the Civil War, roughly 1619-1865. The slave trade, slavery in the colonies, plantation slavery, the Black West, and free Black culture and institutions. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 406 African-American History from 1865 (4) USCP**

History of African-Americans from the Civil War to the present. Reconstruction, racial segregation, the Harlem Renaissance, the Great Migration, the Civil Rights Movement, Black Feminism and Black Power. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor. Fulfills USCP.

**HIST 408 The Age of Roosevelt: Depression and World War, 1929-50 (4)**

Principle forces affecting the nation's political, social and economic life during the Age of Franklin Roosevelt. Included are the politics of the New Deal, government regulation of the economy and response to the Depression, the rise of the modern presidency, racial and ethnic conflict, the politics of class and gender, the home front at war and post-war tension. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 409 Vietnam War at Home and Abroad (4)**

Interaction of revolutionary Vietnamese nationalism with U.S. foreign policy. Analysis of the conduct of the war. Assessment of the impact of the war on U.S. society. 3 lectures and research project. Prerequisite: HIST 303; junior standing.

**HIST 410 Recent America Since 1950: Shattering of the American Consensus (4)**

Political, social and economic forces that have shaped American life since 1950. Subjects included are the Red Scare, suburbanization, the civil rights movement, the Great Society, the politics and culture of protest, recasting the welfare state, and de-industrialization. Emphasis on racial, ethnic and gender issues in the collapse of the American Consensus. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 411 History of United States Foreign Relations (4)**

History of American foreign policy from 1900 to the present. Emergence of the United States as a world power early in the century, the retreat following the Great War, Franklin Roosevelt's diplomacy leading to and through the Second World War, atomic diplomacy and the Cold War, four decades of Containment and the search for a new post-Cold War strategy. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 412 American Presidency (4)**

Examination of the American presidency with emphasis on its role in American society since the beginning of the twentieth century. From the era of congressional government through the Imperial Presidency of the post-World War II period, and beyond, using presidential biography as a historical source. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 414 The Fall of Imperial China (4)**

History of China's last dynasty, the Qing (1644-1912). Origins of Manchus, High Qing era of expansion and prosperity, creation of uniquely Manchu dynasty, new contact with Western imperialism, internal rebellions, modern reform policies, and revolution. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 416 Modern Japan (4)**

Japan's development as a modern state (1800-2000 CE). Themes include Japan's engagement with modernity and nationalism, the emperor system, Japanese imperialist expansion, and postwar reconstruction of Japanese society. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 417 20<sup>th</sup> Century China (4)**

Chinese history in the twentieth century: the fall of the Qing Dynasty and founding of Republic of China in 1912, problems of imperialism and modernity, Chinese Communist Party and People's Republic of China since 1949. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 418 Chinese Film and History (4)**

Examination of 20<sup>th</sup> century Chinese history through the use of Chinese feature films. Films (with English subtitles) serve as main texts for understanding the tremendous changes in modern Chinese history, and the evolving relationships between film and Chinese society. 4 lectures. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 419 Modern Southeast Asia (4)**

Modern history of mainland and maritime Southeast Asia, focusing on the development of political institutions and changing political and cultural identities. Early empires, expansion of capitalism, colonial rule and wars through era of independence. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 420 History of Modern South Asia (4)**

History of modern South Asia from the beginnings of British colonization to independence. Themes include relations between religious groups, the economic impact of British colonialism, political development, the role of indigenous nationalist movements, and the shape of independence. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 421 The History of Prostitution (4)**

Comparative history of prostitution from antiquity to present. Analysis of prostitution from social, cultural, political, gendered and economic perspectives. 4 lectures. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 424 Organizing and Teaching History (4)**

Organization, selection, presentation, application, and interpretation of subject matter in history in secondary schools. 4 seminars. Prerequisite: Admission to teacher education program or valid teaching credential.

**HIST 425 Social Sciences Teaching Practicum (1) (CR/NC)**

**Supervised** practicum for part-time and full-time student teachers in the Social Science Credential Program. Teaching techniques and strategies useful for addressing a wide range of issues that arise in grades 6-12 social science classrooms. Credit/No Credit grading only. Total credit limited to 4 units. **+ seminar.** Prerequisite: HIST 424; concurrent: EDUC 469 or EDUC 479. *Change effective Winter 2010.*

**HIST 426 Imperial Russia (4)**

Political, social, intellectual and economic roots of Russian Absolutism. Emergence of Russia as an imperial power, reform, reaction and revolution - 1689-1914. 3 lectures and research project. Prerequisite: HIST 303; junior standing.

**HIST 427 Soviet Russia (4)**

Transformation of Russian autocracy from tsarist to Bolshevik under the impact of World War I and the Revolution of 1917. The formative force of Marxism-Leninism; Civil War; the "experimental" 20s; forced collectivization and industrialization; the Purges; "engineering" a new Soviet Woman and Man for a new communist world; War: Second and Cold. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 429 Precolonial African History (4)**

Survey of African history from earliest times. Ancient African civilizations, Moslem penetration, the rise of indigenous kingdoms and the continuous impact of Atlantic slave trade. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 430 Modern African History (4)**

Survey of African in the 19th and 20th centuries including European colonialism, African resistance, the rise of African nationalism and problems since independence. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 431 South Africa to 1900 (4)**

History of South Africa prior to white rule including the African societies populating the area, their history prior to European contact, the nature of early white settlement, and the impact of mineral discoveries in the 19<sup>th</sup> century. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 432 Twentieth Century South Africa (4)**

History of South Africa in the 20<sup>th</sup> century focusing on the rise and fall of the apartheid state and including Afrikaner nationalism, apartheid legislation, industrial development, and the growth of effective African resistance leading to full democracy. 3 lectures and research project. Prerequisite: One of the following: HIST 303; junior standing or consent of instructor.

**HIST 434 American Women's History to 1870 (4)**

Female ideology and experience from the colonial period through the American Civil War. Use of a variety of sources, including women's own writing, in order to understand the history of women as it both reflects and shapes American culture and society. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor. *Crosslisted as HIST/WGS 434.*



**HIST 435 American Women's History from 1870 (4)****USCP**

The female past in the modern period of U.S. history. Considers how transformations in gender roles are reflective of other significant changes in American culture and society. Emphasis on class, race, and ethnic variations in women's experience. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor. *Crosslisted as HIST/WGS 435.* Fulfills USCP.

**HIST 436 History of American Thought (4)**

Thought and culture in America since the Puritans. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 437 Nazi Germany (4)**

Background of German Romantic Nationalism; national unification and defeat in World War I; the failure of Weimar Democracy and political radicalization; the Nazi political, economic, and social revolution 1933-1939. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 438 History of American Agriculture (4)**

Agricultural development with emphasis upon economic, political and social implications. 3 lectures and research project. Prerequisite: HIST 303; junior standing, or consent of instructor.

**HIST 439 Topics in California History (4)**

In-depth analysis of selected political, economic, and social issues involved in the development of California from the earliest times to the present. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 440 Topics and Issues in the History of the United States (4)**

Selected topics and issues in United States history. Descriptive subtitles assigned to each course. The Schedule of Classes will list topic selected. May be repeated to 8 units. 3 lectures and a research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 441 Topics and Issues in European History (4)**

Selected topics and issues in European history. Descriptive subtitles assigned to each course. The Schedule of Classes will list topic selected. May be repeated to 8 units. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 442 Topics and Issues in Latin American History (4)**

Selected topics and issues in Latin American history. Descriptive subtitles will be assigned to each course. The Schedule of Classes will list topic selected. May be repeated to 8 units. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor, and either HIST 340 or HIST 341.

**HIST 443 Topics and Issues in Asian History (4)**

Selected topics and issues in Asian history. Descriptive subtitles will be assigned to each course. The Schedule of Classes will list topic selected. May be repeated to 8 units. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 444 Topics and Issues in African History (4)**

Selected topics and issues in African history. Descriptive subtitles will be assigned to each course. The Schedule of Classes will list topic selected. May be repeated to 8 units. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 445 Topics and Issues in Comparative History (4)**

Selected topics and issues in comparative history. Descriptive subtitles will be assigned to each course. The Schedule of Classes will list topic selected. May be repeated to 8 units. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 446 Early Britain (4)**

History of the British Isles from the reconstruction of Celtic history to the end of the Medieval epoch. 3 lectures and research project. Prerequisite: HIST 303; junior standing, or consent of instructor.

**HIST 447 Early Modern Britain (4)**

History of the British Isles from the end of the Medieval epoch to the era of the American revolution, from Richard III to George III. 3 lectures and research project. Prerequisite: HIST 303; junior standing, or consent of instructor.

**HIST 448 Modern Britain: Industry, Empire and War (4)**

History of the British Isles from the loss of the American colonies through the era of the World Wars and the dissolution of the British Empire. 3 lectures and

research project. Prerequisite: HIST 303; junior standing, or consent of instructor.

**HIST 451 Medieval Europe (4)**

Medieval Europe from the fall of Rome to the plague (400-1350 CE), with topics including the Barbarian Kingdoms, the early Church, Charlemagne, medieval art and Gothic architecture, Church fathers and Scholasticism, medieval philosophy, agricultural and commercial revolutions, and the Great Plague. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 452 Renaissance and Reformation Europe (4)**

Europe from 1348 to 1620 CE, with topics including the urban milieu, Renaissance philosophy and artistic expression, the new prince, the educational revolution, the Renaissance Church, Martin Luther, Jean Calvin, and the monumental economic, social, and political changes of the sixteenth century. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 453 Religious Wars and Absolutism (4)**

Europe from 1559 to 1715 CE, focusing on the Catholic-Protestant conflict, the rise of the Absolutist state (especially Louis XIV), the "Crisis of the Seventeenth Century," the Thirty Years War, the English Civil War and Cromwell, and the Newtonian Paradigm. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 454 The Age of Revolution and Napoleon (4)**

Europe from the death of Louis XIV (1715) to the settlements of the Congress of Vienna (1815). International politics, continental and global warfare, the Enlightenment, "Enlightened Absolutism," the French and Industrial Revolutions, and Napoleon. Political, intellectual, economic, and social developments in the eighteenth century. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 455 Europe in the Age of Reaction and Revolution, 1815-1871 (4)**

Reaction to the French Revolution. Industrialization. Liberal socialist and nationalist revolts against the conservative order of 1815. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 456 Europe in the Age of Imperialism and War, 1871-1919 (4)**

Maturation of industrialization, socialism and nationalism. Imperialist competition of nation states for world hegemony. Explosion of the First World War. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 457 Europe in the Age of Fascism (4)**

Democracy in crisis and the fascist alternatives. Second World War and the recovery of Europe in a bipolar world to the fall of the Berlin Wall, German reunification and the disintegration of Yugoslavia. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 458 Gender and Sexuality in Modern Europe (4)**

Social, economic, political, and cultural effects of changing gender systems in modern Europe, particularly but not exclusively with regard to sex and sexuality. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

**HIST 460 Senior Project I (2)**

Completion of paper or creative project under faculty supervision. Must be historical in nature, investigate a question of significance, include an historiographical analysis, and make an argument based on primary and secondary sources. Take HIST 461 during a subsequent quarter. Prerequisite: HIST 303; HIST 304; senior standing or consent of instructor; and History major.

**HIST 461 Senior Project II (2)**

Completion of paper or creative project begun in HIST 460 under faculty supervision. Prerequisite: HIST 303; HIST 304; HIST 460; senior standing or consent of instructor; and History major.

**HIST 467 History Internship (4-12) (CR/NC)**

Supervised work experience using skills of the discipline of history in a public agency ranging from 12 to 36 hours per week. Interns work directly under the supervision of an employee of the agency and are subject to the professional responsibilities typical of the state. Total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Junior standing. Completion of HIST 303 with grade of B or better and consent of internship coordinator.

**HIST 468 Internship in State and National Park History (3)**

Work experience program in interpreting state and national park history. Weekly three-hour seminar and regularly scheduled work experience training at Hearst–San Simeon State Historical Monument. 90 hours of work experience per 3 units of credit. Total credit limited to 6 units. Recommended preparation: Western Civilization Survey, U.S. and California History, History of Art.

**HIST 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Junior standing or consent of instructor.

**HIST 485 Cooperative Education Experience (6) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. No major credit allowed; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**HIST 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. No major credit allowed; total credit limited to 24 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**HIST 500 Special Problems for Graduate Students (1-4)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units. Prerequisite: Graduate standing in History and consent of instructor.

**HIST 504 Graduate Study in History (4)**

Weekly reading and discussion course on practical methods and theoretical approaches to the study and writing of history. 4 seminars. Prerequisite: Graduate standing in History and consent of instructor.

**HIST 505 Graduate Seminar in United States History (4)**

Intensive study of selected topics in United States history. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing in History and consent of instructor.

**HIST 506 Graduate Seminar in European History (4)**

Intensive study of selected topics in modern European history. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing in History and consent of instructor.

**HIST 507 Graduate Seminar in East Asian History (4)**

Intensive study of selected topics in East Asian history. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing in History and consent of instructor.

**HIST 508 Graduate Seminar in Latin American History (4)**

Intensive study of selected topics in Latin American history. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing in History and consent of instructor.

**HIST 509 Graduate Seminar in African History (4)**

Intensive study of selected topics in African history. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing in History and consent of instructor.

**HIST 510 Graduate Seminar in Comparative History (4)**

Intensive study of selective topics in comparative history. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing in History and consent of instructor.

**HIST 512 Supervised Reading for Comprehensive Exams (2)**

Directed supervision of reading for MA comprehensive exams. Regular consultation between advisor and student. Total credit limited to 4 units. **2 seminars.** Prerequisite: HIST 504 and 12 units of graduate study. *Change (to independent study) effective Spring 2011.*

**HIST 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title

selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Graduate standing or consent of instructor.

**HIST 599 Thesis (3)**

Directed supervision of MA thesis. Regular consultation between advisor and student. Course to be taken three times over three separate quarters; total credit limited to 9 units.

**2009-11 Cal Poly Catalog****History Department****BA HISTORY**

□ 60 units upper division

□ GWR

□ 2.0 GPA

□ USCP

\* = Required in Major; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

HIST 110 Western Civ: Ancient to Renaissance.....	4
HIST 111 W. Civ: Reformation to the Present.....	4
HIST 206 American Cultures <i>or</i> HIST 207 Freedom and Equality in American History (D1)* (USCP)	4
HIST 213 Mod Political Econ <i>or</i> HIST 214 Political Econ of Latin America & Middle East (D2)*.....	4
World History: Select 4 units from the following:	
HIST 221, 222, 223 (D3)*.....	4
HIST 303 Research and Writing Seminar in History	5
HIST 304 Historiography.....	4
HIST 460 Senior Project I.....	2
HIST 461 Senior Project II.....	2
History electives (any 300-400 level HIST courses excluding HIST 400, 467, 468, 485, 495.....	12
<i>(Effective Spring 2011)</i>	
Non-U.S., Non-European HIST electives (300-400 level) Select 12 units from the following list:	12
HIST 308, 309, 310, 314, 316, 317, 319, 339, 340, 341, 409, 414, 416, 417, 418, 419, 420, 421, 422, 423, 429, 430, 431, 432, 442, 443, 444, 445, 459.	
<i>(5/10/12) (6/4/14)</i>	
Foreign language requirement, select one: CHIN 121 <i>or</i> CHIN 201, FR 121 <i>or</i> 201, GER 121 <i>or</i> 201, ITAL 201, JPNS 201, SPAN 121 <i>or</i> 201, MLL 121 <i>or</i> 201 (or equivalent) <i>(5/17/13)(8/30/13)</i>	4
	<b>61</b>

**SUPPORT COURSES**

<sup>1</sup> Electives (300-400, including History).....	24
	<b>24</b>

**GENERAL EDUCATION (GE)**

72 units required, 12 of which are specified in Major.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (20 units)**

B1 Mathematics/Statistics .....	8
B2 Life Science .....	4
B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	
B5 elective	
Area B elective (select one course from B1-B5)...	4

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
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C2 Philosophy .....	4
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C3 Fine/Performing Arts .....	4
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C4 Upper-division elective .....	4
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**Area D/E Society and the Individual (8 units)**

D1 The American Experience (40404) * 4 in Major	0
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D2 Political Economy * 4 in Major .....	0
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D3 Comparative Social Institutions * 4 in Major ..	0
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D4 Self Development (CSU Area E) .....	4
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D5 Upper-division elective (Not HIST courses)....	4
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**Area F Technology Elective (upper division) (4 units)****4****60****<sup>1</sup> FREE ELECTIVES .....****35**

*Upper division GE courses taken for a letter grade satisfy support course requirements which would cause free electives to become 47 rather than 35 units. Consult college advisor for additional information.*

**180**

<sup>1</sup> If upper-division GE courses are used to satisfy Major or Support requirements, additional units may be required to complete the 180 total unit requirement.

**2009-11 Cal Poly Catalog**

**Industrial & Manufacturing Engineering**  
**Department**  
**Flowchart**

**BS INDUSTRIAL ENGINEERING**

☐ 60 units upper division      ☐ GWR  
 ☐ 2.0 GPA                      ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

IME 101 Intro Industrial & Manufacturing Engr .....	1
IME 140 Graphics Communication and Modeling...	2
IME 141 Manufacturing Processes: Net Shape .....	1
IME 144 Intro Design and Manufacturing .....	4
IME 156 Basic Electronics Manufacturing or IME 157 Electronics Manufacturing .....	2
IME 223 Process Improvement Fundamentals .....	4
IME 239 Industrial Costs and Controls .....	3
IME 301 Operations Research I .....	4
IME 303 Project Organization and Management .....	4
IME 312 Data Management and System Design .....	4
IME 314 Engineering Economics .....	3
IME 319 Human Factors Engineering .....	3
IME 326 Engineering Test Design and Analysis .....	4
IME 405 Operations Research II .....	4
IME 410 Production Planning/Control Systems .....	4
IME 417 Supply Chain and Logistics Management .....	4
IME 420 Simulation .....	4
<sup>4</sup> IME 421 Manufacturing Organizations .....	3
IME 429 Ergonomics Lab .....	1
IME 430 Quality Engineering .....	4
IME 443 Facilities Planning and Design .....	4
IME 481, 482 Sr Project Design Laboratory I, II .....	2,3
<sup>1,2,3</sup> Technical electives .....	14

Select 14 units from the following. *All but 4 units*  
*At least 6 units must be upper level (300-level or above) engineering courses (AERO, BMED, CE, EE, IME, MATE, ME): (10/18/11)*  
 CE 204, 207;  
 BUS 310, 311, 346, 382, 402, 404, 488;  
 BUS/AG/HUM/EDES/ENGR/SCM/UNIV 350;  
 EE 361;  
 IME 142, 241, 313, 335, 336, 341, 351, 352, 356, 401, 407, 408, 409, 411, 413, 416, 417, 418, 427, 428, 431, 435, 437, 441, 442, 455, 457, 470, 471, 541, 542, 543, 544, 545, 556, 577, 580;  
 IME/AERO 510, 511;  
 IME/MATE 458/CPE 488;  
 IT 341, 406;  
 ME 302, 305, 328, 341;  
 MATE 210, 215;  
 MATH 344, 350;  
 PSY 350, 494

**SUPPORT COURSES**

BIO 213 and ENGR/BRAE 213 (B2)* .....	2,2
CE 204 Mech Materials I/ME 341 Fluid Mech I .....	3
CHEM 124 Gen Chem for Engineering (B3/B4)* .....	4
CSC 232 Computer Programming/Scientists/Engrs .....	3
EE 201, 251 Electric Circuits Theory and Lab .....	3,1
EE 321 Electronics .....	3
ENGL 149 Technical Writing for Engineers (A3)* .....	4
MATH 141, 142 Calculus I, II (B1)* .....	4,4
MATH 143 Calculus III (Add'l Area B)* .....	4
MATH 241 Calculus IV .....	4
MATH 244 Linear Analysis I .....	4
ME 211 Engineering Statics .....	3
ME 212 Engineering Dynamics .....	3
ME 302 Thermodynamics I or MATE 210 Materials Engrg and MATE 215 Materials Lab I .....	3
PHYS 141 General Physics IA (Add'l Area B)* .....	4
PHYS 132, 133 General Physics II, III .....	4,4
PSY 201/202 General Psychology (D4)* .....	4
STAT 321 Prob/Stats for Engrs/Scientists (B6)* .....	4

**74****GENERAL EDUCATION (GE)**

72 units required, 36 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 8 units required at the 300 level.

**Area A Communication (8 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing * 4 units in Support .....	0

**Area B Science and Mathematics (no addl units reqd)**

B1 Mathematics/Statistics * 8 units in Support .....	0
B2 Life Science * 4 units in Support .....	0
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	
B5 (requirement for Liberal Arts students only)	
B6 Upper-division Area B * 4 units in Support .....	0
Additional Area B units * 8 units in Support .....	0

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

<sup>1</sup> IME 400 and IME 500 require a course substitution form and no more than 4 total units are allowed.

<sup>2</sup> The courses selected to satisfy this requirement may not be used to satisfy other major, support, or general education requirements (no double counting of coursework).

<sup>3</sup> Consultation with advisor is recommended prior to selecting technical electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>4</sup> An additional 3 units of technical electives may substitute. (1/13/14)

**Area D/E Society and the Individual (12 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) * 4 units in Support.....	0

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**36****FREE ELECTIVES .....**

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**0**

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**196**

# Industrial Technology

Business Bldg. (03), Room 405  
805 756-2676

## Area Chair: Lou Tornatzky

Clifford S. Barber                      Jagjit Singh  
Yi-hsiang Isaac Chang              Keith Vorst  
Manocher Djassemi                  Jonathan York  
Eric O. Olsen

Industrial Technology prepares individuals to be effective technical managers and entrepreneurial leaders in a rapidly-changing technological and global economy. The baccalaureate curriculum is particularly suited for careers that involve working with people and technology concurrently. It includes instruction in electro-mechanical systems, industrial materials and processes, and quality and safety management that are then applied to technology-based business problems in packaging, value chain management, and technology entrepreneurship. Students take complementary courses in physics, chemistry, calculus and statistics. The curriculum also includes a business core with accounting, economics, marketing, and information systems.

The themes of insuring quality, enabling innovation, and enhancing value are woven through the curriculum.

## Learning Objectives

The Industrial Technology majors will:

1. demonstrate detailed knowledge, skills, and perspectives within program specific areas of technology application.
2. explain and act on ethical issues regarding the applications of technology.
3. explain and act on issues of sustainability regarding the applications of technology.
4. act upon decision tools and methods and explain the action taken.
5. work effectively in teams.
6. demonstrate effective verbal communications skills.
7. will demonstrate effective technical written communications skills.
8. explain and act on interactions between humans and technological systems.

## BS INDUSTRIAL TECHNOLOGY

- ☐ 60 units upper division                      ☐ GWR  
☐ 2.0 GPA    ☐ USCP

\* = Required in Major/Support; also satisfies GE  
Note: No major, support or concentration courses may be taken as credit/no credit.

## MAJOR COURSES

<sup>1</sup> IT 137 Electrical/Electronic Systems <i>or</i> IT 371 <i>or</i> IT 303 (2/4/14).....	4
IT 150 Industrial Power Systems .....	4
IT 233 Decision Making/Prob Solving using CAD .....	4
IT 260 Manufacturing Processes .....	4
IT 326 Product Evaluation.....	4
<sup>1</sup> IT 329 Industrial Materials <i>or</i> IT 390 Industrial Automation (formerly IT 445) <i>or</i> IT 303 (4/19/13)(2/4/14).....	4
IT 330 Fundamentals of Packaging (Area F)* .....	4
IT 341 Plastics Processes and Applications.....	4
<sup>1</sup> IT 403 Quality Systems Management <i>or</i> IT 303 (1/23/14) .....	4
IT 407 Applied Industrial Product Design, Fabrication and Sales .....	4
IT 408 Paper and Paperboard Packaging.....	4
IT 410 Operations Planning and Control .....	4
IT 411 Industrial Safety and Quality Program Leadership .....	4
IT 428 Commercialization of New Technologies ....	4
IT 475 Packaging Performance Testing.....	4
Choose two of the following three courses: .....	8
IT 402, 435, 406	
Senior Project: IT 461, 462 Senior Project I, II <i>or</i> IT 464 Applied Industrial Technology Senior Project Seminar .....	4
Approved electives .....	8
Select from the following. Additional courses may satisfy this requirement, but must be approved in advance by the Area Chair: BUS 342, 387; IT 371, 403, 408, 409, 435, 445, 451, 454, 475	

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80

## SUPPORT COURSES

BUS 212 Financial Acctg for Nonbusiness Majors .....	4
BUS 346 Principles of Marketing.....	4
BUS 391 Information Systems .....	4
CHEM 110 World of Chemistry – Essentials <i>or</i> CHEM 111 Survey of Chemistry (B3 & B4)* .....	4/5
ECON 201 Survey of Economics (D2)* .....	4
MATH 141 Calculus I <i>or</i> MATH 221 Calculus for Business and Economics (B1)* .....	4
PHYS 121, 122 College Physics I, II.....	4,4
STAT 217 Intro to Statistical Concepts and Methods <i>or</i> STAT 218 Appl. Statistics-Life Sciences (B1)* ..	4

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36/37

<sup>1</sup> If IT 303 is taken to meet a requirement, it cannot be double-counted for another requirement.



**GENERAL EDUCATION (GE)**

72 units required, 20 of which are specified in Major and Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing.....	4

**Area B Science and Mathematics (4 units)**

B1 Mathematics/Statistics * 8 units in Support ....	0
B2 Life Science .....	4
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy * 4 units in Support .....	0
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division)**

* 4 units in Major .....	0
	<u>52</u>

<b>FREE ELECTIVES</b> .....	<u>11/12</u>
	<b>180</b>

## 2009-11 Cal Poly Catalog

### Industrial & Manufacturing Engineering Department

#### IME–INDUSTRIAL and MANUFACTURING ENGINEERING

##### **IME 101 Introduction to Industrial and Manufacturing Engineering (1)**

Introduction of major topics in industrial and manufacturing engineering. Time management, study skills and class scheduling necessary for academic success. University services. Professional ethics. Career opportunities review. 1 laboratory.

##### **IME 130 Technical Foundations (2) (CR/NC)**

Introduction to visualization, sketching, and drafting. Basic hand-tools, shop practices, and materials. Clearances and fits, threads and fasteners. Safety. Open to all majors. Credit/No Credit grading only. 1 lecture, 1 laboratory.

##### **IME 140 Graphics Communication and Modeling (2)**

Introduction to computer-aided drafting and modeling of solid objects. Visualization and sketching for engineers. Communication of design information to manufacturing using pictorials, orthographic projection, section views, and auxiliary views. Manufacturing tolerances. 1 lecture, 1 laboratory.

##### **IME 141 Manufacturing Processes: Net Shape (1)**

Metal casting as a net shape process in manufacturing. Properties of molding materials and methods of casting. Introduction to rapid prototyping. Pattern and casting design principles. 1 laboratory.

##### **IME 142 Manufacturing Processes: Materials Joining (2)**

Theory and application of metal cutting and welding processes. Includes shielded metal arc, flux cored arc, submerged arc, gas metal arc, gas tungsten arc, brazing, resistance, and oxy-acetylene processes. Bonding theory, joint design, codes and testing. Introduction to adhesive bonding. Open to all majors. 1 lecture, 1 laboratory.

##### **IME 143 Manufacturing Processes: Material Removal (2)**

Uses, capabilities, and theoretical and operational characteristics of lathe and milling machine tools, including conventional, automatic and numerical control. Cutting tool characteristics, machining parameters, quality control, and production methods. Design considerations for manufacturing. Introduction to robotics and automation. Open to all majors. 1 lecture, 1 laboratory.

##### **IME 144 Introduction to Design and Manufacturing (4)**

Computer-aided solid modeling of parts and assemblies. Introduction to conventional machining processes on lathes and mills, computer numerical control, quality control, production methods, and design for manufacturing. Open to all majors. 2 lectures, 2 laboratories. Prerequisite: IME 130 or IME 140 or consent of instructor.

##### **IME 156 Basic Electronics Manufacturing (2)**

Practical electronics manufacturing knowledge expanded through concepts such as CAD/CAM design, Design for Manufacture (DFM), documentation requirements, prototyping and production planning. Hands-on techniques learned for project planning, soldering, automation, hand tool usage and production methods. 1 lecture, 1 laboratory.

##### **IME 157 Electronics Manufacturing (4)**

Printed circuit board assembly; printed circuit board fabrication process; electronics packaging; overview of semiconductor manufacturing; design, documentation and fabrication of electronic units with emphasis on CAD/CAM. Open to all majors. 2 lectures, 2 laboratories.

##### **IME 200 Special Problems for Undergraduates (1–2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

##### **IME 223 Process Improvement Fundamentals (4)**

Principles of work simplification and motion analysis. Recording of work flow and methods. Process improvement through work measurement and standards, time study, synthetic data, predetermined time systems and work sampling. Allowances and performance rating, productivity measures. Introduction to lean manufacturing principles. Client based project. 3 lectures, 1 laboratory. Prerequisite: MATH 141. Recommended: IME 101.

##### **IME 239 Industrial Costs and Controls (3)**

Estimation of manufacturing costs for production planning, cost analysis, and cost control. Planning, budgeting and control processes. Costs, accounting data and analysis of variances for managerial control, inventory valuation and decision making. Techniques of forecasting, pricing, cost estimating and cost reduction. 3 lectures. Prerequisite: IME 223.

##### **IME 240 Additional Engineering Laboratory (1–2)**

Total credit limited to 4 units, with a maximum of 2 units per quarter. 1 or 2 laboratories.

##### **IME 241 Manufacturing Process Design I (4)**

Economic and engineering analysis of manufacturing processes. Cost estimation for production planning, analysis, and control. Analysis of machining process inputs and mechanisms as an example process. Test report writing, documentation, and inspection methods. Field trips to manufacturing centers. 3 lectures, 1 laboratory. Prerequisite: IME 143 or IME 144, PHYS 131.

##### **IME 251 Introduction to Manufacturing Engineering Analysis (4)**

State of the art methods and processes in mechanical and electronic manufacturing. Selection of materials for manufacturing. Product design and manufacturability. Specifications and metrology in manufacturing. Continuous improvement strategies, such as automation, group technology, value analysis, and flexible system design. 2 lectures, 2 laboratories. Prerequisite: IME 143 or IME 144, PHYS 131, CHEM 124.

##### **IME 270 Selected Topics (1–4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### **IME 301 Operations Research I (4)**

Systems modeling methodology, mathematical model formulations, linear programming, graphical and simplex methods. Duality and sensitivity analysis. Transportation, transshipment and assignment models. Introduction to goal programming and elastic constraints. Computer applications. 3 lectures, 1 activity. Prerequisite: MATH 244.

##### **IME 303 Project Organization and Management (4)**

Design and implementation of a major industrial/business systems project. Project planning considerations. Motivational and influence techniques used in project management. Scheduling techniques with risk assessment. Resource leveling and management under constraints. Reducing project duration. Monitoring progress with earned value analysis. Project audit and closure. Planning and implementation of a project. Application of project management software. 3 lectures, 1 laboratory. Prerequisite: Junior standing, IME 314 or equivalent.

##### **IME 312 Data Management and System Design (4)**

Design and management of industrial databases and reporting systems. Relationships of financial accounting databases and production systems. Efficient data entry and reports, queries, macro function, and Internet based database applications. 3 lectures, 1 laboratory. Prerequisite: CSC 232.

##### **IME 313 Introduction to Information Systems Engineering (4)**

Practical approach to use of modern information technologies related to industrial and manufacturing engineering. Use of networking and application software, including theory and practice. 3 lectures, 1 laboratory. Prerequisite: CSC 232.

##### **IME 314 Engineering Economics (3)**

Economic analysis of engineering decisions. Determining rates of return on investments. Effects of inflation, depreciation and income taxes. Sensitivity, uncertainty, and risk analysis. Application of basic principles and tools of analysis using case studies. 3 lectures. Prerequisite: MATH 241.

##### **IME 319 Human Factors Engineering (3)**

Analysis of factors influencing the efficiency of human work. Data on the physical and mental capacities of persons, the physical environment, work organization, and the problem of aging. Design of machines, operations, human computer interface and work environment to match human capacities and limitations, including the handicapped. Multidisciplinary team project. 3 lectures. Prerequisite: PSY 201 or PSY 202 or consent of instructor, and junior standing.

##### **IME 320 Human Factors and Technology (4)**

Analysis of cognitive, sensory and physical limitations and capabilities of operators and users of technology, both hardware and software, in working and

##### **GE Area F**

living environments. Analysis of pertinent databases for a proactive approach to designing user-centered industrial products /systems, consumer products, and work environment. 4 lectures. Prerequisite: Junior standing and completion of GE Area B requirements. Fulfills GE Area F.

#### **IME 322 Leadership and Project Management (2)**

Theory and practice in leadership and project management skills for engineering design teams. Basic issues related to, and tools used for, managing projects and concepts comprising project management. Emphasis on situations requiring resolutions and management decisions by groups representing various elements of an enterprise. 2 lectures. Prerequisite: Junior standing in an engineering program, and one course in engineering design, or consent of instructor. *Crosslisted as HNRS/IME/MATE 322.*

#### **IME 326 Engineering Test Design and Analysis (4)**

Data gathering and statistical testing applied to industrial engineering and manufacturing fields. Experimental methods for product and process evaluation and comparisons; interpretation of engineering data. Engineering experimental design, linear and nonlinear regression, ANOVA, and multifactor ANOVA. Utilization of existing computer software. 4 lectures. Prerequisite: STAT 321 with a grade of C- or better.

#### **IME 334 CAD/CAM (3)**

Identification and study of the individual techniques of CAD/CAM as being practiced in modern industry. Total credit limited to 6 units. 2 lectures, 1 laboratory. Prerequisite: IME 144 or consent of instructor.

#### **IME 335 Computer-Aided Manufacturing I (4)**

Use of the computer to communicate design information to manufacturing. Computer Numerical Control (CNC) programming. Use of CAD/CAM software. Overview of manufacturing systems in an automated environment, including cellular manufacturing and computer-aided process planning. 3 lectures, 1 laboratory. Prerequisite: IME 144, CSC 232, or consent of instructor.

#### **IME 336 Computer-Aided Manufacturing II (4)**

Advanced Computer Numerical Control (CNC) programming and machine tool control. Machining center operation. Parametric representation of curves and surfaces. Computation of tool paths. Product and process design for CNC machining. CNC machine tool dynamics. Introduction to flexible manufacturing systems and robotics. Design and fabrication projects. 3 lectures, 1 laboratory. Prerequisite: IME 335, ME 212, MATH 244, or consent of instructor.

#### **IME 341 Tool Engineering (4)**

Engineering design of fixtures and tools for manufacturing processes. Interpretation of engineering design specifications. Material selection. Analysis of cost, quality, productivity, and safety in tool design. The role of tooling in manufacturing competitiveness. Design projects. 3 lectures, 1 laboratory. Prerequisite: IME 241, CE 204, MATH 244, MATE 210, or consent of instructor.

#### **IME 342 Manufacturing Systems Integration (4)**

Analysis and design tools for production planning, control, and simulation of manufacturing systems. Use of systems modeling software. Overview of ergonomics and facilities design. 3 lectures, 1 laboratory. Prerequisite: MATH 241 and IME 223 or consent of instructor. Recommended: STAT 321.

#### **IME 351 Advanced Material Removal Process Design (4)**

Advanced turning and milling processes; grinding and non-traditional processes. Thread and gear manufacturing, producibility, machinability, part and tool materials, cutting fluids, and tool life testing. Finishes and measurement of surface roughness. Process design projects. 2 lectures, 2 laboratories. Prerequisite: IME 241, MATE 210 and MATE 215, and CE 204.

#### **IME 352 Manufacturing Process Design II (4)**

Advanced engineering analysis of material shaping processes, surface processing and assembly operations with emphasis on optimizing process parameters, equipment, and operational sequence. Process design projects. 2 lectures, 2 laboratories. Prerequisite: IME 141, IME 142, IME 241, MATE 210/215, CE 204.

#### **IME 356 Manufacturing Automation (4)**

Computers in the factory automation environment. Basic control theory including feedback. Programming and use of programmable logic controllers (PLC), human-machine interface (HMI), and industrial control systems. Interfacing of electro-mechanical systems; analog and digital inputs, output; programmable controllers. Computer process control. 3 lectures, 1 laboratory. Prerequisite: EE 321.

#### **IME 400 Special Problems for Advanced Undergraduates (1-4)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limit to 4 units. Prerequisite: Consent of instructor.

#### **IME 401 Sales Engineering (2)**

Concepts and principles of engineering in sales. Role of the professional engineer in the analysis, design, development, production, and final application of a product or system required by the buyer. 2 seminars. Prerequisite: Senior standing in engineering, or consent of instructor.

#### **IME 404 Engineering Economic Decision Management (3)**

Quantitative approaches to engineering and management problems. Time value concepts, breakeven and replacement analysis, optimization techniques for scheduling. Project cost estimation, resource management and risk analysis. Use of computer software packages. For non-majors only. 3 lectures. Prerequisite: Junior standing.

#### **IME 405 Operations Research II (4)**

Stochastic decision analysis. Queuing models, inventory models and analysis. Markov processes. Computer aided modeling and case studies. 3 lectures, 1 activity. Prerequisite: IME 301, IME 326 or consent of instructor.

#### **IME 407 Operations Research III (4)**

Systems modeling and solution of large scale problems using advanced operations research methods. Integer and goal programming. Application of nonlinear, quadratic, dynamic programming concepts. Case studies of systems modeling including software aided analysis. 3 lectures, 1 activity. Prerequisite: IME 301 or consent of instructor.

#### **IME 408 Systems Engineering (3)**

Systems, subsystems, static, dynamic, closed and open systems. Systems design requirements. Performance measures. Process control modeling and analysis, transform methods, linear systems analysis, digital, adaptive and steady state optimal control. Optimal search strategies. Manufacturing, maintenance, replacement and engineering applications. 3 lectures. Prerequisite: IME 326, IME 405, CSC 232.

#### **IME 409 Economic Decision Systems (3)**

Economic evaluation of information for complex decisions. Analysis of risks and uncertainties. Bayes theory and models. Decision theory, sequential decisions, and value of information applied to financial evaluation and control. Major project justification procedures. 3 lectures. Prerequisite: IME 239, IME 314, and IME 405, or consent of instructor.

#### **IME 410 Production Planning and Control Systems (4)**

Building blocks of manufacturing resource planning (MRP II). Demand forecasting, production planning, master scheduling development. BOM and inventory files. MRP computations and operational challenges. Capacity analysis and production control in push and pull systems. Enterprise Resource Planning (ERP). Principles of JIT and lean manufacturing. 3 lectures, 1 laboratory. Prerequisite: IME 405 or IME 342.

#### **IME 411 Production Systems Analysis (3)**

Systems analysis for production control. Design of computer integrated planning and control systems for scheduling manufacturing orders, monitoring operating costs and control system performance evaluation. Development of computer-aided decision making framework. Interactive decision making using simulation modeling. 2 lectures, 1 laboratory. Prerequisite: IME 410, or equivalent.

#### **IME 413 Flexible Manufacturing Systems (3)**

Structure of flexible manufacturing systems. Planning and control for FMS. Tool management and operations control. Application of techniques related to production scheduling decisions. Cellular manufacturing and production flow analysis. Case studies of flexible manufacturing systems. Computer applications. 3 lectures. Prerequisite: IME 301. Recommended: STAT 321.

#### **IME 416 Automation of Industrial Systems (3)**

Automation in manufacturing and warehousing. Economic selection of automation systems. Projects in automation. 2 lectures, 1 laboratory. Prerequisite: IME 356 or equivalent.

#### **IME 417 Supply Chain and Logistics Management (4)**

Overview of key logistics and supply chain management concepts. Models and solution methods for the design, control, operation, and management of supply chains. Techniques that are used to analyze supply chains. Team projects in partnership with industry sponsors. 4 lectures. Prerequisite: IME 342, or IME 410 or consent of instructor.

**IME 418 Product-Process Design (4)**

Innovation for product development, engineering management of new product development and manufacturing competitiveness. Concurrent engineering. Study of manufacturability constraints in terms of prototyping, designing, testing, pre-production support, processing, quality, delivery, and customer satisfaction. Industrial design projects. Examination of relevant environmental and ethical problems. 3 lectures, 1 laboratory. Prerequisite: IME 341, and senior standing or graduate standing or consent of instructor.

**IME 420 Simulation (4)**

Design and analysis of manufacturing and service systems by simulation. System modeling. Random number and function generators, programming, and characteristics of simulation languages. Design projects using real world problems. Introduction to rule-based expert systems. 3 lectures, 1 laboratory. Prerequisite: IME 326, IME 405, or consent of instructor.

**IME 421 Manufacturing Organizations (3)**

Theory and principles for manufacturing organizations. Competitive advantage. Strategic planning and operations management for organizations and teams in a rapidly changing environment. Engineering management concepts and practices. Team-based projects and cases. 3 seminars. Prerequisite: **Junior standing; IME 314; PSY 201, PSY 202, or KINE 250** or consent of instructor. **Recommended: IME 314. Change effective Spring 2011.**

**IME 422 Manufacturability Engineering (4)**

Manufacturability constraints in terms of issues related to prototyping, designing, testing, preproduction support, processing, quality, delivery, and customer satisfaction. Hands-on projects to discuss the experimental results in dealing with the process of casting, machining, plastic modeling, and electronic board manufacturing. 3 lectures, 1 laboratory. Prerequisite: IME 341, IME 326. Recommended: IME 342.

**IME 427 Process Optimization through Designed Experiments (4)**

Experiments for optimization of industrial processes: process variables, response, measurements, analysis and interpretations. Statistical principles in design. Design approaches: conventional methods, response surface methodology, and Taguchi methods. Type of experiments: factorial, fractional factorial, mixture, and orthogonal arrays. Design projects using real world problems. 3 lectures, 1 laboratory. Prerequisite: IME 326 or consent of instructor.

**IME 428 Engineering Metrology (4)**

Measurement of attributes and variables; standards, accuracy and precision; mechanical, electronic and optical/laser measurement systems. Contact and non-contact measurement; straightness, flatness and squareness; GDT (Geometric Dimensioning and Tolerancing); CMM (Coordinate Measurement Machines); surface roughness; metrology for electronic products. 3 lectures, 1 laboratory. Prerequisite: IME 335 or consent of instructor.

**IME 429 Ergonomics Laboratory (1)**

Investigation of various physiological, sensory, and cognitive capabilities and limitations of people in work and living environments through laboratory data collection, design of experiments and statistical analysis. 1 laboratory. Prerequisite: IME 319, IME 326.

**IME 430 Quality Engineering (4)**

Quality control, reliability, maintainability, and integrated logistic support. Statistical theory of process control and sampling inspection. Risks associated with decisions based on operating characteristics of control charts and sampling plans. Reliability and life testing methods. Economics of statistical QC. Specifications and standards. 4 lectures. Prerequisite: IME 326 or equivalent.

**IME 431 Supplier Quality Engineering (4)**

Customer-supplier partnership. Functions of Supplier Quality Engineering. Supplier selection, development, process qualification, concurrent engineering, value engineering. Process characterization, repeatability, consistency, process control. Quality system standards. Supplier survey, audit, rating, measurement of quality, delivery performance and certification. Customer service, corrective action approaches. 3 lectures, 1 laboratory. Prerequisite: IME 430.

**IME 433 Advanced Work Measurement (3)**

Predetermined time systems. Time formulas. Standard data systems. Use of statistical methods. Standard data systems applied to clerical, manufacturing, and micro assembly. Developing and maintaining computerized systems. Course will be administered with project orientation. 2 lectures, 1 laboratory. Prerequisite: IME 223, IME 326 or equivalent.

**IME 435 Reliability Engineering I (3)**

Reliability concepts and mathematical models, mechanical device reliability, electrical device reliability, systems reliability and maintainability, reliability data, assurance program elements. 3 lectures. Prerequisite: IME 326.

**IME 437 Advanced Human Factors Engineering (3)**

Team-based approach to human factors assessment of consumer and industrial products, systems, and information technology. Team building principles and techniques in human factors analysis. Usability analysis and ergonomics auditing through experimental methods. 2 lectures, 1 laboratory. Prerequisite: IME 319, IME 326 or equivalent.

**IME 440 Quality Process Management (4)**

Quantitative approaches to engineering and management of quality. Statistical process control, quality assurance concepts. Variability loss and off-line QC. Tolerance design and experimental design. Human factors and managerial dimensions influencing quality. For non-majors only. 4 lectures. Prerequisite: Junior standing or consent of instructor.

**IME 441, 442 Engineering Supervision I, II (1,1)**

Theory and principles of supervision. Application of fundamental concepts and techniques of supervision provided by assignment in engineering laboratories. 1 laboratory each. Prerequisite: Consent of instructor.

**IME 443 Facilities Planning and Design (4)**

Design concepts and input requirements in planning and design of new or renovation of existing manufacturing systems. Product, process, and flow and activity analysis techniques. Flow lines and buffering techniques. Computer-aided layout design and evaluation. Design of handling systems. Math models of location problems. Multidisciplinary team project. 3 lectures, 1 laboratory. Prerequisite: IME 144, IME 223, IME 405 or IME 342, IME 314, or equivalent. Recommended: IME 319, IME 420.

**IME 455 Manufacturing Design and Implementation I (3)**

A mix of industry and in-house structured group projects. Projects progress through a complete cycle from design through implementation. Application of project management methods. Examination of relevant economical and safety issues. 3 laboratories. Prerequisite: IME 418.

**IME 457 Advanced Electronic Manufacturing (4)**

Design and fabrication of commercial electronic products; PCB layout design, bill of material analysis and component purchasing, production planning and scheduling, programming automated surface-mount assembly line, marketing of products. Multidisciplinary project teams exposed to real-world challenges of electronics manufacturers. 2 lectures, 2 laboratories. Prerequisite: IME 156 or IME 157.

**IME 458 Microelectronics and Electronics Packaging (4)**

Materials, processes, and reliability of microelectronics and electronics packaging, surface mount assembly and printed circuit board fabrication. Overview of semiconductor manufacturing and optoelectronics packaging. 3 lectures, 1 laboratory. Prerequisite: MATE 210 and PHYS 133 or consent of instructor. *Crosslisted as CPE 488/IME 458/MATE 458.*

**IME 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Consent of instructor.

**IME 471 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

**IME 481 Senior Project Design Laboratory I (2)**

Culminating design project typical of problems faced in professional practice. Individual or group projects typically involve system design, modeling, analysis and testing. Project method includes costs, planning, scheduling, appropriate research methodology and formal reports. 2 laboratories. Prerequisite: Senior standing in major and consent of instructor.

**IME 482 Senior Project Design Laboratory II (3)**

Continuation of IME 481. Involves research methodology: problem statement, method, results, analysis, synthesis, project design, construction (when feasible), and evaluation/conclusions. Project results presented in thesis-like formal reports

suitable for reference library and formal oral presentations. 3 laboratories. Prerequisite: IME 481.

**IME 493 Cooperative Education Experience (2) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 6 units. Prerequisite: Sophomore standing and consent of instructor.

**IME 494 Cooperative Education Experience (6) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 18 units. Prerequisite: Sophomore standing and consent of instructor.

**IME 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units. Prerequisite: Sophomore standing and consent of instructor.

**IME 500 Individual Study (1-4)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to students who have demonstrated ability to do independent work. Total credit limited to 4 units. Prerequisite: Consent of department chair and supervising faculty member.

**IME 501 Graduate Survey I (4)**

Survey of traditional industrial engineering applications in industrial systems, work methods, measurements and analysis. Facilities design, automation and logistics of industrial operations. Human factors and cost estimation of industrial applications. 3 seminars, 1 activity. Prerequisite: Graduate standing.

**IME 502 Graduate Survey II (4)**

Survey of current issues in data analysis and mathematical modeling of industrial systems. Queuing theory, Markov Chains quality control and supply chain issues. 4 lectures. Prerequisite: Graduate standing and consent of instructor.

**IME 503 Applied Statistical Methods in Engineering (4)**

Application of hypothesis testing, regression models, and ANOVA models to forecasting, process optimization, cost estimation, work measurement, inventory control, scheduling, and ergonomics. Probability distributions of process outputs in industries and service systems such as Normal, exponential, Uniform, Hypergeometric, Binomial, and Poisson. Applications in queuing, reliability, Markov chains. Expectations of random variables. Measures of central tendency and variation. Population and a random sample. Central limit theorem and its application in simulation of processes. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**IME 507 Graduate Seminar (2)**

Selected topics of interest to industrial engineering, integrated technology management, and engineering management graduate students. The Schedule of Classes will list topic selected. Total credit limited to 4 units, with a maximum of 2 units per quarter. 1 seminar, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**IME 510 Systems Engineering I (4)**

Project management. Scheduling and budgeting. Queuing theory. Process control and life-cycle cost analysis. Contracts and negotiation. 4 lectures. Prerequisite: Graduate standing or consent of instructor. *Crosslisted as AERO/IME 510.*

**IME 511 Systems Engineering II (4)**

Risk management. Design strategies to meet system/mission requirements. Design for supportability, manufacturability, reliability, etc. Quality function development and quality control concepts. 4 lectures. Prerequisite: AERO 510 or IME 510, graduate standing or consent of instructor. *Crosslisted as AERO/IME 511.*

**IME 516 Mechatronics Systems Analysis (4)**

Overview of smart products and intelligent manufacturing systems. Tools and technologies utilized in the design, manufacturing, and operations of such products and systems. Artificial Intelligence Technologies and Fuzzy Logic.

Design of smart products and intelligent systems. Case studies. Team projects and formal presentations. 3 seminars, 1 laboratory. Prerequisite: IME 416 or ME 405 or equivalent.

**IME 520 Advanced Information Systems for Operations (4)**

Advanced information systems (IS) applications in manufacturing and service operations. Introduction of common IS applications, such as manufacturing execution systems; reporting systems; capacity planning systems; scheduling systems; and customer inquiry systems. Industry-specific analysis of IS requirements and availability. 4 seminars. Prerequisite: IME 410 or consent of instructor.

**IME 526 Advanced Topics in Manufacturing System Design (4)**

Modeling and analysis of manufacturing systems. Advanced topics in manufacturing system design to support development of complex systems: Virtual Reality, discrete event simulation, system architectures, systems integration, scheduling and control of manufacturing systems. Total credit limited to 12 units. 3 seminars, 1 laboratory. Prerequisite: IME 410 or equivalent.

**IME 541 Advanced Operations Research (4)**

Operations Research approach to model building. Linear programming and sensitivity analysis. Network flow models. Integer programming, large scale linear programming. Goal programming and multi-attribute decision making. Dynamic programming. Nonlinear programming and search methods. Applications in model building and computer solutions in planning, resource allocation, scheduling, and other industrial and service operations. 3 lectures, 1 laboratory. Prerequisite: Graduate standing and consent of instructor.

**IME 542 Reliability Engineering II (4)**

Reliability engineering terminology and definitions. Reliability mathematics; probability plotting; load-strength interference and safety margin. Failure distributions and failure rate models. Weibull analysis; bath tub curve; reliability of parts. Reliability of systems; redundancy; reliability allocation. Maintainability and availability. Failure modes and effects analysis. Fault tree analysis. Failure data analysis; reliability testing; reliability growth testing. Electronic system, mechanical and software reliability. Safety and human reliability; reliability management. 3 lectures, 1 laboratory. Prerequisite: IME 503.

**IME 543 Advanced Human Factors (4)**

Theory and application of man-machine relations and system design. Concepts of mathematical models, human information input channels, decision making based on capability of human operator. 3 seminars, 1 laboratory. Prerequisite: IME 319 or equivalent, IME 326 or equivalent and graduate standing.

**IME 544 Advanced Topics in Engineering Economy (4)**

Review of interest calculations and comparison of economic alternatives. Replacement analysis. Capital planning and budgeting. Mathematical programming and capital budgeting. Utility theory. Decision making under risk and uncertainty. Application of simulation in risk modeling. Benefit-cost analysis. Multi-attribute decision making. Analytic hierarchy process. 3 lectures, 1 activity. Prerequisite: Undergraduate course in engineering economy.

**IME 545 Advanced Topics in Simulation (4)**

Validation of simulation models. Statistical techniques for variance reduction. Experimental design and optimization. Comparison of attributes of simulation languages. Review of current manufacturing and service industry applications. Case studies. 3 lectures, 1 laboratory. Prerequisite: IME 420 and graduate standing.

**IME 548 Engineering Decision Making (4)**

Principles, concepts, models, and case studies of decision making, both quantitative and nonquantitative. Emphasizes commonly used techniques when quantitative models do not exist, do not cover all key factors, or when sufficient data are not available. 3 lectures, 1 laboratory. Prerequisite: IME 301, IME 314, STAT 321 or equivalent and graduate standing.

**IME 555 Computer-Integrated Manufacturing (4)**

CIM and concurrent engineering concepts. Systems analysis methodologies and functional specifications. Technological and managerial strategies for system integration. Analysis of contemporary CIM frameworks. Information networks and protocols for integrated manufacturing systems. Implementation strategies for CIM and concurrent engineering. 3 seminars, 1 laboratory. Prerequisite: IME 335, IME 411 or equivalent, graduate standing.

**IME 556 Technological Project Management (4)**

Projects in industrial organizations and enterprises. Emerging technologies and project management. Relationship to strategic plans and managing change in

organizations. Formulating, selecting, structuring, and planning projects. Project organization and control. Overcoming barriers. Application of project management software. 3 seminars, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

#### **IME 557 Technological Assessment and Planning (4)**

Assessing likely future technological environments, speed of change in competitive environments, relationship to business, strategic, and technology plans of firms. Past, present and technological evolution and operational changes. Technological and competitive impact assessment and business/technology strategy development. Use of case studies and company experiences. 4 seminars. Prerequisite: IME 503 or equivalent, and graduate standing.

#### **IME 558 Executive Seminars (4)**

Culminating overview of major issues facing organizations as they meet the challenge to sustain a competitive advantage in a business environment characterized by rapid and pervasive change. Topics include project management, virtual organizations, the service sector, manufacturing futures, and information technology. 2 seminars, 2 supervision. Prerequisite: Advanced graduate program status or consent of instructor.

#### **IME 559 Engineering Research and Development (4)**

Principles, approaches and practices for effective engineering innovation, design, research and development (R&D) in business and industry. Relationship of R&D with corporate strategy and technology base. R&D objectives through implementation. Integration of creativity, evaluation, design, and ongoing operations. Case studies. 4 seminars. Prerequisite: IME 314 or equivalent and graduate standing.

#### **IME 560 Quality Engineering II (4)**

Integrated total quality system engineering for manufacturing and service firms. Classical and modern quality philosophies and quality assurance and improvement methods. Statistical methods. Designing for quality, continuous quality improvement, and total quality system integration. Case studies. 4 seminars. Prerequisite: IME 421, IME 430, or equivalent.

#### **IME 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to graduate students and selected seniors. The Schedule of Classes will list title selected. 1-4 seminars. Prerequisite: Graduate standing and/or consent of instructor.

#### **IME 571 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Graduate standing or consent of instructor.

#### **IME 575 Critical Technologies (4)**

Scientific, engineering and strategic overview of numerous critical emerging technologies. Topics include: technologies critical for different engineering disciplines, critical to numerous industries, and/or critical to the national interest. Focus on each technology to include: understanding key scientific fundamentals, evaluating commercialization potential to industry, and identifying conditions and outlook for future technological breakthroughs. 3 seminars, 1 laboratory. Prerequisite: Engineering graduate student and consent of instructor.

#### **IME 577 Engineering Entrepreneurship (4)**

The special requirements of entrepreneurship in a high-tech environment. Guest lectures, focused seminar topics, a business plan project, and case studies provide the tools to evaluate and pursue technology-based business opportunities. ~~4 lectures, 3 lectures, 1 laboratory~~. Prerequisite: Graduate standing or consent of instructor. *Change effective Winter 2011.*

#### **IME 580 Manufacturing Systems (4)**

Modern approaches in production and inventory planning and control to support large-scale manufacturing systems, material requirements planning (MRP I), manufacturing resource planning (MRP II), and just-in-time (JIT) manufacturing systems. Enterprise resource planning (ERP) and integration with financials. Information requirements, operational issues, and policy matters. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

#### **IME 591, 592 Integrated Product Development I, II (4) (4)**

Team taught course addressing: product opportunity identification, customer needs analysis, concept definition, requirements definition, product-process analysis, product specification, design/process description, prototyping, project management, packaging, product promotion/introduction, and manufacturing ramp-up. Team projects in partnership with industry sponsors, field-trips and

formal presentations.

3 seminars, 1 laboratory for each. Prerequisite: Graduate standing.

#### **IME 593 Cooperative Education Experience (2) (CR/NC)**

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

#### **IME 594 Cooperative Education Experience (6) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

#### **IME 595 Cooperative Education Experience (12) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

#### **IME 596 Team Project/Internship (1-10)**

Integrative learning experience through internship and team project with industrial organization. Requires advanced study and focuses on industrial unstructured problem or opportunity requiring integration across disciplines. Team project involves student, faculty, and sponsoring firm representative(s) in a collaborative learning environment, and culminates in comprehensive written report. Total credit limited to 10 units, normally taken over 2 quarters. Prerequisite: Advanced graduate standing, completion of, or concurrent enrollment in, engineering courses in specialization, and consent of participating faculty.

#### **IME 599 Design Project (Thesis) (1-9)**

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis. Prerequisite: Graduate standing and consent of instructor.



## 2009-11 Cal Poly Catalog

### Journalism Department

#### JOUR—JOURNALISM

##### JOUR 201 Journalism History (4)

Survey of historical influences in the development of today's journalism. Contributions of women and minorities to American mass media. Rise of technology in the communication industry. 4 lectures.

##### JOUR 203 News Reporting and Writing (4)

Introduction to the fundamental techniques of reporting and writing news articles from print and online perspectives. Extensive laboratory and field practices in gathering and evaluating information. Writing basic news stories under close supervision. 3 lectures, 1 laboratory.

##### JOUR 205 Agricultural Communications (4)

Survey of the media of agricultural communication. Newspaper farm pages and sections, general and specialized agricultural magazines. Radio and TV farm broadcasts. Public and private agencies involved in agricultural communication. Role of California minorities in agriculture. Writing on agriculture-related issues. 3 lectures, 1 activity.

##### JOUR 219 Multicultural Society and the Mass Media (4) USCP

The role of the mass media in a democratic multicultural society. Portrayal and stereotyping of ethnic minorities by different mass media forms throughout U.S. history. The growing impact of minorities in the United States. Achievement and goals of current American ethnic media, with special attention to Latinos/as and African-Americans. 4 lectures. Fulfills USCP.

##### JOUR 233 Copy Editing (4)

Introduction to the techniques of newspaper, magazine, and on-line copy desk work. Rewriting and editing copy and headlines for news, feature stories, and on-line material. Headline, caption, and display copy writing. Ethical issues in copy editing. Selecting, cropping, and writing captions. Art/photography selection, sizing, and cropping. Basic editing functions of Photoshop and Quark. Practical laboratory experience in editing. 3 lectures, 1 laboratory. Prerequisite: JOUR 203.

##### JOUR 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### JOUR 285 Introduction to Web-Based Journalism (4)

Introduction to the social, editorial and technical issues surrounding the Web as a new form of communication. Fundamentals of gathering, writing and publishing content for the Web that includes using photographs, sound, pictures and video to tell a story. 3 lectures, 1 laboratory. Prerequisite: JOUR 203.

##### JOUR 302 Mass Media Law (4)

Legal basis for freedom of expression. Court decisions resolving conflicts between First Amendment and right to fair trial, privacy, reputation. Source confidentiality, freedom of information, contempt, copyright. Federal and state laws and regulations affecting mass media reporters, editors, publishers, news directors. 4 lectures. Prerequisite: JOUR 203.

##### JOUR 303 Multimedia Reporting and Production (4)

Advanced exploration of the social editorial and technical issues surrounding the Web as a new form of communication. Advanced application of multimedia reporting skills including production, editing and online publishing using a variety of platforms. Focus on using the most effective online medium to report on a particular news event. 3 lectures, 1 laboratory. Prerequisite: JOUR 285 or consent of instructor.

##### JOUR 304 Public Affairs Reporting (4)

Experience leading to advanced skills in reporting and writing stories about contemporary issues, government and courts. Field and laboratory assignments in beat reporting, public meeting coverage, writing style, investigative techniques and online journalism research. 3 lectures, 1 laboratory. Prerequisite: JOUR 203 and JOUR 233 or JOUR 342.

##### JOUR 312 Introduction to Public Relations (4)

Overview of the history, growth and ongoing development of public relations as an information management function in a multi-cultural environment. Public

relations practices used in commercial and non-profit sectors, and first-hand application of public relations skills. 4 lectures. Prerequisite: Sophomore standing.

##### JOUR 331 Contemporary Advertising (4)

Principles of advertising, copy, layout, and production for print and broadcast media. Economic, political, and social function of advertising in a free market society. Advertising ethics. Social responsibility of advertising in a multicultural environment. Emerging advertising technologies. Advertising on the Internet. 4 lectures.

##### JOUR 333 Broadcast News (4)

Beginning broadcast news writing and reporting for radio and television. Emphasis on developing news judgment and producing radio newscasts. Introduction to television studio equipment and procedures. Lab experience includes writing and reporting live on-air for KCPR. 3 lectures, 1 laboratory. Prerequisite: JOUR 285.

##### JOUR 342 Public Relations Writing and Editing (4)

Theory, strategic planning and practice in writing persuasive public relations copy for diverse internal and external audiences. Emphasis on gathering information, preparing news releases, newsletters and other communications vehicles. Analysis of various media case studies. 4 lectures. Prerequisite: JOUR 312.

##### JOUR 346 Broadcast Announcing and Production (4)

Develop on-air skills in the performance of voice-overs, stand-ups, hosting and the production of televised public service announcements. Emphasis on the effective use of audio and non-linear video editing techniques as well as broadcast writing. 3 lectures, 1 activity. Prerequisite: JOUR 203 and JOUR 333.

##### JOUR 348 Electronic News Gathering (4)

Instruction on electronic news gathering (ENG) that includes advanced news writing, field reporting and editing for broadcast. Emphasis on developing research techniques, interviewing skills, responsible and effective non-linear video editing, compelling use of natural sound and professional on-air delivery. 3 lectures, 1 laboratory. Prerequisite: JOUR 203 and JOUR 333.

##### JOUR 352 Advanced Newspaper Reporting: *Mustang Daily* (3)

Reporting lab for students holding editorial positions on *Mustang Daily*. Total credit limited to 6 units. 2 lectures, 1 laboratory. Prerequisite: JOUR 304.

##### JOUR 353 Broadcast Journalism Practicum (3)

Senior-level course synthesizing the diverse skills and experiences developed through the broadcast journalism curriculum. Students produce a live 30-minute CPTV newscast per week, or a one-hour KCPR segment that incorporates news, information, talk and entertainment. Emphasis on news producing, reporting and announcing skills. Total credit limited to 6 units. 2 lectures, 1 laboratory. Prerequisite: JOUR 333 and JOUR 346 or JOUR 348. Non-majors: consent of instructor.

##### JOUR 390 Visual Communication for the Mass Media (4)

Theory and application of visual communication in today's print, broadcast and public relations media. Extensive experience in visual and text manipulation for effective information communication. 3 lectures, 1 laboratory. Prerequisite: JOUR 203.

##### JOUR 400 Special Problems for Advanced Undergraduates (1–4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of instructor.

##### JOUR 401 Global Communication (4)

Global communications facilities and operations; world transmission of information; survey of world wire services and international print and electronic media. Analysis of press operations under varying government ideologies, including third world countries. 4 seminars. Prerequisite: JOUR 203.

##### JOUR 402 Journalism Ethics (4)

Current issues revolving around the social responsibility of the mass media. Role of the public, government, and media in considerations of media accountability. Professional behavior in media organizations. 4 seminars. Prerequisite: Junior standing, JOUR 203; junior standing.

##### JOUR 407 Feature Writing (4)

Practice in researching, interviewing, writing and marketing nonfiction articles for print media, and analysis of similar work in current distribution. 4 lectures. Prerequisite: JOUR 304 or consent of instructor; junior standing.

**JOUR 410 Applied Multimedia Reporting (4)**

Exploration of the uses of computers for newsgathering and reporting. Focus on information gathering from mass media, governmental and corporate data bases and contextual manipulation using personal computers and mainframe computers. Commercial online and Internet tools (such as the World Wide Web) and database tools used for day-to-day and project oriented reporting. 3 lectures, 1 laboratory. Prerequisite: JOUR 203; junior standing.

**JOUR 413 Public Relations Campaigns (3)**

Methods employed in dissemination by organizations, institutions and governments. Interaction of media and PR practitioners, strategies for integrating appropriate media to facilitate effective dissemination, case histories, formation and measurement of public opinion. Public opinion survey projects.

Development of skills needed to plan and conduct internal and external public relations campaigns for corporate and non-profit organizations. Includes goal setting, management of resources, budgeting, creation of campaign communications, and outcomes analysis. 3 lectures. Prerequisite: JOUR 203 and JOUR 312 and JOUR 342 or consent of instructor. *Change effective Fall 2009.*

**JOUR 415 Advanced Public Relations Practice: CCPR (3)**

Proposing, creating, managing, and implementing public relations campaigns for community-based clients on behalf of the student-run firm, Central Coast PRspectives. 2 lectures, 1 laboratory. Prerequisite: JOUR 413.

**JOUR 444 Media Internship (3)**

Application of techniques on daily basis with media under supervision of department faculty. Prerequisite: Junior standing in Journalism and consent of instructor.

**JOUR 460 Senior Project (3)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 90 hours total time.

**JOUR 470 Selected Advanced Topics (2-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 2-4 lectures. Prerequisite: Consent of instructor; junior standing.

## 2009-11 Cal Poly Catalog

### Journalism Department

#### BS JOURNALISM

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                      ☐ USCP

#### MAJOR COURSES

JOUR 203 News Reporting and Writing .....	4
JOUR 219 Multicultural Society and the Mass Media (USCP) .....	4
JOUR 285 Introduction to Web-Based Journalism .....	4
JOUR 302 Mass Media Law .....	4
JOUR 401 Global Communication .....	4
JOUR 402 Journalism Ethics .....	4
JOUR 444 Media Internship.....	3
JOUR 460 Senior Project <i>or</i> JOUR 462 Advanced Media Practicum(8/29/13) .....	3
Follow one of the following tracks .....	18
Broadcast Track (18)	
JOUR 333, 346, 348, 353	
News Editorial Track (18)	
JOUR 233, 304, 352, 407	
Public Relations Track (18)	
JOUR 312, 333 or 304, 342, 413, 415	
JOUR electives. <del>4 units must be 300-400 level</del>	
<del>Maximum 4 units of lower division. 4/13/09</del>	
(1/24/12)	
a. Media Technologies. Select 8 units from JOUR 303, 390, 410	
b. Select 8 units from <b>any JOUR course not used elsewhere in the major</b>	16
JOUR 201, 205, 331, 470 .....	
(1/24/12)	<b>64</b>

#### <sup>1</sup> SUPPORT COURSES

Students are strongly encouraged to take modern language courses as part of their non-journalism electives. These can be in any acceptable language discipline. <del>No journalism or mass communication courses (8/29/13)</del> .....	20
Department-approved upper division electives .....	24
At least 12 units must be in the College of Liberal Arts and/or College of Science and Mathematics. All courses must have a lecture component. Courses must be approved by your academic advisor and department chair.	
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#### GENERAL EDUCATION (GE)

- 72 units required.  
 →See page 50 for complete GE course listing.  
 →Minimum of 12 units required at the 300 level.

#### Area A Communication (12 units)

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

#### Area B Science and Mathematics (20 units)

B1 Mathematics/Statistics .....	8
B2 Life Science .....	4

B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	
B5 elective	
Area B elective (select one course from B1-B5) ...	4

#### Area C Arts and Humanities (16 units)

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

#### Area D/E Society and the Individual (20 units)

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

#### Area F Technology Elective (upper division) (4 units)

	<b>72</b>
<sup>2</sup> FREE ELECTIVES .....	<b>0</b>
	<b>180</b>

<sup>1</sup> No more than 12 units in journalism and/or mass communication courses may be taken. (8/29/13)

<sup>2</sup> If GE courses are used to satisfy Support requirements, additional units may be required to complete the 180 total unit requirement. (8/29/13)

## 2009-11 Cal Poly Catalog

### Kinesiology Department

## KINE–KINESIOLOGY

### BASIC INSTRUCTIONAL PROGRAM

Enrollment is open to all students except for designated intramural courses. Courses carry 1 unit of credit, meet 2 hours per week, and are designed to develop skill, knowledge of rules, background and analysis of techniques, and desirable attitudes toward physical fitness and participation in physical activities. The beginning course or its equivalent is prerequisite to the intermediate, and the intermediate to the advanced. Prerequisite may be waived by consent of the instructor.

No more than two different activity courses nor more than one section of an individual activity course may be taken for credit in any one quarter. A student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course. Any level of an activity course can be repeated only once for credit.

Students not majoring in kinesiology may apply a maximum of 12 units of credit earned in general and intramural activity courses toward the bachelor's degree.

All basic instructional courses (KINE 100–176) are evaluated on a Credit/No Credit basis. A miscellaneous course fee may be required—see the Schedule of Classes.

KINE 100 Adaptive Activity  
 KINE 101 Gymnastics  
 KINE 102 Tumbling and Vaulting  
 KINE 103 Archery  
 KINE 104 Badminton, Beg.  
 KINE 105 Badminton, Int.–Adv.  
 KINE 107 Billiards  
 KINE 108 Basketball  
 KINE 109 Bowling  
 KINE 110 Cycling  
 KINE 111 Fencing  
 KINE 112 Bowling, Int.  
 KINE 113 Intermediate Billiards  
 KINE 116 Aerobic Exercise  
 KINE 121 Golf, Beg.  
 KINE 122 Golf, Int.–Adv.  
 KINE 125 Jogging  
 KINE 126 Judo  
 KINE 129 Stretch, Flex and Relax  
 KINE 131 Physical Conditioning  
 KINE 132 Racquetball, Beg.  
 KINE 133 Racquetball, Int.–Adv.  
 KINE 135 Skin Diving  
 KINE 136 Scuba Diving  
 KINE 137 Self-Defense  
<sup>1</sup> KINE 138 Karate  
 KINE 139 Soccer  
 KINE 140 Ultimate Disc  
 KINE 142 Softball  
 KINE 143 Swimming for Non-Swimmers  
 KINE 144 Swimming, Advanced Beginner  
 KINE 145 Swimming, Int.  
 KINE 146 Swimming, Adv.  
 KINE 147 Swim Conditioning  
 KINE 148 Tennis, Beg.  
 KINE 149 Tennis, Int.–Adv.  
 KINE 150 Intermediate Karate  
 KINE 151 Volleyball, Beg.  
 KINE 152 Volleyball, Int.–Adv.  
 KINE 154 Weight Training  
 KINE 156 Aqua-Aerobics  
 KINE 159 Wrestling  
 KINE 174 Intramurals  
 KINE 176 Fitness Walking

### PROFESSIONAL ACTIVITIES

Priority for enrollment given to those students pursuing a major in Kinesiology. Kinesiology majors may apply a maximum of 12 units of credit earned in KINE 101-199 or KINE 208-229 toward the bachelor's degree. When applicable, course selection should be determined by students after consultation with their

advisor. All courses are one or two units and meet for two or four hours per week. The primary purpose of all professional activities is for students to attain intermediate skills in performance and analysis and knowledge of rules and strategy. Secondary purposes may include leadership and teaching experiences. In some classes a beginning level activity class (see Physical Education) will be recommended for individuals who have little or no previous experience.

#### KINE 208 Golf (1)

Beginning to intermediate golf skills, rules, and etiquette including a combination of skill instruction and course play. Leadership activity assigned. 1 activity.

#### KINE 210 Tennis (1)

Beginning to intermediate tennis skills, etiquette, rules, and equipment. Singles and doubles play. Leadership activity assigned. 1 activity.

#### KINE 211 Softball-Baseball (1)

Basic fundamentals of baseball and softball, including but not limited to throwing, catching, and hitting. Rules and strategies discussed and practiced. Leadership activity assigned. 1 activity.

#### KINE 212 Racquetball (1)

Beginning to intermediate racquetball skills. Rules, regulations, basic strokes and shots, strategies and tournament play. Leadership activity assigned. 1 activity.

#### KINE 213 Basketball (1)

Beginning to intermediate basketball skills. Skill development, knowledge of rules, advanced strategies for playing basketball. Leadership activity assigned. 1 activity.

#### KINE 214 Volleyball (1)

Beginning to intermediate volleyball skills. Basic fundamentals, rules, regulations, strategies, skill development and games. Leadership activity assigned. 1 activity.

#### KINE 216 Wrestling (1)

Beginning to intermediate skills. Basic fundamentals of wrestling, rules and regulations. Leadership activity assigned. 1 activity.

#### KINE 217 Flag Football/Football (1)

Beginning to intermediate skills. Basic skills, strategies, rules and regulations for flag football. Leadership activity assigned. 1 activity.

#### KINE 218 Aquatics (2)

Intermediate skill level in stroke technique including front crawl, backstroke, breaststroke, butterfly, elementary backstroke and sidestroke. Other aquatic skill activities introduced. Must be able to swim 25 yards non-stop in order to participate. Leadership activity assigned. 2 activities.

#### KINE 219 Progressive Resistive Strength Training (1)

Biomechanical principles for performing various exercises, and the muscle groups associated with those exercises. Training considerations involving load, repetitions, sets, regimens, training frequency, and rest/recovery intervals. Leadership activity assigned. 1 activity.

#### KINE 220 Group Fitness Activities (2)

Aerobic fitness activities appropriate for large and small group exercise sessions, and leadership skills associated with the delivery of these activities. Combative aerobic, water-based, flexibility, and muscular strength and endurance activities. Leadership activity assigned. 2 activities.

#### KINE 221 Combatives/Self Defense (1)

Beginner skills emphasizing offensive and defensive techniques for self-protection. 1 activity.

#### KINE 223 Cross Country and Track Events (1)

Beginning to intermediate skills in performance and analysis. Knowledge of rules and strategies. Development of skills and knowledge relating to performance, training, and scoring for cross-country and track running events. Leadership activity assigned. 1 activity.

#### KINE 224 Field Events (1)

Intermediate skills in performance and analysis. Knowledge of rules and strategies. Development of skills relating to performance, training, and scoring track field events. Leadership activity assigned. 1 activity.

<sup>1</sup> KINE 138 meets 3 hours per week.

**KINE 226 Soccer (1)**

Development of beginning and intermediate skills. Rules, regulations and game play. Leadership activity assigned. 1 activity.

**KINE 227 Aerobic Dance and Activities (2)**

Development of instructional competency in the basic components of aerobic exercise, specifically relating to aerobic dance. Emphasis on warm-up, cardiovascular fitness, heart-rate monitoring, dance choreography, elements of higher risk stretching, relaxation protocols and equipment. 2 activities.

**KINE 228 Cooperative Games and Activities (1)**

Introduction of a variety of cooperative games. Non-traditional movement experiences designed to enhance social, cognitive, and physical development. Leadership activity assigned. 1 activity.

**KINE 229 Badminton (1)**

Beginning and intermediate skills. Rules, regulations and strategies for competition. Leadership activity assigned. 1 activity.

**ACADEMIC COURSES**

Professional courses designed primarily for the student majoring in kinesiology.

**KINE 241 Understanding Fitness and Training (1)**

Introduction to physiological principles and factors which provide the basis for the development and maintenance of optimal physical fitness. 1 lecture. Prerequisite: Concurrent enrollment in one course in the PE 101-199 series, or consent of instructor.

**KINE 250 Healthy Living (4)****GE D4**

Personal health with emphasis on healthful behavioral practices including physical fitness, nutrition, psychosocial well-being, alcohol and other drugs, intentional and unintentional injury, reproductive health, infectious and non-infectious diseases. 4 lectures. Not open to students with credit in KINE 255. Fulfills GE D4.

**KINE 255 Personal Health: A Multicultural Approach (4)****GE D4 USCP**

Personal health with special emphasis on multicultural practices. Not open to students with credit in KINE 250. 4 lectures. Fulfills GE D4 and USCP.

**KINE 260 Women's Health Issues (4)****GE D4 USCP**

Introduction to major health issues that affect women disproportionately or differently from men. Topics include female sexual health and reproduction, exercise and eating behaviors, substance abuse, mental health and stress, and violence against women. 4 lectures. Fulfills **GE D4** and USCP. *Changed effective Summer 2009.*

**KINE 270 Orientation to Kinesiology (4)**

Designed to acquaint the student with disciplinary and professional perspectives in kinesiology, computer applications, and the Kinesiology program at Cal Poly. 4 lectures.

**KINE 275 Sports Officiating (2)**

Designed to provide knowledge, understanding, appreciation of officiating in general, and the development of skills in officiating. 1 lecture, 1 activity.

**KINE 276 Athletic Coaching Theory (3)**

Basic concepts, methods, practices, strategies and philosophies as they apply to competitive athletics. 3 lectures.

**KINE 277 Coaching Practicum (2-3) (CR/NC)**

Practical experience through the actual coaching of a competitive sports team. 2-3 activities; minimum of 2 hours per week per unit. Total credit limited to 6 units. Credit/No Credit grading only. Learning outcomes must be developmental if more than one practicum is completed. Prerequisite: Consent of instructor.

**KINE 280 First Aid/CPR (1) (CR/NC)**

An American Red Cross certification course in Standard First Aid Adult/Child/Infant CPR. Skills and knowledge necessary in the treatment of life-threatening emergencies and other injuries and sudden illnesses. Red Cross First Aid/CPR certifications issued upon successful completion of certification requirements. Credit/No Credit grading only. 1 activity.

**KINE 290 Selected Topics (1-4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

**KINE 300 Planning Techniques in Physical Education (3)**

Practical skills and techniques of teaching physical education in schools. Unit and lesson planning, class management, implementation and evaluation of a lesson in a laboratory setting. 2 lectures, 1 laboratory. Prerequisite: KINE 270 and 2 courses from KINE 208-KINE 229 or equivalent. Concurrent: KINE 306.

**KINE 301 Functional Muscle Anatomy (1)**

Functional organization of the human muscular system. All major muscle groups, with emphasis on segmental motion. 1 laboratory. Prerequisite: KINE 270, ZOO 331 or concurrent enrollment.

**KINE 302 Biomechanics (4)**

Fundamental biomechanical concepts and their application to human movement activities, and analyses of exercise mechanics and skill performance. 3 lectures, 1 laboratory. Prerequisite: ZOO 331, KINE 301, KINE 270.

**KINE 303 Physiology of Exercise (4)**

Application of human physiology to exercise situations. 3 lectures, 1 laboratory. Prerequisite: KINE 270, ZOO 331, 332 (*or transfer equivalent*).

**KINE 304 Pathophysiology and Exercise (3)**

Selected human diseases, their etiology, pathophysiology, symptoms, diagnosis, effects on health and physical performance, and as affected by preventive or therapeutic exercise. 3 lectures. Prerequisite: KINE 303.

**KINE 305 Drug Education (2)**

Instruction on the nature and effect of the use of tobacco, alcohol, narcotics and restricted dangerous drugs. 2 lectures. Prerequisite: GE Area D4.

**KINE 306 Assessment in K-12 Physical Education (3)**

Measurement and evaluation techniques in physical education, including statistics, computer applications, and measurement theories. Assessment tools in psychomotor, cognitive, and affective domains. 2 lectures, 1 laboratory. Prerequisite: KINE 270 and STAT 217/STAT 218. Concurrent: KINE 300.

**KINE 308 Motor Development (3)**

Motor development of individuals from birth to maturity. Emphasis on interrelationship between motor and cognitive characteristics and affective needs and interests. 3 lectures. Prerequisite: KINE 270, GE D4 or consent of instructor.

**KINE 309 Creative and Nontraditional Games (3)**

Introduction of preparatory teachers to non-traditional and multicultural games and activities which address the State Framework and the National Standards. Students present the activities in a manner which demonstrates effective models of instruction, including maximum participation. 1 lecture, 2 activities. Prerequisite: KINE 300.

**KINE 310 Concepts and Applications in Elementary Physical Education (3)**

Movement as it relates to physical motor skill development, fitness, wellness, social development, cross-cultural understanding, and self-image. 2 lectures, 1 activity. Prerequisite: GE D4. Recommended: Junior standing.

**KINE 315 Field Sports (3)**

Introduction and preparation for teaching field sports in accordance with state and national standards for K-12 physical education programs. Students learn to present activities in a manner that reflects effective models of instruction. 1 lecture, 2 activities. Prerequisite: KINE 300.

**KINE 316 Net and Wall Games (3)**

Introduction and preparation for teaching net and wall games in accordance with state and national standards for K-12 physical education programs. Students learn to present activities in a manner that reflects effective models of instruction. 1 lecture, 2 laboratories. Prerequisite: KINE 300, KINE 306.

**KINE 317 Computer Applications in Kinesiology (2)**

Applications of computers, data processing and information technology as related to understanding and solving problems in the field of kinesiology. Total credit limited to 4 units. 2 activities. Prerequisite: Basic computer literacy.

**KINE 319 Measurement and Evaluation in Kinesiology (4)**

Principles of test selection and administration, measurement and evaluation of data characteristics, and data analysis related to motor behavior and the performance of physical skills. 3 lectures, 1 activity. Prerequisite: KINE 270, STAT 217 or STAT 218.

**KINE 323 Sport and Gender (4)****GE D5 USCP**

Intersections between sport and gender in American society. Identification and discussion of the historical, sociological and psychological issues that affect the sport experiences of males and females, especially as they relate to class, race/ethnicity, sexuality, and political movements. 4 lectures. Prerequisite:



Junior standing; completion of GE Areas A, D1 and either D3 or D4. Kinesiology majors will not receive GE Area D5 credit. Fulfills GE D5 and USCP.

**KINE 324 Sport, Media and American Popular Culture (4) GE D5 USCP**  
Issues of class, race/ethnicity, gender, various forms of deviance, and other aspects of social life. Exploration of sociological manifestations and implications of how the aforementioned social issues are embedded in mediated forms of sports. Kinesiology majors will not receive GE Area D5 credit. 3 lectures, 1 activity. Prerequisite: Junior standing; completion of GE Areas A, D1 and D3. Fulfills GE D5 and USCP.

**KINE 354 Health Education Strategies (2)**

Introduction to health promotion services, environment, and instruction within public and private settings. Strategies, methods, technology and resources used in the design and delivery of health education about infectious and non-infectious diseases. 2 activities. Prerequisite: BIO 111/BIO 115, KINE 250 or KINE 255.

**KINE 384 Water Safety Instructor (4)**

Analysis of swimming strokes and techniques with emphasis on teaching methods for beginners through advanced swimmers. Those students who complete the course requirements are eligible for American Red Cross Water Safety Instructor certification. 2 lectures, 2 activities. Prerequisite: Demonstrate proficiency in swimming or instructor permission.

**KINE 396 Outdoor Education (3)**

Introduction and preparation for teaching Outdoor Education activities in accordance with the Physical Education Content Standards for California. Students learn to present activities in a manner that reflects effective models of instruction. Includes a clinical teaching experience. 1 lecture, 2 activities. Prerequisite: KINE 300, KINE 306, and KINE 384.

**KINE 400 Special Problems for Advanced Undergraduates (1–3)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 3 units per quarter. Prerequisite: Senior standing or consent of instructor.

**KINE 401 Managing Kinesiology Programs (3)**

Planning, organizing and controlling programs in public, commercial, private and clinical physical activity settings. Emphasis on legal, ethical and budgetary considerations. 3 lectures. Prerequisite: KINE major and senior standing or consent of instructor.

**KINE 402 Motor Learning and Control (4)**

Variables which control sensory-motor integration. Analysis of factors which affect the acquisition of motor skills as related to the learning process and the learning environment. 3 lectures, 1 activity. Prerequisite: STAT 217 or STAT 218 or STAT 221 or equivalent coursework.

**KINE 405 Community Health Promotion (4)**

Practices to educate and empower communities toward actions that resolve health issues and problems. Sociological, historical, educational, environmental and biological influences on health status. 3 lectures, 1 activity. Prerequisite: KINE 250 or KINE 255 and GE Areas A and D3, junior standing.

**KINE 406 Neuroanatomy (4)**

Structure and function of the human nervous system. Afferent and efferent pathways involved in perception and action. Behavioral aspects of motor control and related neurological dysfunction and pathologies. Designed for allied health professions students. 4 lectures. Prerequisite: ZOO 331 and ZOO 332.

**KINE 407 Adapted Physical Activity (4)**

Major categories of disabling conditions with implications for the development of physical activity programs for specific disabilities. 3 lectures, 1 laboratory. Prerequisite: KINE 270, GE Area B2 and B3, sophomore standing. Recommended: ZOO 331, 332. *Formerly KINE 307.*

**KINE 408 Exercise and Health Gerontology (4)**

Special fitness, exercise, and health needs of elder adults. Theories of aging and age-related changes. Health and physical activity programs for elder adults. 3 lectures, 1 activity. Prerequisite: KINE 250 or KINE 255, and one of the following: KINE 220, KINE 227, KINE 228, or KINE 219, senior standing or consent of instructor.

**KINE 410 Psychology of Coaching (3)**

Psychological considerations of the coach-athlete relationship and mental preparation of teams and individuals for competition and practice. Special

emphasis on the male and female adolescent with regard to the psychological implications of sports participation. 3 lectures. Prerequisite: Junior standing. Recommended: PSY 201 or PSY 202.

**KINE 411 Psycho/Social Aspects of Physical Activity (4)**

Psychological and sociological effects of physical activity on individuals and groups in American society. 4 lectures. Prerequisite: KINE 270 and junior standing. Recommended: Completion of GE Areas A and D3; PSY 201 or PSY 202.

**KINE 416 Physical Education/Recreation Facilities (3)**

Management, clientele considerations, facilities and outdoor areas planning and operations, personnel, finance and equipment as related to physical education and recreation areas and facilities. Consideration of architectural and environmental barriers. Field visits required. 3 lectures. Prerequisite: Upper division standing and consent of instructor for non-KINE/REC majors.

**KINE 419 Physical Education Program Content in the Elementary School (3)**

Cognitive and psychomotor competencies required to design a developmental physical education program for elementary aged school children. 2 lectures, 1 activity. Prerequisite: KINE 300 and two activity classes.

**KINE 421 Strategies for Teaching Physical Education (3)**

Systematic analysis and refinement of teaching skills within the discipline of physical education. 2 lectures, 1 activity. Prerequisite: KINE 419.

**KINE 422 Teaching Elementary School Physical Education (4)**

Implementation of a developmental physical education program for elementary aged children. The program will complement that conducted in the local public schools. 1 lecture, 1 seminar, 2 laboratories. Prerequisite: KINE 421.

**KINE 423 Teaching Middle School Physical Education (4)**

Techniques for teaching physical education in middle school. Emphasis on class organization, lesson plan development and evaluation, class management and control, and understanding the middle school setting. For students teaching middle school physical education in the local public schools. 1 lecture, 1 seminar, 2 laboratories. Prerequisite: KINE 422.

**KINE 424 Organization and Implementation of a K-12 Physical Education Program (4)**

Methods of teaching K-12 physical education, with emphasis on alignment with the California Physical Education Challenge Standards, English language learners, special students, and educational technologies. 4 lectures. Prerequisite: KINE 425 or consent of instructor.

**KINE 425 Teaching High School Physical Education (4)**

Techniques for teaching physical education in high schools. Emphasis on teaching strategies, organization, lesson plan development, self-evaluation, class management, and behavior management. 1 seminar, 1 lecture, 2 laboratories. Prerequisite: KINE 423, and one 300-level activity class.

**KINE 426 Senior Seminar (2)**

Capstone course which engages students in activities that integrate the sub-disciplines of kinesiology, and facilitates the development of a personal portfolio. 2 seminars. Prerequisite: Senior standing.

**KINE 434 Health Promotion Program Planning: Theory and Practice (4)**

Theory and methods to facilitate individual and group behavior change to promote health and prevent disease. Concepts from behavioral sciences, health behavior theory, motivation, and decision making. Development of planning and evaluation skills. 3 lectures, 1 laboratory. Prerequisite: KINE 250 or KINE 255, completion of GE Areas A and D3, and junior standing.

**KINE 437 Directed Fieldwork (1–3) (CR/NC)**

Practical work experience in related activities of kinesiology under qualified supervision. Total credit limited to 9 units. Credit/No Credit grading only. Minimum of 2 laboratory hours per week per unit. Prerequisite: Senior standing or consent of instructor.

**KINE 438 Adapted Physical Activity Fieldwork (1–3) (CR/NC)**

Practical experience in adapted physical activity programming. Students plan and conduct physical activity programs for people who are disabled. Total credit limited to 6 units. Credit/No Credit grading only. Prerequisite: KINE 407, and consent of instructor.

**KINE 440 Physical Education Practicum (1)**

Supervised experience involving organizational and instructional responsibilities in activity, lecture and/or laboratory classes as determined by curricular



concentration or certificate program. Total credit limited to 3 units. Prerequisite: Consent of instructor.

#### **KINE 443 Health Education for Teachers (4)**

The health status, special concerns and national health objectives for school aged children. Coordinated school health programs and California Health Framework. Health, nutrition, safety, alcohol, tobacco and other drugs, reproductive health, and chronic disease prevention. Satisfies CCTC requirement for credential. 4 lectures. Prerequisite: GE B2, D4 and junior standing.

#### **KINE 445 Electrocardiography (4)**

Basic principles of electrocardiography, including practical skills of the ECG technician. Recognition of normal ECG patterns and abnormal changes related to rhythm disturbances, conduction defects, myocardial ischemia/infarction, and exercise. 3 lectures, 1 laboratory. Prerequisite: KINE 303 or consent of instructor.

#### **KINE 446 Echocardiography (4)**

Basic principles of echocardiography, including practical skills of the echocardiographer. Recognition of normal echocardiographic patterns and abnormalities, including those caused by pathology and exercise conditioning. 2 lectures, 2 laboratories. Prerequisite: KINE 445 or consent of instructor.

#### **KINE 450 Worksite Health Promotion Programs (3)**

Designed to acquaint students with those events, situations and relationships leading to healthy lifestyles in fitness and occupational settings. Design and implementation of workplace health promotion programs. 3 lectures. Prerequisite: KINE 250 or KINE 255, and senior standing.

#### **KINE 451 Nutrition for Fitness and Sport (5)**

Application of nutritional and metabolic facts to selected aspects of physical training, degenerative disease, obesity and weight control, diet manipulation and modification in sport, nutritional supplementation and special dietary considerations for the young and old, male and female athletes. 5 lectures. Prerequisite: KINE 250 or KINE 255, KINE 303. Recommended: CHEM 313.

#### **KINE 452 Testing and Exercise Prescription for Fitness Specialists (4)**

Selected areas of health/fitness screening and evaluation. Application of components relevant to the development and administration of exercise programs for persons regardless of sex, age, functional capacity and presence or absence of CHD or CHD risk factors. 2 lectures, 2 laboratories. Prerequisite: KINE 303, KINE 445 (or concurrent enrollment in KINE 445) or consent of instructor.

#### **KINE 461 Senior Project (1)**

Comprehensive report, or a field experience, or a synthesis of professional literature that integrates content from kinesiology courses. Topic must be approved by the instructor. 1 laboratory. Prerequisite: KINE 319 and completion of GE Area A.

#### **KINE 462 Research Honors Senior Project (2-4)**

Completion of an advanced research, or creative project. Intended for students taking a significant or leadership role in a professional area. Results may be submitted for poster presentation or other public/professional forum. 2-4 laboratories (minimum 60 hours). Prerequisite: KINE 319, completion of GE Area A, and consent of instructor.

#### **KINE 463 Exercise Science and Health Promotion Fieldwork (3) (CR/NC)**

200 hours of concentration specific practical experience over a ten-week period at an approved agency that provides exercise/fitness/health promotion programs. Students participate in program administration under the direct supervision of an approved on-site coordinator. Credit/No Credit grading only. Prerequisite: Senior standing, minimum GPA of 2.0, successful completion of all concentration coursework requirements and consent of fieldwork coordinator.

#### **KINE 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Consent of instructor.

#### **KINE 471 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Consent of instructor.

#### **KINE 485 Cooperative Education Experience (6) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation

by work supervisor required. Major credit limited to 6 units; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

#### **KINE 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 12 units; total credit limited to 24 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

#### **KINE 500 Individual Study (1-3)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Only 6 units may be applied to degree requirements. Prerequisite: KINE 517 and consent of department head, graduate advisor, and supervising faculty member.

#### **KINE 501 Evaluation of Literature and Current Trends in Kinesiology (3)**

Analysis and evaluation of published studies and current trends in kinesiology. 3 seminars. Prerequisite: Graduate standing.

#### **KINE 502 Current Trends and Issues in Physical Education and Sport (3)**

Practical problems in physical education and sport and their solution in terms of desired objectives in these fields. 3 seminars. Prerequisite: Graduate standing.

#### **KINE 503 Current Health Issues (3)**

Advanced seminar investigating current health issues. Factors that influence health status, current and historical trends in health and disease, and the healthcare system in the U.S. 3 seminars. Prerequisite: KINE 250 or KINE 255 and graduate standing or consent of instructor.

#### **KINE 504 Advanced Pathophysiology and Exercise (3)**

Selected human diseases, their etiology, pathophysiology, symptoms, diagnosis, effects on health and physical performance, and as affected by preventive or therapeutic exercise. Not open to students with credit for KINE 304. 3 lectures. Prerequisite: KINE 303 or equivalent, and graduate standing.

#### **KINE 505 Introduction to Issues, Ethics and Policies in Teaching (1) (CR/NC)**

Knowledge and skills of teaching at the college level. Preparation and support for teaching activity and laboratory classes in the department. Prepares students to be supervisors and teachers in their current or future employment. Credit/No Credit grading only. 1 seminar. Prerequisite: Graduate standing.

#### **KINE 510 Health Behavior Change (3)**

Examination of contemporary research, theory and practice related to facilitating healthy behavior change. Analysis of health problems from biological, ecological, and psycho-social perspectives with emphasis on understanding the acquisition and maintenance of healthy behavior. 3 seminars. Prerequisite: KINE 250 or KINE 255, KINE 503 or KINE 504.

#### **KINE 511 Administration and Leadership in Kinesiology (3)**

Principles and techniques of administration in health, activity and academic settings including budget, personnel supervision, resource acquisition, leadership techniques, and facility management. 3 seminars. Prerequisite: Graduate standing.

#### **KINE 517 Research Methods in Kinesiology (3)**

Experimental, descriptive, historical, philosophical, survey, and action research in kinesiology. Selection of adequate problems for investigation; various sampling techniques and analyses; use of library facilities; manuscript requirements for the thesis. 3 seminars. Prerequisite: KINE 501 or consent of instructor.

#### **KINE 518 Research Prospectus and Proposal Writing (2) (CR/NC)**

Strategies for identifying academically valid research topics. Planning considerations for qualitative and quantitative research including grant writing, human subjects review, personnel, equipment, and timelines. Design and composition of effective research proposals. Credit/No Credit grading only. 2 seminars. Prerequisite: KINE 517.

#### **KINE 522 Advanced Biomechanics (4)**

Advanced biomechanical concepts applied to human movement, examination of research, and biomechanical analyses of movement activities. Performance, occupational, and clinical settings. Laboratory techniques including motion

analysis, force platform, and electromyography. 3 seminars, 1 laboratory.  
Prerequisite: KINE 302 or equivalent.

**KINE 525 Advanced Motor Learning and Control (3)**

Analysis of control theories, research principles and motor learning variables involved in the acquisition of skilled movement with an emphasis on the behavioral level of learning. 3 seminars. Prerequisite: KINE 402 or equivalent.

**KINE 526 Sport and Exercise Psychology (3)**

Theoretical and professional issues in the psychological foundations of sport and exercise. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**KINE 530 Advanced Physiology of Exercise (4)**

Physiological determinants of physical work capacity and sports performance. 3 seminars, 1 laboratory. Prerequisite: KINE 303 and graduate standing.

**KINE 534 Advanced Health Promotion Program Planning: Theory and Practice (4)**

Theory and methods to facilitate individual and group behavior change to promote health and prevent disease. Concepts from behavioral sciences, health behavior theory, motivation, and decision making. Development of planning and evaluation skills. Not open to students with credit in KINE 434. 3 lectures, 1 laboratory. Prerequisite: KINE 250 or KINE 255, KINE 503 or KINE 504, and graduate standing.

**KINE 536 Advanced Electrocardiography (4)**

Theory and application of electrocardiography and other techniques for cardiovascular assessment and treatment of cardiac disease and other abnormalities. 3 seminars, 1 laboratory. Prerequisite: KINE 445 or equivalent and graduate standing.

**KINE 537 Internship (3–12) (CR/NC)**

Supervised work experience in an approved wellness/fitness clinical facility, school, or other faculty approved setting. Total credit limited to 12 units. Maximum of 6 units may be applied toward Master of Science in Kinesiology. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor. Student must be advanced to candidacy.

**KINE 539 Effective Practice in Teaching and Coaching (3)**

Observation and analysis of teaching physical education and coaching sports with special emphasis in pedagogical systems. 2 seminars, 1 laboratory. Prerequisite: Graduate standing.

**KINE 570 Selected Advanced Topics (4)**

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 4 lectures. Prerequisite: Graduate standing or consent of instructor.

**KINE 581 Graduate Seminar in Kinesiology (1–3)**

Directed group study of selected topics for advanced students. The Schedule of Classes will list topic selected. Total credit limited to 6 units. 1–3 seminars. Prerequisite: Graduate standing or consent of instructor.

**KINE 585 Cooperative Education Experience (6) (CR/NC)**

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**KINE 599 Thesis or Project (1-6)**

Completion of a thesis or project pertinent to the field of kinesiology. Independent research under the guidance of the faculty. Prerequisite: KINE 517, KINE 518, consent of graduate committee and supervising faculty member.

**2009-11 Cal Poly Catalog****Kinesiology Department****BS KINESIOLOGY****Flowchart**

☐ 60 units upper division

☐ GWR

☐ 2.0 GPA

☐ USCP

\* = Required in Major; also satisfies GE

Course sequencing: See flowcharts at

[www.csmadvising.calpoly.edu](http://www.csmadvising.calpoly.edu)**MAJOR COURSES**

<sup>1</sup> KINE 208–KINE 229 Professional Activity .....	6
KINE 218 Aquatics or KINE 230 Aquatic Fitness Activities (6/28/12).....	1-2
KINE 250 Health Education (D4)*or	
KINE 255 Personal Health: A Multicultural Approach or KINE 260 Women's Health Issues (D4)* (USCP) (2/15/12).....	4
KINE 270 Orientation to Kinesiology .....	4
KINE 280 First Aid/CPR .....	1
KINE 301 Functional Muscle Anatomy .....	1
KINE 302 Biomechanics.....	4
KINE 303 Physiology of Exercise .....	4
KINE 402 Motor Learning and Control .....	4
KINE 407 Adapted Physical Activity .....	4
KINE 411 Psycho/Social Aspects of Physical Act .....	4
KINE 451 Nutrition for Fitness and Sport .....	5
KINE 460 Experiential Sr. Project (1) or KINE 461 Senior Project (1) or KINE 462 Research Honors Senior Project (1-4 2-4) (5/10/11) .....	1-4
MATH 119 Pre-Calculus Trigonometry or MATH 141 Calculus I (B1)* (8/18/10).....	4
PHYS 118 Introductory College Physics .....	4
STAT 217 Intro to Statistical Concepts and Methods or STAT 218 Applied Statistics-Life Sciences (B1)* .....	4
ZOO 331, 332 Human Anatomy & Physiol I, II (transfer equivalent ZOO 231, 232) .....	5,5
Concentration courses (see below) (B2)* .....	48-60
	46-58
	<del>112</del> 111-127

(6/28/12)

**GENERAL EDUCATION (GE)**

72 units required, 20 of which are specified in Major.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing.....	4

**Area B Science and Mathematics (no add'l units req'd)**

B1 Mathematics/Statistics * 8 in Major .....	0
B2 Life Science * 4 in concentration .....	0
B3 Physical Science * 4 in concentration.....	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) * 4 in Major	0
D5 Upper-division elective (not in KINE).....	4

**Area F Technology Elective (upper division) (4 units)**

52

**FREE ELECTIVES** ..... 1-17 16  
(6/28/12)**180****CONCENTRATIONS (select one)****<sup>1</sup> Exercise Science and Health Promotion Concentration**

KINE 218 Aquatics .....	2
KINE 219 Progressive Resistive Strength Training	1
KINE 304 Pathophysiology and Exercise.....	3
KINE 319 Measurement and Evaluation in Kine	4
KINE 401 Managing Kinesiology Programs .....	3
KINE 408 Exercise and Health Gerontology.....	4
KINE 434 Health Promotion Program Planning.....	4
KINE 463 Clinical and Worksite Health Promotion Field Work .....	3
<sup>2</sup> BIO 111/BIO 115/BIO 161 (B2/B4)* .....	4
Students select one of the following tracks.....	26-32
<sup>2</sup> Clinical Exercise Science Track (26-27)	
KINE 445; 446 or 406; 452; CHEM 111 or 127 (B3); 312; 313 (5/29/09)	
Worksite Commercial Health and Fitness Track (28)	
KINE 354, 445, 450, 452; BUS 387; CHEM 110 (B3)*; COMS 301; JOUR 312	
Health Education Specialist Track (30-32)	
KINE 305, 354, 405, 443, 450; CHEM 110 or 111 (B3); COMS 418 <sup>3</sup> ; FSN 210, MCRO 221	
	54-60
	52-58

**Teaching Concentration** is inactive effective **Summer**

**2009.** The faculty are redesigning the curriculum in response to logistical and professional circumstances that impact the training of physical education teachers. A revised concentration is planned for 2011. Please contact the department for more information.

<sup>1</sup> Students following the Exercise Science and Health Promotion Concentration should take KINE 212, KINE 220, KINE 227 and KINE 228.

<sup>2</sup> Students interested in careers in the health professions should take BIO 161 in lieu of BIO 111/115, and CHEM 127 in lieu of CHEM 111.

<sup>3</sup> Students may substitute KINE 260, KINE 298, KINE 308, KINE 406, KINE 446, KINE 449, KINE 453, or KINE 454. (7/25/12)

**Teaching Concentration**

KINE 218 Aquatics .....	2
KINE 300 Planning Techniques in PE .....	3
KINE 306 Assessment in K-12 Physical Education .....	3
KINE 308 Motor Development .....	3
KINE 309 Creative and Non-Traditional Games .....	3
KINE 315 Field Sports .....	3
KINE 316 Net/Wall Games (removed 5/29/09) .....	3
KINE 396 Outdoor Education .....	3
KINE 419 Physical Education Program Content in Elementary School .....	3
KINE 421 Strategies for Teaching PE .....	3
KINE 422 Teaching Elementary School PE .....	4
KINE 423 Teaching Middle School PE .....	4
KINE 425 Teaching High School PE .....	4
KINE 443 Health Education for Teachers .....	4
BIO 111 General Biology (B2&B4)* .....	4
CHEM 110 World of Chemistry (B3)* .....	4
DANC 381 Methods of Teaching Dance .....	4
	<hr/> 57 54

**Individualized Course of Study**

KINE 218 Aquatics .....	2
BIO 111 General Biology or BIO 161 Intro to Cell and Molecular Biology (B2&B4)* .....	4
CHEM 110 or CHEM 111 or CHEM 127 (B3)* ....	4/5
Approved electives .....	38
Select from the following:	
KINE 231, 260, 265, 298, 304, 308, 311, 319, 320, 405, 401, 406, 408, 434, 435, 445, 446, 449, 450, 453, 454;	
ANT 201; ART 101, 148; BIO 162;	
BIO 302/303/351; CHEM 128, 129, 312, 313, 316, 317, 318, 371; COMS 212, 418; FSN 210, 310, 315, 416; MCRO 224; PHIL 339;	
PHYS 104, 121, 122, 123; PSY 201/202, 256, 306, 317, 330, 405; SCM 451; SOC 110	
(12/14/10) (2/15/12)	
(7/17/12) (7/25/12)	
	<hr/> 48-49
	46-47

**2009-11 Cal Poly Catalog****Kinesiology Department****MASTER OF SCIENCE DEGREE IN KINESIOLOGY****General Characteristics**

The degree program offers advanced study in kinesiology to qualify graduates to enter occupations that require training beyond the bachelor's degree. The program is designed to strengthen the breadth and depth of the student's academic preparation in kinesiology and its sub-disciplines and improve competence for: a) positions in corporate/commercial, community, non-profit or government exercise and health promotion programs, b) teaching physical education, health or exercise science at the community college level, c) positions in obesity, diabetes and heart disease prevention in community, clinical or rehabilitative health care settings, d) independent research in the field of emphasis, and e) continued graduate study at doctoral granting institutions.

Two program options are available:

**Thesis Option:** 39 units of graduate committee approved coursework, 6 units of thesis research/project design, and successful completion of an oral defense of the thesis/project.

**Non-Thesis Option:** 45 units of graduate committee approved coursework and a comprehensive examination.

Most kinesiology graduate courses are offered every other year on a rotational basis. Students admitted with classified graduate standing can typically complete the program within two academic years. Applications to the program are currently accepted every quarter; however, a fall quarter entry is best for optimal progression toward completion of the degree.

**Prerequisites**

Applicants to the program must have a bachelor's degree from an accredited institution with a minimum grade point average of 2.75 in the last 90-quarter units. Letters of recommendation from persons knowledgeable about the applicant's academic achievement and potential as a graduate student are required.

**Classified Graduate Standing**

For admission to the program with classified graduate standing, the applicant must have an undergraduate degree in kinesiology or the equivalent academic preparation as determined by the coordinator of the kinesiology graduate program. Applicants with a grade point average below the required 2.75 and an undergraduate degree in kinesiology may appeal to the graduate coordinator to be "conditionally" accepted. This procedure involves a review process and a specified contract to be successfully completed before admission to classified graduate standing. Special attention is focused upon student performance in undergraduate

science and kinesiology coursework for applicants with a GPA below 2.75 requesting to be conditionally accepted.

**Conditionally Classified Graduate Standing**

Applicants to the program without an undergraduate degree in kinesiology or equivalent academic preparation may be admitted to the program with conditionally classified graduate standing. Applicants with undergraduate deficiencies must remove these deficiencies through coursework or examination before Advancement to Candidacy and may complete this coursework while enrolled as a graduate student at Cal Poly.

Information regarding specific coursework prerequisites and application procedures for admission to the kinesiology master of science program is available on the department website at <http://kinesiology.calpoly.edu> or from the graduate program coordinator.

**Advancement to Candidacy**

For Advancement to Candidacy a student shall have:

- successfully completed all conditionally classified requirements
- successfully completed the Graduation Writing Requirement
- filed a formal study plan
- maintained a minimum 3.0 GPA for all course work completed on the formal study plan

~~At least 18 units must be completed after advancement to candidacy-- (6/14/10)~~

**Requirements for the Degree**

The formal study plan must include 45 units of graduate committee approved coursework. The approved coursework on the formal study plan is designed to prepare the student to achieve his/her stated career objective. At least 30 of the units must be completed at the 500 level in Kinesiology.

All candidates must meet the current Graduation Writing Requirement.

Each candidate must successfully complete a comprehensive examination before the degree is granted. The examination can take one of two forms: (1) those students following the thesis option must successfully defend the thesis or project in an oral examination, or (2) those students following the non-thesis option must pass a comprehensive examination dealing with current general knowledge in the discipline of kinesiology and the application of coursework taken on the formal study plan.

*If the degree requirements are not completed within 7 years, the student will need to complete additional requirements as determined by the graduate committee. See the catalog for "Time Limit for Degree" for more information.*

Up to 15 units may be taken in 400/500-level courses outside of the Kinesiology Department with graduate committee approval provided these courses were not required as

part of the undergraduate degree program. Only 12 units of 400-level kinesiology courses may be put on the formal study plan.

At least 32 units must be completed in residence and no more than 9 units of graduate committee approved extension courses may be included on the formal study plan.

### CURRICULUM FOR MS KINESIOLOGY

	<i>Thesis Option</i>	<i>Non-Thesis Option</i>
KINE 501 Eval Literature & Current Trends in Kinesiology .....	3	3
KINE 511 Administration and Leadership in Kinesiology .....	3	3
KINE 517 Research Methods in Kinesiology .....	3	3
Select from the following: .....	12	12-20
KINE 503 Current Health Issues (3)		
KINE 522 Adv. Biomechanics (4)		
KINE 525 Adv Motor Learning and Control (3)		
KINE 526 Sport/Exercise Psych (3)		
KINE 530 Advanced Physiology of Exercise (4)		
KINE 539 Effective Practice in Teaching and Coaching (3)		
Approved 400-500 electives .....	12	12-20
<i>Thesis option</i> .....	12	–
KINE 518 Research Prospectus and Proposal Writing (2)		
KINE 599 Thesis or Project (3,3)		
STAT 513 Applied Experimental Design/Regression Models (4)		
Elective appropriate for thesis research or applied project (4)		
<i>Non-Thesis option</i> .....	–	4
STAT 512 Statistical Methods		
Comprehensive Exam .....	No	Yes
	45	45

For more detailed information or advisement, contact the Kinesiology graduate program coordinator.



## 2009-11 Cal Poly Catalog

### Landscape Architecture Department

## LA–LANDSCAPE ARCHITECTURE

### LA 101 Introduction to Landscape Architecture (4)

Introduction to the profession of landscape architecture and orientation to the department curriculum and learning processes. 3 lectures, 1 discussion.

### LA 130 Landscape Interpretation (4)

Introduction to the relationships between culture and art, architecture and the natural environment through the description and exploration of significant landscapes and related societies and cultures. 4 lectures.

### LA 170 Principles of Design Communication (4)

Overview of design communications for landscape architects incorporating the principles, techniques, skills and tools used in design generation, exploration, review and implementation. 4 laboratories. Prerequisite: LA 130.

### LA 202 Design Fundamentals I (4)

Introduction to the principles, methods and elements of two- and three-dimensional design in order to communicate intended concepts and meanings. Exploration of the basic design elements including composition, design process and the creation of spatial settings. 4 laboratories. Prerequisite: LA 170; concurrent: LA 220, LA 243.

### LA 203 Design Fundamentals II (4)

Continuation of ideas introduced in LA 202 with the introduction of environmental and visual perception, including three-dimensional site design and landscape architectural design principles. Spatial design and sequencing of space with concern for human behavioral, environmental and natural site factors and generation of program, concept and design development. 4 laboratories. Prerequisite: LA 202, LA 220, LA 243; concurrent: LA 241.

### LA 204 Design Fundamentals III (4)

Continuation of ideas introduced in LA 202 and LA 203 with the introduction of the principles of design theory, landscape ecology and technical applications. Problems of increasing complexity incorporate critical and creative problem solving, the relationship of aesthetics, response to human needs and design for sustainable environments. 4 laboratories. Prerequisite: LA 203, LA 241; concurrent: LA 242.

### LA 211 History of Landscape Architecture: Ancient Civilizations through Colonial America (4) GE C3

Exploration of the continuous alteration of the landscape through recorded time and examination of how humankind has influenced this change. The metaphor of "garden" provides understanding for agrarian regions, urban spaces, and vernacular landscapes of the world. 4 lectures. Fulfills GE C3.

### LA 212 History of Modern and Contemporary Landscape Architecture (4) GE C3

Philosophies and ethics of important personalities in twentieth century landscape architecture. Design theories supporting these individuals' projects and the nature of their practice, combined with the influential events in industry, the arts and sciences, politics, and society of this century. 4 lectures. Fulfills GE C3.

### LA 213 Site and Terrain Analysis (4)

Introduction to various inventory and analysis methodologies, case study reviews, mapping and overlay techniques, environmental ethics and an overall understanding of the function and structure of the natural landscape. Visual assessment, synthesis techniques and relating mapped analytical data with design program analysis for use in site planning. 2 lectures, 2 laboratories. Enrollment limited to CRP and LA majors.

### LA 220 Landscape Ecology: Concepts, Issues and Interrelationships (4)

Concepts, theories and techniques related to landscape analysis, ecology, planning and design with an emphasis on landscape assessment, sustainability, land health, environmental protection and restoration, and natural resource management. 4 lectures. Prerequisite: LA 101, LA 170, concurrent: LA 202.

### LA 221 California Plants and Plant Communities (4)

Introduction to the horticultural characteristics and landscape design potential of California native plants, California plant communities and associated vernacular plants. Includes experiences in field identification, basic planting design, installation techniques and maintenance requirements. Required field trips. 2 lectures, 2 laboratories. Prerequisite: BOT 121 or consent of instructor.

### LA 240 Additional Landscape Architecture Laboratory (1–3)

Total credit limited to 6 units, with a maximum of 3 units per quarter. 1–3 laboratories.

### LA 241 Site Engineering Techniques and Applications (4)

Introduction and application of the techniques, methods, principles and criteria for site engineering and landform design. Includes an introduction to soil science, survey methods, and experiences in the principles, procedures and application of site grading and drainage for landscape architecture. 4 laboratories. Prerequisite: LA 202, LA 220, LA 243; MATH 118/119; concurrent: LA 203.

### LA 242 Implementation Strategies (4)

Introduction and application of the methods, principles and criteria for landscape implementation. Encompasses fundamental design and technical decisions common to landscape architectural design and construction projects including the development of concept, design development and working drawings, and construction management process. 3 lectures, 1 activity. Prerequisite: LA 203, LA 241; concurrent: LA 204.

### LA 243 Materials and Techniques of Landscape Construction (4)

Introduction to the properties, uses and inherent qualities of the fundamental materials of landscape architectural concerns and associated construction techniques and processes. Materials and techniques explored as a source of design ideas, form and expression in landscape architecture. 3 lectures, 1 activity. Prerequisite: LA 170; concurrent: LA 202, LA 220.

### LA 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### LA 317 The World of Spatial Data and Geographic Information Technology (4) GE Area F

Basic foundation for understanding the world through geographic information and the tools available to utilize spatial data. Application of Geographic Information Systems (GIS) and related technologies, including their scientific basis of operation. 3 lectures, 1 activity. Prerequisite: Junior standing, a course in computer science, and completion of Area B. *Crosslisted as LA/NR/GEOG 317.* Fulfills GE Area F.

### LA 318 Applications in GIS (3)

ARC/INFO and ArcView Geographic Information System (GIS) computer software to explore environmental, natural resource, social and economic issues using spatial data. Develop and apply data base and software management competencies. 1 lecture, 2 laboratories. Prerequisite: Junior standing, computer literacy or consent of instructor. *Crosslisted as LA/NR 318.*

### LA 320 Design Theory for Landscape Architects (4)

Complements the material and knowledge presented in the history of landscape architecture, architecture and art courses. Design theory and associated concepts as they are related to landscape architecture. Literature research and analysis of completed design projects. The artists/designers, materials and overall expressions of work are related to the social and economic issues of the time as well as their associations with the other arts and sciences. 4 lectures. Prerequisite: LA 211, LA 212, or consent of instructor.

### LA 330 Cultural Landscapes: People, Places and Ethical Decisions (4)

Investigation of the complexities and interrelatedness of culture, environment and ethical decisions. Interpretation of personal and cultural values and ethics in terms of decisions made and behaviors and actions expressed in the built landscape. ~~4~~ 3 lectures, ~~1~~ activity. Prerequisite: LA 211, LA 212; ~~concurrent: LA 320.~~ *Change effective Fall 2010.*

### LA 349 Advanced Planting Design (4)

Advanced examination of the theories and applied principles of planting design. Emphasis on connections between art and science in the design of parks, gardens and other landscapes. Case studies and field trips. 2 lectures, 2 activities. Prerequisite: EHS 231, EHS 232 and EHS 381 or LA 221.

### LA 363 Recreation and Open Space Planning and Design (4)

Planning and design methods for meeting leisure requirements. Issues of recreation and society. Relationship of recreation and open spaces, assessment of needs and supply of resources. 3 lectures, 1 activity. Prerequisite: Must have completed minimum of one 200-level course in planning, design or recreation and third-year standing or consent of instructor.

**LA 370 Professional Practice (4)**

Issues related to the practice of landscape architecture incorporating processes, procedures and outcomes of professional practice. Topics include professional ethics, business and legal aspects of the profession, relationships to the client and society, personal goal setting, resume and portfolio preparation. 4 lectures. Prerequisite: LA 204.

**LA 371 Internship (3) (CR/NC)**

Involvement in a work setting related to landscape architecture. Thirty hours work experience per unit of credit. Credit/No Credit grading only. Prerequisite: Third year standing in Landscape Architecture.

**LA 400 Special Problems for Advanced Undergraduates (1–3–4)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6–8 units, with a maximum of 3–4 units per quarter. Prerequisite: Consent of instructor. *Change effective Fall 2010.*

**LA 401 Research Project (1) (CR/NC)**

Research methods in landscape architecture and proposal writing techniques. Students prepare proposal and strategy for fifth year study in area of concentration. Credit/No Credit grading only. 1 seminar. Prerequisite: Completion of four focus studios and four Integrated Learning Courses (ILC).

**LA 402 Design Theory and Exploration Focus Studio (4)**

Exploration and application of design theory, exploratory design process and form exploration to design and planning projects. Emphasis on incorporation of inquiry techniques based on the synthesis of interdisciplinary frameworks of art and design theory with historical and cultural issues. Total credit limited to 12 units. 4 laboratories. Prerequisite: LA 204, LA 211, LA 212 or consent of instructor; prerequisite or concurrent: LA 320; concurrent: Integrated Learning Course (ILC) of student's option.

**LA 403 Natural Environments Design Focus Studio (4)**

Assessment, exploration and integration of landscape ecology, sustainability and environmental planning to design and planning projects. Emphasis on interpretation and application of environmental and ecological issues at a range of design scales. Total credit limited to 12 units. 4 laboratories. Prerequisite: LA 204, LA 220, LA 211, LA 212 or consent of instructor; concurrent: Integrated Learning Course (ILC) of student's option.

**LA 404 Cultural Environments Design Focus Studio (4)**

Assessment, exploration and interpretation of cultural values, issues and landscapes to design and planning projects. Emphasis on observation and inquiry of diverse cultural settings, differences in cultural values and personal ethics in the design process. Total credit limited to 12 units. 4 laboratories. Prerequisite: LA 204, LA 211, LA 212 or consent of instructor; concurrent: Integrated Learning Course (ILC) of student's option.

**LA 405 Project Design and Implementation Focus Studio (4)**

Development, exploration and integration of project design and implementation strategies to design and planning projects. Emphasis on creative and exploratory problem solving, spatial design, project resolution, and graphic communication. Total credit limited to 12 units. 4 laboratories. Prerequisite: LA 204, LA 243, LA 242, LA 241 or consent of instructor; concurrent: Integrated Learning Course (ILC) of student's option.

**LA 411 Regional Landscape History (4)**

Developmental history of the landscape in the western region with specific focus on the Basin and Range region and California. One or more field trips required. 4 lectures. Prerequisite: Fourth year standing or consent of instructor.

**LA 431 CAD and Digital Media Communications (ILC) (4)**

Integrated Learning Course (ILC) to assist integration and application of computer-aided drafting (CAD) skills in coursework, project planning and design studio courses. Focus on CAD skills and integration of digital media. Total credit limited to 12 units. 4 activities. Prerequisite: LA 170, LA 204 or consent of instructor; concurrent: Design Focus Studio of student's option.

**LA 432 Landscape Ecology Applications (ILC) (4)**

Integrated Learning Course (ILC) to assist integration and application of landscape ecology principles in project planning and design studio courses. Focus on understanding and developing a framework for ecological planning and design to anticipate consequences of planning and design decisions. Total credit limited to 12 units. 4 activities. Prerequisite: LA 220, LA 221 or consent of instructor; concurrent: Design Focus Studio of student's option.

**LA 433 Cultural Environments (ILC) (4)**

Integrated Learning Course (ILC) to assist integration and application of culture, environment and personal ethics in coursework, project planning and design studio courses. Focus on skills, distinctions and integration of analyzing the cultural landscape, understanding diverse cultural values and assessing personal ethics. Total credit limited to 12 units. 4 activities. Prerequisite: LA 211, LA 320, LA 330 or consent of instructor; concurrent: Design Focus Studio of student's option.

**LA 434 Project Design and Implementation (ILC) (4)**

Integrated Learning Course (ILC) to assist integration and application of project design principles and implementation strategies in project planning and design studio courses. Focus on skills, techniques and decisions of the design, documentation and construction processes. Total credit limited to 12 units. 4 activities. Prerequisite: LA 241, LA 242, LA 243 or consent of instructor; concurrent: Design Focus Studio of student's option.

**LA 435 Professional Practice (ILC) (4)**

Integrated Learning Course (ILC) to assist integration and application of professional practice principles and techniques in planning and design studio and internship courses. Focus on achieving a high level of professional quality, ethical concern, and legal responsibility in project work. Total credit limited to 12 units. 4 activities. Prerequisite: LA 370 or consent of instructor; concurrent: Design Focus Studio of student's option.

**LA 436 Traditional and Digital Media Communications (ILC) (4)**

Integrated Learning Course (ILC) to assist integration and application of graphic communication and presentation skills in coursework, project planning and design studio courses. Focus on skills, distinctions and integration of traditional and digital media explorations. Total credit limited to 12 units. 4 activities. Prerequisite: LA 170, LA 202, LA 203, LA 204 or consent of instructor; concurrent: Design Focus Studio of student's option.

**LA 437 3D Digital Design Communications (ILC) (4)**

Integrated Learning Course (ILC) to assist integration and application of 3D digital graphic communication and presentation skills in coursework, project planning and design studio courses. Focus on skills and integration of three-dimensional digital media explorations. Total credit limited to 12 units. 4 activities. Prerequisite: LA 170, LA 204 or consent of instructor; concurrent: Design Focus Studio of student's option.

**LA 438 GIS Application to Design Projects (ILC) (4)**

Integrated Learning Course (ILC) to assist integration and application of geographic information systems (GIS) and spatial information into focus design studio courses. Total credit limited to 12 units. 4 activities. Prerequisite: LA 220 or consent of instructor; concurrent: Design Focus Studio of student's option.

**LA 461 Senior Design Project Focus Studio (4)**

Comprehensive landscape architectural design and research project showing professional level competency in the integration of design theory, landscape architectural principles and project resolution. Emphasis on creative resolutions, organization and communication skills and technical abilities in program generation, design process, design and research. Total credit limited to 8 units. 4 laboratories. Prerequisite: Completion of Design Focus Sequence (20 units from LA 402-LA 405).

**LA 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

**LA 471 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Consent of instructor.

**LA 481 Visual Resource Management Methods (4)**

Investigation and application of the major visual resource management methods relevant to landscape architecture. Theoretical basis for visual resource assessment, the different assessment techniques, and the process of translating assessment results into visual resource management techniques. 2 lectures, 2 activities. Prerequisite: Fourth-year standing or graduate standing, or consent of instructor.

**LA 482 Evaluating Social and Behavioral Factors for Open Space Design (4)**

User oriented approach to open space design. Interview and survey techniques, behavioral trace mapping and systematic observation, post occupancy evaluation and similar methods are used to generate user input and feedback in the design process. Understanding the behavioral implications of designed environments. 2 lectures, 2 activities. Prerequisite: Fourth-year or graduate standing or consent of instructor.

**LA 483 Special Studies in Landscape Architecture (1–12)**

Special issues and problems through research, field trips, seminars and other forms of investigation and involvement. Course requirements are determined prior to each individual project through a contractual agreement between students and department. Departmental Off Campus Study Program guidelines apply. Total credit limited to 36 units. 1–12 activities. Prerequisite: Fourth- or fifth-year standing, or consent of instructor.

**LA 485 Cooperative Education Experience (6) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 6 units; total credit limited to 18 units. Credit/No Credit grading only. Prerequisite: Junior standing and consent of instructor.

**LA 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 12 units; total credit limited to 24 units. Credit/No Credit grading only. Prerequisite: Junior standing and consent of instructor.

**LA 551 Regional Landscape Assessment I (4)**

Definition, research and filing of data covering the biological, cultural and physical resources of a specific region. Concepts of regionalism, land planning, reclamation and preservation are integral to the course. Utilization of mainframe and microcomputer facilities and software. 4 laboratories. Prerequisite: Graduate standing or consent of instructor.

**LA 552 Regional Landscape Assessment II (4)**

Application of data manipulation techniques in order to model both impacts on natural systems and land development potentials. Use of planning strategies to predict outcomes resulting from the land use decision process. Utilization of mainframe and microcomputer facilities and software. 4 laboratories. Prerequisite: LA 551 and graduate standing.

**LA 585 Cooperative Education Experience (6) (CR/NC)**

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**LA 595 Cooperative Education Experience (12) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

## 2009-11 Cal Poly Catalog

### Liberal Arts and Engineering Studies

#### LAES–LIBERAL ARTS and ENGINEERING STUDIES

##### LAES 200 Special Problems for Undergraduates (1–4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

##### LAES 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### LAES 301 Project-Based Learning in Liberal Arts and Engineering Studies (4)

Researching, writing, revising and presenting a technical proposal suitable for submission to a national design competition seeking innovative solutions to complex technological/social problems. Examination of how to define LAES as a new field of study; analysis of the creative process and team building in theory and in application. For LAES majors only. 4 lectures. Prerequisite: MATH 241; PHYS 133, PHYS 132; GE Area A; completion of 4 engineering fundamentals courses.

##### LAES 400 Special Problems for Advanced Undergraduates (1–4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

##### LAES 411 Global Synthesis in Liberal Arts and Engineering Studies (4)

Onsite work with a global technical development and/or design team to develop a project to be completed/expanded upon in LAES 461. Through guided online discussion with the instructor and fellow LAES students, work through intercultural collaboration and design issues, and present works-in-progress. 4 lectures. Prerequisite: LAES 301, ~~senior~~ junior standing. *Change effective Spring 2011.*

##### LAES 430 Internship (2–12) (CR/NC)

Work experience in business, industry, government and other areas of student career interest. Periodic written progress reports, final report, and evaluation by work supervisor required. Credit/No Credit grading. Total credit limited to 12 units. Prerequisite: Approval of area chair, junior standing, and a CPSLO cumulative GPA of at least 2.5 without being on academic probation.

##### LAES 461 Senior Project in Liberal Arts and Engineering Studies (4)

Under faculty supervision, the selection and completion of a senior project, demonstrating an interdisciplinary focus in LAES. With one-on-one format with the instructor, individual or small group work through many iterations of the senior project, with occasional showing of works in small student groups. Prerequisite: LAES 411, senior standing.

##### LAES 462 Capstone Senior Seminar in Liberal Arts and Engineering Studies (4)

The final refinement and completion of LAES senior projects and other projects. In a development workshop format, presentation of final versions of works-in-progress to combined faculty and professional review committees throughout the quarter. Prerequisite: LAES 461.

##### LAES 470 Selected Advanced Topics (1–4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

##### LAES 471 Selected Advanced Laboratory (1–4)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

##### LAES 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 6 units; total credit limited to 18 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

##### LAES 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. Major credit limited to 6 units; total credit limited to 24 units. Prerequisite: Sophomore standing and consent of instructor.

**2009-11 Cal Poly Catalog****Flowchart****123****Landscape Architecture Department****BACHELOR OF LANDSCAPE ARCHITECTURE**

□ 60 units upper division

□ GWR

□ 2.0 GPA

□ USCP

\* = Required in Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

LA 101 Introduction to Landscape Architecture .....	4
LA 130 Landscape Interpretation <i>or</i> LA 171 Principles of Digital Communication (5/24/13) ....	4
LA 170 Principles of Design Communication .....	4
LA 202 Design Fundamentals I .....	4
LA 203 Design Fundamentals II .....	4
LA 204 Design Fundamentals III .....	4
LA 211 History of Landscape Architecture: Ancient Civilizations through Colonial America .....	4
LA 212 History of Modern and Contemporary Landscape Architecture .....	4
LA 220 Landscape Ecology: Concepts, Issues and Interrelationships .....	4
LA/BOT 221 California Plants and Plant Communities <i>or</i> EHS 381 Native Plants for California Landscapes .....	4
LA 241 Site Engineering Techniques & Apps .....	4
LA 242 Implementation Strategies .....	4
LA 243 Materials/Techniques of Landscape Constr. ....	4
LA 320 Design Theory for Landscape Architecture .....	4
LA 330 Cultural Landscapes: People, Places and Ethical Decisions .....	4
LA 370 Professional Practice .....	4
LA 371 Internship .....	3
LA 402 Design Theory & Exploration Focus Studio .....	4
LA 403 Natural Envmnts Design Focus Studio .....	4
LA 404 Cultural Envmnts Design Focus Studio .....	4
LA 405 Proj. Design/Implementation Focus Studio .....	4
<i>Select one course from:</i>	
LA 402, LA 403, LA 404, or LA 405 .....	4
<i>Select 20 units from the following Integrated Learning Course (ILC) topics. A minimum of three (3) ILC topics must be chosen. (ILC topic courses are repeatable) .....</i>	
LA 431 CAD/Digitl Media Communic. (ILC) (4) .....	20
LA 432 Landscape Ecology Applications (ILC) (4) .....	
LA 433 Cultural Environments (ILC) (4) .....	
LA 434 Project Design/Implementation (ILC) (4) .....	
LA 435 Professional Practice (ILC) (4) .....	
LA 436 Traditional/Digital Design Communications (ILC) (4) .....	
LA 437 3D Digital Design Communic. (ILC) (4) .....	
LA 438 GIS App. To Design Projects (ILC) (4) .....	
LA 461 Senior Design Project Focus Studio .....	4,4
Upper division LA electives .....	8
Two 4-unit courses or one 4-unit course and one 3-unit course plus one unit of free elective. May be LA courses, including additional ILCs and Focus Studios, <b>EDES 333</b> , or CAED interdisciplinary studios. (4/29/10)	

**SUPPORT COURSES**

ARCH 217/218/219 History of Architecture (C3)*	4
BOT 121 General Botany <i>or</i> BIO 114 Plant Diversity and Ecology (B2 & B4)* .....	4
CRP 212 Introduction to Urban Planning .....	4
EDES 101 Intro Architecture & Env Design .....	2
EHS 231 Plant Materials .....	4
EHS 232 Plant Materials .....	4
MATH 118 Pre-Calculus Algebra (B1)* .....	4
MATH 119 Pre-Calculus Trigonometry (B1)* .....	4
Select 8 units from the following .....	8
BIO 227 Wildlife Conservation Biology (4)	
BRAE 337 Landscape Irrigation (4)	
SS 121 Introductory Soil Science (4)	
STAT 217 Intro to Stat Concepts and Methods (4) <i>or</i> STAT 218 Applied Stat for Life Sciences (4)	
Professional electives .....	8
May include any course in: College of Architecture and Environmental Design; Art and Design Department; TH 330; any minor in the College of Architecture and Environmental Design.	

**46****GENERAL EDUCATION (GE)**

72 units required, 16 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (4 units)**

B1 Mathematics/Statistics * 8 units in Support .....	0
B2 Life Science * 4 units in Support .....	0
B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts * 4 units in Support .....	0
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division)**

(4 units) .....	4
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**56****FREE ELECTIVES .....****0****225**



**2009-11 Cal Poly Catalog****Social Sciences Department****LATIN AMERICAN STUDIES MINOR**

Latin America is a region of critical importance to the United States, and California in particular. Students gain an interdisciplinary understanding of Latin America, as well as its cultural, political, and economic connections to California and the United States. This knowledge is increasingly important for a number of careers. The minor also promotes critical thinking skills and enhances the appreciation of diversity as students confront issues relevant to Latin America and US-Latin American relations.

<b>Required courses</b>	<i>Units</i>
ES 243 Survey of Latino/a Studies (D3) .....	4
GEOG 370 Geography of Latin America (D5) .....	4
SPAN 121 <i>or</i> 201 Fundamentals of Spanish (8/30/13)	4
<i>Select two:</i> .....	8
ANT 325 Pre-Columbian Mesoamerica (D5) <i>or</i>	
ANT 330 Indigenous South Americans (D5) (4)	
HIST 340 History of Modern Latin America (4)	
HUM 310 Humanities in World Cultures	
(subtitles: Culture of Latin America <i>or</i> Mexico)	
(C4) (4)	
POLS 328 Politics of Developing Areas (4)	
<b>Advisor Approved Electives</b> .....	8
A minimum of 14 units at the 300-400 level required in the minor.	

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**2009-11 Cal Poly Catalog****[Political Science Department](#)****LAW AND SOCIETY MINOR**

The minor consists of required coursework and advisor approved electives. Details are available from the Political Science Department.

**Required courses**

POLS 245 Judicial Process.....	4
POLS 341 American Constitution .....	4
Select two from the following: .....	8
POLS 334 Jurisprudence (4)	
POLS 343 Civil Rights in America (4)	
POLS 344 Civil Liberties (4)	

**Advisor approved electives ..... 12**

ES 380;  
JOUR 302;  
LS 214;  
NR 404;  
PHIL 334;  
POLS 295, 340, 386 (4 units max), 426;  
PSY 375;  
SOC 402, 406, 412

(7/2/13)

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# University-Wide Programs

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and Planning  
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## BA Liberal Arts and Engineering Studies

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[laes.calpoly.edu](http://laes.calpoly.edu)

The BA degree program in Liberal Arts and Engineering Studies (LAES) is jointly offered by the colleges of Liberal Arts and Engineering. This program prepares students for a wide range of innovative careers in emerging professional fields that combine skills and interests in the arts, technology and culture, and also prepares them for further study in graduate school. This program is open to all students at Cal Poly. This program is not intended to be an ABET-accredited engineering program.

The curriculum allows Liberal Arts and Engineering Studies students, in collaboration with students from all other Cal Poly majors, to participate in development teams working on national and international technology and cultural projects. To further prepare students for work with diverse teams that include participants from across the globe, the program requires students to spend three to six months studying and/or working abroad.

The BA in Liberal Arts and Engineering Studies leads to careers such as:

- audio technology
- digital media production and management
- digital publishing
- environmental technology education
- film and television production
- government policy making/analysis
- international technology management
- science education, such as science instrumentation and systems procurement
- sustainable community development
- technical communications
- technology services and management

Graduates of the Liberal Arts and Engineering Studies program receive a solid foundation in engineering and scientific principles, as well as a cultural appreciation that supports them in careers requiring significant levels of

technical and cultural fluency. To support these goals, the primary learning objectives are to:

- Have a working knowledge of the essential philosophical, ethical, aesthetic and expressive aspects of our culture and their historical development.
- Communicate effectively through a variety of media in diverse, multicultural contexts.
- Understand a technical system, component, or process.
- Function effectively as a member of an inter-disciplinary and international team.
- Identify technical problems and use a multidisciplinary perspective to help formulate effective solutions.
- Possess a solid understanding of the ethical and professional responsibilities associated with the creation, use, and integration of new and existing technology.
- Understand the social, political, and historical impact of technical solutions on complex modern problems.
- Be able to continue asking questions and seeking interdisciplinary solutions to technological dilemmas.
- Understand their responsibilities as informed citizens in a technological society and therefore remain engaged in helping that society improve.

## Concentrations

LAES students must select *one* concentration from Engineering and *one* from Liberal Arts. Students may choose to follow an individualized course of study constructed in consultation with LAES advisors.

### Engineering

Computer Graphics  
Culture, Society and Technology  
Electrical Engineering (Power)  
System Design

### Liberal Arts

Interactive Communication–Cinema  
Interactive Communication–Theatre  
Publishing Technology  
Technical Communication

**BA LIBERAL ARTS and ENGINEERING STUDIES**

☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                      ☐ USCP

\* = Required in Major; also satisfies GE

Note: No major, support or concentration courses may be taken as credit/no credit.

**MAJOR COURSES**

CHEM 124 Gen Chem for Engineering (B3/B4)* ...	4
ENGL 149 Technical Writing for Engineers (A3)*	4
LAES 301 Project-Based Learning in LAES .....	4
LAES 411 Collab. Global Partnerships in LAES <i>or</i> <b>LAES 302 (3/12/14)</b> .....	4
LAES 461 Senior Project (or other approved senior project course) .....	4
LAES 462 Capstone Senior Seminar in LAES .....	4
MATH 141, 142 Calculus I, II (B1)* .....	4,4
MATH 143 Calculus III (B5)* .....	4
MATH 241 Calculus IV .....	4
MATH 244 Linear Analysis I <i>or</i> advisor approved elective .....	4
PHYS 141 General Physics IA .....	4
PHYS 132, 133 General Physics II, III .....	4,4
STAT 312/321/350 .....	4
Engineering concentration (minimum 8 units at 300-400 level) .....	34-35
Liberal Arts concentration (minimum 12 units at 300-400 level) .....	24
Study Abroad or Global Perspectives courses (300-400 level) .....	4,4
	<b>126-127</b>

**GENERAL EDUCATION (GE)**

72 units required, 20-32 of which are specified in Major, depending on concentration.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (8 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing * 4 units in Major .....	0

**Area B Science and Mathematics (4 units)**

B1 Mathematics/Statistics * 8 units in Major .....	0
B2 Life Science .....	4
B3 Physical Science * 4 units in Major .....	0
B4 One lab taken with either a B2 or B3 course	
B5 * 4 units in Major .....	0

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts * may be in Liberal Arts concentration .....	0-4
C4 Upper-division elective * may be in Liberal Arts concentration .....	0-4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division) \*in conc** 0-4  
**40-52**

**FREE ELECTIVES** ..... **14-1**

**180**

**ENGINEERING CONCENTRATIONS (select one)****Computer Graphics Concentration**

CSC 100 Computer Science Orientation .....	2
CSC 101 Fundamentals of Computer Science I .....	4
CSC 102 Fundamentals of Computer Science II .....	4
CSC 103 Fundamentals of Computer Science III .....	4
CSC 141 Discrete Structures I .....	4
CPE 129, 169 Digital Design and Lab .....	3,1
CPE 229, 269 Computer Des Assembly & Lab .....	3,1
CSC 357 Systems Programming .....	4
CSC 471 Intro to Computer Graphics .....	4
	<b>34</b>

**Electrical Engineering (Power) Concentration**

EE 111, 151 Intro to Electrical Engineering, Lab .....	1,1
EE 112 Electric Circuit Analysis I .....	2
EE 211, 241 Electric Circuit Analysis II, Lab .....	3,1
EE 212, 242 Electric Circuit Analysis III, Lab .....	3,1
EE 255, 295 Energy Conver Electromag, Lab .....	3,1
EE 335, 375 Electromagnetics, Lab .....	4,1
EE 406 Power Systems Analysis I .....	4
EE 407, 444 Power Systems Analysis II, Lab .....	4,1
Advisor approved power technical elective .....	4
	<b>34</b>

**System Design Concentration**

IME 101 Intro Industrial & Manuf Engr .....	1
IME 223 Process Improvement Fundamentals .....	4
IME 239 Industrial Costs & Controls .....	3
IME 301 Operations Research I .....	4
IME 303 Project Organization & Management .....	4
IME 314 Engineering Economics .....	3
IME 320 Human Factors & Tech (Area F)* .....	4
IME 326 Engineering Test Design & Analysis .....	4
IME 420 Simulation .....	4
IME 443 Facilities Planning and Design .....	4
	<b>35</b>

**Individualized Course of Study** ..... **34**

Courses to be selected with program advisor.  
Minimum 8 units at 300-400 level.

**LIBERAL ARTS CONCENTRATIONS (select one)****Culture, Society and Technology Concentration**

ES/WGS 350 Gender, Race, Science & Technology (Area F)* (USCP) .....	4
HUM 303/PHIL 341/PHIL 337 (C4)* .....	4
POLS 451 Technology & Public Policy .....	4
<i>Approved electives. Select from:</i> .....	12
ANT 360; COMS 317; GEOG 318, 333; HIST 354, 359; JOUR 331, 470; PHIL 322, 340; POLS 347; PSY 311, 494	
	<hr/> 24

**Interactive Communication – Cinema Concentration**

TH 210 Introduction to Theatre (C3)* .....	4
ENGL 371 Film Styles and Genres (C4)* .....	4
ENGL 411 New Media Arts I.....	4
<i>Approved electives. Select from:</i> .....	12
ENGL 210, 370, 372, 412, 416, 419; COMS 311, 385, 419	
	<hr/> 24

**Interactive Communication – Theater Concentration**

TH 210 Introduction to Theatre (C3)* .....	4
TH 227/228 Theatre History .....	4
ENGL 411 New Media Arts I.....	4
<i>Approved electives. Select from:</i> .....	12
ENGL 210, 412; TH 220, 230/330, 310/320/360/390, 430, 434; HUM 320	
	<hr/> 24

**Technical Communication Concentration**

ENGL 317 Technical Editing .....	4
ENGL 319 Information Design & Production.....	4
COMS 317 Technology & Human Comm .....	4
<i>Approved electives. Select from:</i> .....	12
ENGL 210, 310, 418/420; HUM 303; PHIL 337/341; COMS 213, 301	
	<hr/> 24

**Publishing Technology Concentration**

GRC 101 Intro to Graphic Communication.....	3
GRC 201 Digital Publishing Systems.....	3
GRC 211 Substrates, Inks and Toners.....	4
HUM 303/PHIL 341/PHIL 337 (C4)* .....	4
<i>Approved electives. Select from:</i> .....	10
COMS 317; GRC 316, 328, 329, 402; PSY 494	
	<hr/> 24

**Individualized Course of Study** ..... 24

Courses or a minor to be selected from College of Liberal Arts with program advisor approval.  
Minimum 12 units at 300-400 level.

**University Studies (UNIV) Courses**

University Studies (UNIV) courses provide an opportunity for interdisciplinary study, addressing university-wide learning objectives (such as diversity, environmental literacy, sustainability, etc.). UNIV courses are to be offered across college boundaries, typically team-taught by two or more faculty, and carry GE and/or USCP credit. Proposals are solicited annually for new and existing courses. UNIV courses are administered by the Academic Programs office. The offerings are subject to available funding, which may be sufficient to offer two or three UNIV courses each quarter.

**2009-11 Cal Poly Catalog**  
**Liberal Studies Program**

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**BS LIBERAL STUDIES**      **Flowchart**

☐ 60 units upper division

☐ GWR

☐ 2.0 GPA

☐ USCP

\* = Required in Major; also satisfies GE

**MAJOR COURSES**

LS 101 Orientation to Liberal Studies .....	1
LS 214 Constitutional Issues in History of U.S. and California Education .....	4
LS 230 Field Experience I .....	2
LS 250 Field Experience II .....	2
LS/ENGL 260 Children's Literature .....	4
LS 270 Intro to Visual and Performing Arts Standards in the Elementary Classroom .....	4
LS 310 Storytelling: The Oral Tradition or LS 477 Myth and Folklore in Art for Elementary Classrooms .....	4
LS 311 Visual Arts in the Elementary Classroom or LS 475 Elements and Principles of Art in Elementary Classrooms .....	4
LS 461 Senior Project Seminar, or BIO 400 and BIO 462 for students with an emphasis area in science (4/8/10) .....	4
BIO 113 Animal Diversity & Ecology (4) (B2&B4)* or BIO 160 Diversity and the History of Life (4) (or any GE B2/B4 life science course) (3/16/12) .....	4
BIO 114 Plant Diversity & Ecology (B2&B4)* (or transfer of any GE B2 life science course)* (8/30/11) .....	4
BIO 115 Animal/Human Structure & Function (or any anatomy course) .....	4
ENGL 391 Topics in Applied Linguistics .....	4
GEOG 308 Global Geography (D5)* .....	4
HIST 208 Survey of California History (USCP) .....	4
HIST 210 World History (D3)* .....	4
KINE 310 Concepts and Applications in Elementary Physical Education .....	3
KINE 443 Health Education for Teachers .....	4
MATH 227 Math for Elementary Teaching I (B1)* .....	4
MATH 328 Math for Elementary Teaching II .....	4
MATH 329 Math for Elementary Teaching III .....	4
MATH 330 Algebraic Thinking with Technology .....	4
PSC 101 The Physical Environment: Matter and Energy (B3&B4)* (or any GE B3 PHYS course) .....	4
PSC 102 Physical Environ: Atoms & Molecules (or any chemistry course) .....	4
PSC 103 Physical Environ: Earth & Universe (or any GEOL or ASTR course) .....	4
PSY 201/202 General Psychology (D4)* .....	4
STAT 130 Intro to Statistical Reasoning or STAT 217 Intro to Statistical Concepts and Methods (B1)* .....	4
Emphasis Area (a minimum of 8 units at 300-400 level) .....	16

**SUPPORT COURSES**

CD/EDUC 207 The Learner's Development, Culture and Identity in Educational Settings .....	4
EDUC 310 Effective Teaching & Classroom Mgt: Multicultural Perspective in K-3 & 4-8 Setting or EDUC 427 Theories Methods & Assessment of First & Second Language Acquisition in Schools .....	4
<sup>1</sup> EDUC 430 Teaching Reading and Language Arts with a Multicultural Perspective (6) or EDUC 428 Primary Grade (K-3) Literacy & Language Arts Instruction in Schools with Diverse Populations (4) .....	6
EDUC 431 Teaching Soc. Science and the Arts with a Multicultural Perspective .....	4
EDUC 435 Learning to Teach K-8 Mathematics with a Multicultural Perspective .....	4
EDUC 436 Learning to Teach K-8 Science with a Multicultural Perspective .....	4
(3/21/13)	26

**GENERAL EDUCATION (GE)**

72 units required, 32 of which are specified in Major.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (no add'l units req'd)**

B1 Mathematics/Statistics * 8 units in Major .....	0
B2 Life Science * 4 units in Major .....	0
B3 Physical Science * 4 units in Major .....	0
B4 One lab taken with either a B2 or B3 course * .....	0
Select one course from B1-B5* 4 units in Major .....	0

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy (PHIL 230/231 recommended) .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

**Area D/E Society and the Individual (8 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions * 4 units in Major .....	0
D4 Self Development (CSU Area E) * 4 units in Major .....	0
D5 Upper-division elective * 4 units in Major .....	0

**Area F Technology Elective (upper division) .....**

40

**FREE ELECTIVES .....**

0

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<sup>1</sup> EDUC 428 and 2 units of free electives may substitute for EDUC 430.

**Courses Needed for Multiple Subject Credential**

EDUC 440 Educating Individuals with Exceptional Needs .....	4
EDUC 434 Student Teaching – Multiple Subject Credential .....	10
EDUC 455 Multiple Subject Student Teaching Seminar I.....	3
EDUC 456 Multiple Subject Student Teaching II ...	12
EDUC 457 Multiple Subject Student Teaching Seminar II .....	<u>3</u>
	<b>32</b>

EDUC 480 Computer Based Curriculum (Level I  
Technology requirement) or its equivalent is  
also required.



## 2009-11 Cal Poly Catalog

### Liberal Studies Program

## LS—LIBERAL STUDIES

### LS 101 Orientation to Liberal Studies (1)

Exploration of the Liberal Studies Program as preparation for the Multiple Subject Credential and for a teaching career in California. To be taken during the first quarter in attendance at Cal Poly as a Liberal Studies major. 1 lecture.

### LS 214 Constitutional Issues in the History of U.S. and California Education (4)

Examination of U.S. and California constitutions, significant legislation, and court cases affecting public education from the colonial period to the present. Overview of contributions by individuals of historical, national, and international educational significance. Examination of landmark decisions. 4 lectures.

### LS 230 Field Experience in the Elementary Classroom I (2)

Overview of current practices and issues in elementary education, including teacher compensation, cultural impact on schools, time and classroom management, English learners, and the affective aspect of teaching. 24–30 hours of fieldwork required. 1 lecture, 1 activity. *Change effective Winter 2011.*

### LS 250 Field Experience in the Elementary Classroom II (2)

Overview of current practices and issues in elementary education, including components of effective teaching, motivating students, diagnostic/prescriptive teaching, curriculum, and accountability. In addition to class time, 24–30 hours of fieldwork required. 1 lecture, 1 activity. *Change effective Winter 2011.*

### LS 260 Children's Literature (4)

Analysis and evaluation of traditional literature, fantasy, realistic fiction, historical fiction, informational books, picture books, and poetry for children in multiple subject classroom grades K–6. Emphasis on multicultural texts. 4 lectures. Prerequisite: Completion of GE Area A. *Crosslisted as ENGL/LS 260.*

### LS 270 Introduction to Visual and Performing Arts Standards in the Elementary Classroom (4)

Introduction to the California visual and performing arts teaching standards. Emphasis on ~~artistic aesthetic~~ perception, creative expression, historical/cultural context, aesthetic valuing and application to the elementary classroom. ~~Must attend three outside art performances.~~ 4 lectures. *Change effective Winter 2011.*

### LS 290 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### LS 310 Storytelling: Modern Applications of Traditional Narrative (4)

Techniques for ~~selection, preparation and presentation~~ of traditional folktales and myths ~~for an audience.~~ Applications of ~~storytelling in teaching and organizations;~~ theory and history of folk literature and mythology. 4 lectures. Prerequisite: COMS 101 or COMS 102. *Change effective Winter 2011.*

### LS 310 Storytelling: The Oral Tradition (4) ~~see above for revisions~~

~~Techniques for performing traditional folktales and myths in primary and secondary teaching situations. Selection, preparation and presentation of folklore for an audience; history of folk literature and mythology. 4 lectures. Prerequisite: COMS 101 or COMS 102. Change effective Winter 2011.~~

### LS 311 Visual Arts in the Elementary Classroom (4)

Theory, philosophy ~~and applications~~ of visual arts, through ~~multiple~~ strategies, as related to child development and ~~educational~~ processes for the elementary classroom. ~~One Saturday field trip required.~~ 4 lectures. Prerequisite: LS 270. *Change effective Winter 2011.*

### LS 311 Visual Arts in the Elementary Classroom (4) ~~see above for revisions~~

~~Theory and philosophy of visual arts, through multi strategies, as related to child development and visual arts processes for the elementary classroom. 4 lectures. Prerequisite: LS 270 or consent of instructor. Change effective Winter 2011.~~

### LS 312 Advanced Visual Arts in the Elementary Classroom (4)

Application of visual arts, through ~~multiple~~ strategies including direct ~~curriculum inclusion~~ for the elementary ~~schools and art community~~ settings. ~~Two Saturday~~

~~field trips required.~~ 4 lectures. Prerequisite: LS 311. *Change effective Winter 2011.*

### LS 312 Advanced Visual Arts in the Elementary Classroom (4) ~~see above for revisions~~

~~Application of visual arts, through multi strategies including direct classroom application, as related to child development and visual arts processes for the elementary setting. 4 lectures. Prerequisite: LS 311. Change effective Winter 2011.~~

### LS 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: consent of instructor, junior standing.

### LS 461 Senior Project Seminar (4)

Examination of issues in education of state, national and international concern. Students prepare presentations and conduct individual research and analysis of selected problems. Substantial research paper required. 4 seminars. Prerequisite: Senior standing, completion of GWR or consent of instructor.

### LS 470 Selected Advanced Topics (1–4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

### LS 475 Elements and Principles of Art in Elementary Classrooms (4)

Standards-based, visual art concepts for K-6 learning. Focus on the elements of art, principles of design and fostering of artistic perception within historical and cultural contexts. Events and theories influencing current practices in art education. Taught on-line. 4 lectures. Prerequisite: LS 270.

### LS 476 Elementary Learning Through Art-Making Processes (4)

Analysis and practice of skills and techniques to facilitate K-6 learning through art-making processes, deconstructed into inquiry through anchor artworks, techniques, criteria development, aesthetic valuing, assessment, curriculum integration and technology. Taught on-line. 4 lectures. Prerequisite: LS 475.

### LS 477 Myth and Folklore in Art for Elementary Classrooms (4)

Symbols, metaphors, attributes of myths and folktales in artworks and literature. Both image and story used for teaching standards-based integrative lessons in art and other content areas in the elementary classroom. Taught on-line. 4 lectures. Prerequisite: LS 270.

**2009-11 Cal Poly Catalog****Industrial & Manufacturing Engineering Department****Flowchart****BS MANUFACTURING ENGINEERING**

□ 60 units upper division

□ GWR

□ 2.0 GPA

□ USCP

\* = Required in Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

IME 101 Intro Industrial and Manufacturing Engr...	1
IME 140 Graphics Communication and Modeling...	2
IME 141 Manufacturing Processes: Net Shape .....	1
IME 142 Manufacturing Processes: Matls Joining..	2
IME 144 Intro Design and Manufacturing .....	4
<sup>4</sup> IME 157 Electronics Manufacturing .....	4
IME 223 Process Improvement Fundamentals .....	4
<sup>5</sup> IME 241 Process Design I.....	4
IME 314 Engineering Economics.....	3
IME 326 Eng Test Dsgn & Analysis <i>or</i> IME 327 (1/23/14).	4
IME 335 Computer-Aided Manufacturing I.....	4
IME 341 Tool Engineering I <i>or</i> IME 330 (1/23/14).	4
IME 342 Manufacturing Systems Integration.....	4
IME 352 Manufacturing Process Design II <i>or</i> IME 450 (1/23/14).....	4
IME 356 Manufacturing Automation .....	4
IME 417 Supply Chain and Logistics Management	4
IME 418 Product-Process Design .....	4
IME 430 Quality Engineering .....	4
IME 481, 482 Senior Project Design Lab I, II .....	2,3
<sup>1,2,3</sup> Technical electives .....	12
<i>Select 12 units from the following. All but 4 units must be upper level (300-level or above) engineering courses (AERO, BMED, CE, EE, IME, MATE, ME):</i>	
AERO 300, 301, 302, 303, 304, 306, 320, 331, 401;	
BMED 212, 310, 410, 420, 425, 440;	
BUS 310, 311, 346, 488;	
BUS/AG/HUM/EDES/ENGR/SCM/UNIV 350;	
CE 207;	
EE 361;	
IME 301, 303, 312, 313, 319, 336, 351, 401, 405, 407, 408, 409, 410, 411, 413, 416, 420, 421, 427, 428, 429, 431, 435, 437, 441, 442, 443, 455, 457, 470, 471, 542, 545, 556, 577, 580;	
IME/MATE/HNRS 322;	
IME/MATE 458/CPE 488;	
IME/AERO 510, 511;	
IT 326, 329, 330, 336, 341, 371, 406, 407;	
MATE 310, 320, 330, 340, 350, 355, 360, 430, 435, 440, 445, 450, 460;	
MATH 344, 350;	
ME 305, 318, 326, 328, 329, 341, 343, 405, 406, 410, 412, 415, 416, 422, 423, 430, 431, 441, 446	

**78****SUPPORT COURSES**

BIO 213 <i>and</i> ENGR/BRAE 213 (B2)* .....	2,2
CE 204 Mechanics of Materials I .....	3
CHEM 124 Gen Chem for Engineering (B3/B4)* .....	4
CHEM 125 Gen Chem for Engineering .....	4
CSC 232 Computer Programming for Scientists and Engineers .....	3
EE 201 Electric Circuits Theory .....	3
EE 251 Electric Circuits Lab.....	1
EE 321 Electronics.....	3
ENGL 149 Technical Writing for Engineers (A3)* .....	4
MATE 210 Materials Engineering .....	3
MATE 215 Materials Laboratory I .....	1
MATH 141, 142 Calculus I, II (B1)* .....	4,4
MATH 143 Calculus III (Add'l Area B)* .....	4
MATH 241 Calculus IV .....	4
MATH 244 Linear Analysis I .....	4
ME 211 Engineering Statics.....	3
ME 212 Engineering Dynamics .....	3
ME 302 Thermodynamics I.....	3
PHYS 141 General Physics IA (Add'l Area B)* .....	4
PHYS 132, 133 General Physics II, III .....	4,4
STAT 321 Prob/Stats for Engrs/Scientists (B6)* .....	4

**78****GENERAL EDUCATION (GE)**

72 units required, 32 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 8 units required at the 300 level.

**Area A Communication (8 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing * 4 units in Support .....	0

**Area B Science and Mathematics (no add'l units required)**

B1 Mathematics/Statistics * 8 units in Support.....	0
B2 Life Science * 4 units in Support.....	0
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	
B5 (requirement for Liberal Arts students only)	
B6 Upper-division Area B * 4 units in Support .....	0
Additional area units * 8 units in Support .....	0

<sup>1</sup> IME 400 and IME 500 require a course substitution form and no more than 4 total units are allowed.<sup>2</sup> The courses selected to satisfy this requirement may not be used to satisfy other major, support, or general education requirements (no double counting of coursework).<sup>3</sup> Consultation with advisor is recommended prior to selecting technical electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.<sup>4</sup> IME 156 (2 units) and an additional 2 units of technical electives may substitute. (1/23/14)<sup>5</sup> An additional 4 units of technical electives may substitute. (1/23/14)

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
	<b>40</b>

**FREE ELECTIVES .....** **0**

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**196**

**2009-11 Cal Poly Catalog****Materials Engineering Department****Flowchart****BS MATERIALS ENGINEERING**

□ 60 units upper division

□ GWR

□ 2.0 GPA

□ USCP

\* = Required in Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

MATE 110 Intro to Materials Engrg Design I.....	1
MATE 120 Intro to Materials Engrg Design II.....	1
MATE 130 Intro to Materials Engrg Design III.....	1
MATE 210 Materials Engineering and MATE 215 Materials Laboratory I.....	3,1
MATE 222 Materials Selection for the Life Cycle...	4
MATE 225 Materials Laboratory II.....	1
MATE 232 Materials, Ethics, and Society.....	4
MATE 235 Materials Laboratory III.....	1
MATE 310 Noncrystalline Materials Systems.....	4
MATE 330 Hybrid Materials Systems.....	4
MATE 340 Electronic Materials Systems.....	4
MATE 350 Structural Materials Systems.....	4
MATE 360 Metallurgical Materials Systems.....	4
MATE 370 Process Design.....	4
<sup>4</sup> MATE 481 Corporate Culture.....	1
MATE 482, 483, 484 Senior Project I, II, III.....	1,2,2
<sup>1,2</sup> Technical electives.....	12
Select at least 3 courses from the following:	
MATE 401, 406, 425, 430, 435, 440, 445, 450, 460, 470, 471, 501, 504, 510, 520, 522, 525, 540, 545, 550, 560, 565, 570, 571, 580, 590, MATE/CHEM 446, MATE/IME 458/CPE 488, MATE/BMED 530, MATE/ME 555, PHYS 412, 413, CHEM 444.	
<sup>1,2</sup> Approved electives/Technical Breadth electives ....	13
Select 13 units from the following:	
AERO/HNRS 310; BMED 310, 550; BMED/MATE 530; BRAE 239; BUS 207, 212, 488; CD/PSY 254; CE 207; CHEM 216, 217, 218, 312, 316, 317, 318, 319, 444, 447; (7/5/12)	
CHEM/MATE 446; CPE 488/IME/MATE 458; CSC/CPE 235; EE/PHYS 422; ECON 221; ENGR 451, 470, 471; ENGR 322/SCM 302; ERSC/GEOG 250; GEOL 201; HIST 410, 417; IME 223, 303, 421; IME/HNRS/MATE 322;	

IT 341;  
MATE 401, 406, 425, 430, 435, 440, 445, 450,  
460, 470, 471, 504, 510, 540, 550, 570, 571, 580;  
ME 212, 341;  
NR/RPTA 203, NR 434; (10/5/12)  
PHYS 211, 412, 413;  
PSY 256, 305, 419;  
UNIV/HNRS 392, 424, 492;  
ZOO 331

Total units for Major Courses:

**72****SUPPORT COURSES**

CE 204 Mechanics of Materials I.....	3
CHEM 124 Gen Chem for Engrg I (B3/B4)* .....	4
CHEM 125 Gen Chem for Engineering II .....	4
<sup>3</sup> CHEM 305 Physical Chemistry.....	4
CSC 231 Programming for Engineering Students or CSC 234 C and Unix .....	2
EE 201, 251 Electric Circuits Theory and Lab .....	3,1
ENGL 149 Technical Writing for Engineers (A3)* .....	4
IME 314 Engineering Economics (or IME 326).....	3
MATH 141, 142 Calculus I, II (B1) * .....	4,4
MATH 143 Calculus III (Add'l Area B)*.....	4
MATH 241 Calculus IV .....	4
MATH 244 Linear Analysis I .....	4
ME 211 Engineering Statics.....	3
ME 343 Heat Transfer or ME 302 Thermodyn. I ....	3
PHYS 141 General Physics IA (Add'l Area B)* .....	4
PHYS 132, 133 General Physics II, III.....	4,4
STAT 312 Statistical Methods for Engineers (B6)* .....	4
IME 144 Intro to Design and Manufacturing .....	4

**74****GENERAL EDUCATION (GE)**

72 units required, 28 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 8 units required at the 300 level.

**Area A Communication (8 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing * 4 units in Support .....	0

**Area B Science and Mathematics (4 units)**

B1 Mathematics/Statistics * 8 units in Support.....	0
B2 Life Science.....	4
B3 Physical Science * 4 units in Support.....	0

<sup>1</sup> The courses selected to satisfy this requirement may not be used to satisfy other major, support, or general education requirements (no double counting of coursework).

<sup>2</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>3</sup> MATE 470 with the topic "Thermodynamics of Materials" for 4 units may substitute. (8/30/12)

<sup>4</sup> 1 additional unit of an upper-division technical elective or an approved technical breadth elective may substitute. (7/15/13)

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B4 One lab taken with either a B2 or B3 course	
B5 (requirement for Liberal Arts students only)	
B6 Upper-division Area B * 4 units in Support .....	0
Additional Area B units* 8 units in Support .....	0
<b>Area C Arts and Humanities (16 units)</b>	
C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
<b>Area D/E Society and the Individual (16 units)</b>	
D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
	<b>44</b>
<b>FREE ELECTIVES .....</b>	<b>0</b>
	<b>190</b>

## 2009-11 Cal Poly Catalog

### Mathematics Department

#### MATH–MATHEMATICS

Satisfactory completion of the Entry Level Mathematics (ELM) requirement is a prerequisite for enrollment in all mathematics courses except MATH 100 and MATH 104. For additional mathematics placement (MAPE) information, see page 44.

##### **MATH 100 Beginning Algebra Review (3) (CR/NC)**

Review of basic algebra skills at the beginning algebra level intended primarily to prepare students for MATH 104. Course open only to students who have taken the ELM examination and are not qualified for MATH 104. Not for baccalaureate credit. Credit/No Credit grading only. 3 lectures.

##### **MATH 104 Intermediate Algebra (3) (CR/NC)**

Review of basic algebra skills at the intermediate algebra level intended primarily to prepare students for MATH 116. Not for baccalaureate credit. Credit/No Credit grading only. 3 lectures. Prerequisite: Appropriate score on the ELM examination, or credit in MATH 100.

##### **MATH 110 Beginning Algebra Workshop (1) (CR/NC)**

Facilitated study and discussion of the theory, problems, and applications of beginning algebra. Not for baccalaureate credit. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 100.

##### **MATH 112 The Nature of Modern Mathematics (4) GE B1**

Topics from contemporary mathematics, their development, applications, and role in society. Some typical topics, to be chosen by the instructor: graph theory, critical path analysis, statistical inference, coding, game theory, and symmetry. 4 lectures. Prerequisite: Passing score on ELM examination, or an ELM exemption, or credit in MATH 104. Fulfills GE B1.

##### **MATH 114 Intermediate Algebra Workshop (1) (CR/NC)**

Facilitated study and discussion of the theory, problems, and applications of intermediate algebra. Not for baccalaureate credit. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 104.

##### **MATH 116, 117 Pre-Calculus Algebra I, II (3) (3) GE B1**

Pre-calculus college algebra without trigonometry. Special products and factoring, exponents and radicals. Fractional and polynomial equations. Matrices, determinants, and systems of equations. Polynomial, rational, exponential, and logarithmic functions. Graphing, inequalities, absolute value, and complex numbers. MATH 116 and MATH 117 are equivalent to MATH 118, but are taught at a slower pace. Upon completion of MATH 116 and MATH 117, a student will receive 4 units of GE credit for Area B1. Not open to students with credit in MATH 118. 3 lectures. **MATH 116** prerequisite: Passing score on ELM examination, or an ELM exemption, or credit in MATH 104. **MATH 117** prerequisite: MATH 116 with a grade of C- or better or consent of instructor.

##### **MATH 118 Pre-Calculus Algebra (4) GE B1**

Pre-calculus algebra without trigonometry. Special products and factoring, exponents and radicals. Fractional and polynomial equations. Matrices, determinants, and systems of equations. Polynomial, rational, exponential, and logarithmic functions. Graphing, inequalities, absolute value, and complex numbers. MATH 118 is equivalent to MATH 116 and MATH 117. Not open to students with credit in MATH 117. 4 lectures. Prerequisite: Completion of ELM requirement and passing score on appropriate Mathematics Placement Examination. Fulfills GE B1.

##### **MATH 119 Pre-Calculus Trigonometry (4) GE B1**

Rectangular and polar coordinates. Trigonometric functions, fundamental identities. Inverse trigonometric functions and relations. Vectors, complex numbers, conic sections, and analytic geometry. 4 lectures. Prerequisite: Completion of ELM requirement and passing score on appropriate Mathematics Placement Examination, or MATH 117, or MATH 118 or equivalent. Fulfills GE B1.

##### **MATH 126, 127 Pre-Calculus Algebra Workshop I, II (1) (1) (CR/NC)**

Facilitated study and discussion of the theory, problems, and applications of pre-calculus algebra. Credit/No Credit grading only. 1 laboratory. **MATH 126** corequisite: Concurrent enrollment in the associated section of MATH 116. **MATH 127** corequisite: Concurrent enrollment in the associated section of MATH 117.

##### **MATH 128 Pre-Calculus Algebra Workshop (1) (CR/NC)**

Facilitated study and discussion of the theory, problems, and applications of pre-calculus algebra. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 118.

##### **MATH 129 Pre-Calculus Trigonometry Workshop (1) (CR/NC)**

Facilitated study and discussion of the theory, problems, and applications of pre-calculus trigonometry. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 119.

##### **MATH 141, 142, 143 Calculus I, II, III (4) (4) GE B1**

Limits, continuity, differentiation, integration. Techniques of integration, applications to physics, transcendental functions. Infinite sequences and series, vector algebra, curves. 4 lectures. **MATH 141** prerequisite: Completion of ELM requirement and passing score on appropriate Mathematics Placement Examination, or MATH 118 and high school trigonometry, or and MATH 119 or equivalent. **MATH 142** prerequisite: MATH 141 with a grade of C- or better or consent of instructor. **MATH 143** prerequisite: MATH 142. *Crosslisted as HNRS/MATH 141, 142, 143.* Each fulfills GE B1. *Change effective Spring 2011.*

##### **MATH 151, 152, 153 Calculus Workshop I, II, III (1) (1) (1) (CR/NC)**

Facilitated study and discussion of the theory, problems, and applications of calculus. Credit/No Credit grading only. 1 laboratory. **MATH 151** corequisite: Concurrent enrollment in the associated section of MATH 141. **MATH 152** corequisite: Concurrent enrollment in the associated section of MATH 142. **MATH 153** corequisite: Concurrent enrollment in the associated section of MATH 143.

##### **MATH 161, 162 Calculus for the Life Sciences I, II (4) (4) GE B1**

Review of exponential, logarithmic, and trigonometric functions. Differential and integral calculus with applications to the biological sciences. Introduction to differential equations and mathematical modeling. Examples, exercises and applications to emphasize problems in life sciences. Not open to students with credit in MATH 141, 142, respectively. 4 lectures. **MATH 161** prerequisite: Completion of ELM requirement and passing score on appropriate Mathematics Placement Examination, or MATH 118 or equivalent. **MATH 162** prerequisite: MATH 161. Each fulfills GE B1.

##### **MATH 171 Calculus for the Life Sciences Workshop I (1) (CR/NC)**

Facilitated study and discussion of the theory, problems, and applications of calculus for the life sciences. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 161.

##### **MATH 182 Calculus for Architecture and Construction Management (4) GE B1**

Integral calculus with applications to architecture and construction management. The algebra of vectors. Polar, cylindrical, and spherical coordinate systems. Not open to students with credit in MATH 142. 4 lectures. Prerequisite: MATH 141 or equivalent. Fulfills GE B1.

##### **MATH 192 Calculus for Architecture and Construction Management Workshop (1) (CR/NC)**

Facilitated study and discussion of the theory, problems, and applications of calculus to architecture and construction management. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 182.

##### **MATH 202 Orientation to the Mathematics Major (1) (CR/NC)**

Career opportunities in the field of mathematics, preparing a field of study, and a survey of departmental facilities and procedures related to research, study and graduation. Credit/No Credit grading only. 1 lecture. Corequisite: Sophomore standing or consent of instructor.

##### **MATH 206 Linear Algebra I (4)**

Matrices, inverses, linear systems, determinants, eigenvalues, eigenvectors, vector spaces, linear transformations, applications. 4 lectures. Prerequisite: MATH 143 or consent of instructor.



**MATH 211, 212 Computational Mathematics I, II (4) (4)**

Fundamentals of procedural programming in C/C++ and selected applications to problems in integral and differential calculus, matrix analysis, geometry, and physics. 4 lectures. **MATH 211** prerequisite: MATH 141 or consent of instructor. **MATH 212** prerequisite: MATH 211.

**MATH 221 Calculus for Business and Economics (4) GE B1**

Polynomial calculus for optimization and marginal analysis, and elementary integration. Not open to students with credit in MATH 142. 4 lectures. Prerequisite: Completion of ELM requirement and passing score on appropriate Mathematics Placement Examination, or MATH 118 or equivalent. Fulfills GE B1.

**MATH 227 Mathematics for Elementary Teaching I (4) GE B1**

Introduction to problem solving, set theory, number systems, arithmetic operations, models, and number theory. This class is designed for Liberal Studies majors. Other students will be admitted only by consent of instructor. 4 lectures. Prerequisite: Passing score on ELM examination, or an ELM exemption, or credit in MATH 104. Fulfills GE B1. *Formerly MATH 327.*

**MATH 231 Calculus for Business and Economics Workshop (1) (CR/NC)**

Facilitated study and discussion of the theory, problems, and applications of business calculus. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 221.

**MATH 241 Calculus IV (4)**

Partial derivatives, multiple integrals, introduction to vector analysis. 4 lectures. Prerequisite: MATH 143. *Crosslisted as HNRS/MATH 241.*

**MATH 242 Differential Equations I (4)**

Ordinary differential equations: first-order linear equations, separable equations, exact equations, second-order linear equations, nonhomogeneous equations, systems of first-order linear equations, systems of nonlinear equations, modeling and applications. Not open to CENG students. 4 lectures. Prerequisite: MATH 206 and MATH 241.

**MATH 244 Linear Analysis I (4)**

Separable and linear ordinary differential equations with selected applications; numerical and analytical solutions. Linear algebra: vectors in  $n$ -space, matrices, linear transformations, eigenvalues, eigenvectors, diagonalization; applications to the study of systems of linear differential equations. 4 lectures. Prerequisite: MATH 143 or consent of instructor. *Crosslisted as HNRS/MATH 244.*

**MATH 248 Methods of Proof in Mathematics (4)**

Methods of proof (direct, contradiction, conditional, contraposition); valid and invalid arguments. Examples from set theory. Quantified statements and their negations. Functions, indexed sets, set functions. Proofs in number theory, algebra, geometry and analysis. Proof by induction. Equivalence and well-defined operations and functions. The axiomatic method. 4 lectures. Prerequisite: MATH 143 or consent of instructor.

**MATH 258 Methods of Proof in Mathematics Workshop (1) (CR/NC)**

Facilitated study and discussion of the methods and techniques of proof in mathematics. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 248.

**MATH 270 Selected Topics (1–4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

**MATH 300 Technology in Mathematics Education (4)**

Examination of existing hardware and software designed for educational uses. Discussion of mathematical topics appropriate for computer enhancement. Special methods and techniques for educational uses of computers. Emphasis on activity learning and applications. Computer as a classroom management device. 4 lectures. Prerequisite: MATH 141 or MATH 329, and a course in CSC or MATH 211, or consent of instructor.

**MATH 304 Vector Analysis (4) GE B6**

Differential and integral calculus of vector-valued functions. Green's Theorem, Stokes' Theorem, and the Divergence Theorem. Applications and generalizations. 4 lectures. Prerequisite: MATH 206 or MATH 244, and MATH 241, or consent of instructor. Fulfills GE B6.

**MATH 306 Linear Algebra II (4)**

Inner product spaces, orthogonality, Fourier series and orthogonal bases, linear transformations and similarity, eigenvalues and diagonalization. 4 lectures.

Prerequisite: MATH 241, and MATH 206 or MATH 244, and a C- or better in MATH 248, or consent of instructor.

**MATH 316 Introduction to Linear Algebra Workshop II (1) (CR/NC)**

Facilitated study and discussion of the methods and techniques of proof in linear algebra. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 306.

**MATH 326 Mathematics and Visual Art (4) GE B5**

Topics connecting mathematics and visual art including regular polygons, symmetry groups, repetition and pattern, perspective, straightedge and compass constructions, and origami. Examples of mathematical art including historic and contemporary art. 4 lectures. Prerequisite: Completion of GE Area B1 and a college course in art or design. Fulfills GE B5.

**MATH 328, 329 Mathematics for Elementary Teaching II, III (4) (4)**

Introduction to rational and real numbers, probability and counting techniques, statistics, and geometry. Computer applications. 4 lectures. **MATH 328** prerequisite: MATH 227 with a grade of C- or better or consent of instructor. **MATH 329** prerequisite: MATH 328.

**MATH 330 Algebraic Thinking with Technology (4)**

Algebraic concepts for elementary teachers. Mathematical patterns, equations and inequalities, linear and quadratic functions, exponential and logarithmic functions, systems of equations, roots of polynomials, factoring of polynomials, and right-triangle trigonometry. Computer applications. 4 lectures. Prerequisite: MATH 329 or consent of instructor.

**MATH 331 Topics in Mathematics for Teachers (1-6) (CR/NC)**

Topics in mathematics for practicing credentialed teachers. Content will vary according to teaching level. The Schedule of Classes will list topic selected. Total credit limited to 12 units. Credit/No Credit grading only. 1-6 activities. Prerequisite: Multiple Subject or Single Subject teaching credential or consent of instructor.

**MATH 335 Graph Theory (4)**

Introduction to graph theory and its applications: isomorphism, paths and searching, connectedness, trees, tournaments, planarity, graph colorings, matching theory, network flow, adjacency and incidence matrices. Further topics to be selected from the theory of finite state machines, Ramsey theory, extremal theory, and graphical enumeration. 4 lectures. Prerequisite: **MATH 248** or **Junior** junior standing or **consent of instructor**. *Change effective Fall 2010.*

**MATH 336 Combinatorial Mathematics (4)**

Methods of enumerative combinatorics: sum, product, and division rules, bijective and recursive techniques, inclusion and exclusion, generating functions, and the finite difference calculus. Advanced topics to be selected from the theory of partitions, Polya theory, designs, and codes. 4 lectures. Prerequisite: **MATH 248** or junior standing or **consent of instructor**. *Change effective Winter 2011.*

**MATH 341 Theory of Numbers (4)**

Properties of numbers. Euclid's Algorithm, greatest common divisors, diophantine equations, prime numbers, congruences, number theoretic functions, the quadratic reciprocity laws, primitive roots and indices. 4 lectures. Prerequisite: MATH 248 with a grade of C- or better or consent of instructor.

**MATH 344 Linear Analysis II (4) GE B6**

Linear methods applied to the solution of differential equations. Laplace transforms. Series solutions to ordinary differential equations. Orthogonality in  $n$ -space, Gram-Schmidt orthogonalization and least squares methods. Orthogonal bases in function spaces, Sturm-Liouville theory. Fourier series and transforms. Special functions of applied mathematics. 4 lectures. Prerequisite: MATH 206 and MATH 242, or MATH 241 and MATH 244, or consent of instructor. Fulfills GE B6.

**MATH 350 Mathematical Software (4)**

Problem-solving using mathematical software. 4 lectures. Prerequisite: MATH 206 or MATH 244, and MATH 241, and an introductory college-level programming course, or consent of instructor.

**MATH 351 Typesetting with LaTeX (1) (CR/NC)**

Preparing documents, especially mathematical ones, using LaTeX and AMS-LaTeX. Credit/No Credit grading only. 1 lecture. Prerequisite: Junior standing or consent of instructor.

**MATH 370 Putnam Exam Seminar (2)**

Directed group study of mathematical problem-solving techniques. Open to undergraduate students only. Class members are expected to participate in the annual William Lowell Putnam Mathematical Competition. Course may be repeated up to eight units. 2 seminars. Prerequisite: Consent of instructor.

**MATH 371 Math Modeling Seminar (2)**

Directed group study of mathematical modeling techniques. Open to undergraduate students only. Class members are expected to participate in the annual Mathematical Competition in Modeling. Total credit limited to 8 units. 2 seminars. Prerequisite: Consent of instructor.

**MATH 372 Mathematical Community Service Projects (2) (CR/NC)**

Directed group mathematical research in support of volunteer community service projects. Total credit limited to 8 units. 2 seminars. Prerequisite: consent of instructor and consent of department chair.

**MATH 400 Special Problems for Advanced Undergraduates (1-4)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units. Prerequisite: Junior standing and consent of department chair.

**MATH 404 Introduction to Differential Geometry (4)**

Theory of curves and surfaces in space. Topics such as Frenet formulas, curvature, geodesics, Cartan structural equations, Gauss-Bonnet Theorem. 4 lectures. Prerequisite: MATH 304 or consent of instructor.

**MATH 406 Linear Algebra III (4)**

Complex vector spaces, unitary and self-adjoint matrices, Spectral Theorem, Jordan canonical form. Selected topics in linear programming, convexity, numerical methods, and functional analysis. 4 lectures. Prerequisite: MATH 306 or consent of instructor.

**MATH 408, 409 Complex Analysis I, II (4) (4)      MATH 408: GE B6**

Elementary analytic functions and mappings. Cauchy's Integral Theorem; Poisson's Integral Formula. Taylor and Laurent series, theory of residues, and the evaluation of integrals. Harmonic functions, conformal mappings. 4 lectures. **MATH 408** prerequisite: MATH 242, or MATH 241 and MATH 244, or consent of instructor. **MATH 408** fulfills GE B6. **MATH 409** prerequisite: MATH 408.

**MATH 412 Introduction to Analysis I (4)**

Introduction to concepts and methods basic to real analysis. Topics such as the real number system, sequences, continuity, uniform continuity and differentiation. 4 lectures. Prerequisite: MATH 306 or consent of instructor.

**MATH 413, 414 Introduction to Analysis II, III (4) (4)**

A continuation of Introduction to Analysis I covering such topics as integration, infinite series, uniform convergence and functions of several variables. Highly recommended for students planning to enter graduate programs or secondary teaching and those interested in applied mathematics. 4 lectures. **MATH 413** prerequisite: MATH 412 or consent of instructor. **MATH 414** prerequisite: MATH 413.

**MATH 416 Differential Equations II (4)**

Qualitative theory of ordinary differential equations: Existence and Uniqueness Theorem, phase portraits, limit sets, stability of fixed points and periodic orbits, energy functions, Poincaré-Bendixson Theorem, Poincaré maps, bifurcations, attractors, chaos. 4 lectures. Prerequisite: MATH 206 and MATH 242, or MATH 241 and MATH 244, or consent of instructor.

**MATH 418 Partial Differential Equations (4)**

Mathematical formulation of physical laws. Separation of variables. Orthogonal functions and generalized Fourier series. Bessel functions, Legendre polynomials. Sturm-Liouville problem. Boundary value problems; nonhomogeneous techniques. Applications to heat flow, potential theory, vibrating strings and membranes. 4 lectures. Prerequisite: MATH 344 or consent of instructor. Recommended: MATH 304.

**MATH 419 Introduction to the History of Mathematics (4)**

Evolution of mathematics from earliest to modern times. Major trends in mathematical thought, the interplay of mathematical and technological innovations, and the contributions of great mathematicians. Appropriate for prospective and in-service teachers. 4 lectures. Prerequisite: MATH 248 with a grade of C- or better and at least one upper division course in mathematics, or consent of instructor.

**MATH 422 Introduction to Analysis I Workshop (1) (CR/NC)**

Facilitated study and discussion of the methods and techniques of proof in introductory analysis. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 412.

**MATH 423 Advanced Mathematics for Teaching (4)**

Introduction to mathematics education research and advanced exploration of the mathematics taught in California's public high schools and middle schools through problem analysis, concept analysis, and problem connections. 4 lectures. Prerequisite: MATH 442 and MATH 481.

**MATH 424 Organizing and Teaching Mathematics (4) (CR/NC)**

Organization, selection, presentation, application and interpretation of subject matter in mathematics. Introduction to current issues in mathematics education. For students who will be teaching in secondary schools. Credit/No Credit grading only. 4 lectures. Prerequisite: Acceptance into the Mathematics Single Subject Credential Program, or senior standing in the mathematics major, or consent of instructor.

**MATH 425 Mathematics Student Teaching Seminar (1) (CR/NC)**

Principles and practice in effective teaching of mathematics at the middle and high school level, learning theories, curriculum content and structure, classroom issues, and the teaching profession. Credit/No Credit grading only. Total credit limited to 2 units. 1 seminar. Prerequisite: Acceptance into Step II of the Single Subject Credential Program in Mathematics. Concurrent: EDUC 469 or EDUC 479.

**MATH 435 Discrete Mathematics with Applications I (4)**

Methods of discrete mathematics with applications. Generating functions and Lagrange inversion, partition theory, permutation statistics and q-analogues, posets and Möbius inversion. Additional topics including lattice paths and basic hypergeometric series. 4 lectures. Prerequisite: MATH 248 with a grade of C- or better and MATH 336, or consent of instructor.

**MATH 436 Discrete Mathematics with Applications II (4)**

Methods of discrete mathematics with applications. Polya theory, codes, designs, matroids, the combinatorics of symmetric functions, and tableaux combinatorics. Additional topics including transversals and Latin squares, asymptotics, and discrete probability theory. 4 lectures. Prerequisite: MATH 435, and MATH 482 or concurrent enrollment in MATH 482, or consent of instructor.

**MATH 437 Game Theory (4)**

Development of the mathematical concepts, techniques, and models used to investigate optimal strategies in competitive situations; games in extensive, normal, and characteristic form, Nash equilibrium points and Nash Bargaining Model. 4 lectures. Prerequisite: MATH 206 or MATH 244, and MATH 248 with a grade of C- or better, or consent of instructor.

**MATH 440 Topology I (4)**

Introduction to general topological spaces with emphasis on surfaces and manifolds. Open and closed sets, continuity, compactness, connectedness. Quotient spaces. 4 lectures. Prerequisite: MATH 412 and concurrent enrollment in or completion of MATH 481, or consent of instructor.

**MATH 441 Topology II (4)**

Introduction to general topological spaces with emphasis on surfaces and manifolds. Fundamental group. Triangulations of spaces, classification of surfaces. Other topics may include covering spaces, simplicial homology, homotopy theory and topics from differential topology. 4 lectures. Prerequisite: MATH 440 or consent of instructor. Recommended: MATH 304.

**MATH 442 Euclidean Geometry (4)**

Foundations of Euclidean geometry, finite geometries, congruence, similarities, polygonal regions, circles and spheres. Constructions, mensuration, the parallel postulate. Appropriate for prospective and in-service mathematics teachers. 4 lectures. Prerequisite: MATH 248 with a grade of C- or better or consent of instructor. Recommended: MATH 300 or familiarity with dynamic geometry software.

**MATH 443 Modern Geometries (4)**

Non-Euclidean and projective geometries. Properties of parallels, biangles, Saccheri and Lambert quadrilaterals, angle-sum and area. Limiting curves, hyperbolic trigonometry, duality, perspectivity, quadrangles, fundamental theorems of projective geometry, conics. 4 lectures. Prerequisite: MATH 442.

**MATH 451 Numerical Analysis I (4)**

Topics in interpolation and approximation methods, initial value problems, and boundary value problems of ordinary differential equations. 4 lectures. Prerequisite: MATH 206 and MATH 242, or MATH 241 and MATH 244, and an introductory college-level programming course, or consent of instructor.

**MATH 452 Numerical Analysis II (4)**

Numerical techniques for solving partial differential equations of the parabolic, hyperbolic and elliptic type. Further topics in approximation theory. 4 lectures. Prerequisite: MATH 451 or equivalent.

**MATH 453 Numerical Optimization (4)**

Algorithms for solving optimization problems that cannot be solved analytically. Descent algorithms including exact and practical line-searches, steepest descent method, and Newton and quasi-Newton methods for unconstrained minimization. Optimality conditions for constrained optimization, linear programming. Projection and Lagrangian methods, and interior point methods for constrained minimization. 4 lectures. Prerequisite: MATH 306 and MATH 451, or consent of instructor. *Formerly MATH 431.*

**MATH 459 Senior Seminar (4)**

Written and oral analyses and presentations by students on topics from advanced mathematics and mathematical modeling. 4 seminars. Prerequisite: MATH 306, and completion of at least two additional upper-division courses in the math major, or consent of instructor.

**MATH 460 Applied Mathematics Senior Seminar (4)**

Written and oral analyses and presentations by students on topics in applied mathematics, including applications to sustainability. Construction of mathematical models for physical and biological problems, with analysis and interpretation of the solutions of these models using both analytical and numerical techniques. 4 seminars. Prerequisite: MATH 306, MATH 344, and MATH 451, or consent of instructor.

**MATH 461, 462 Senior Project I, II (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. **MATH 461** prerequisite: MATH 459 or MATH 460. **MATH 462** prerequisite: MATH 461.

**MATH 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Junior standing and consent of instructor.

**MATH 481, 482 Abstract Algebra I, II (4) (4)**

Introduction to the study of algebraic structures, including groups, rings and fields. 4 lectures. **MATH 481** prerequisite: MATH 306 or MATH 341 or consent of instructor. **MATH 482** prerequisite: MATH 481.

**MATH 485 Cooperative Education Experience (6) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. No major credit allowed; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**MATH 491 Abstract Algebra I Workshop (1) (CR/NC)**

Facilitated study and discussion of the methods and techniques of proof in abstract algebra. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 481.

**MATH 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. No major credit allowed; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**MATH 500 Individual Study (1-4)**

Individual research or advanced study planned and completed under the direction of a departmental faculty member. Open only to graduate students demonstrating ability to do independent work. Total credit limited to 12 units. Prerequisite: Graduate standing and consent of department chair.

**MATH 501, 502 Methods of Applied Mathematics I, II (4) (4)**

Introduction to advanced methods of mathematics useful in the analysis of engineering problems. Theory of vector fields, Fourier analysis, Sturm-Liouville theory, functions of a complex variable. Selected topics in asymptotic analysis, special functions, perturbation theory. Not open to students in major or master's degree program in mathematics. MATH 501: Distance Learning Lab fee may be required—see the Schedule of Classes. 4 lectures. **MATH 501** prerequisite: MATH 344 or AERO 300 or equivalent, and graduate standing, or consent of instructor. **MATH 502** prerequisite: MATH 501.

**MATH 504 Mathematical Topics for Teachers (1-4) (CR/NC)**

Mathematical topics for practicing credentialed teachers. Professional growth through improvement of teachers' mathematical content knowledge and pedagogical approaches using technology, discussion, reflection, and hands-on activities. Content will vary according to teaching level. The Schedule of Classes will list topic selected. Total credit limited to 12 units. Not open to undergraduate or graduate students in mathematics. Credit/No Credit grading only. 1-4 activities. Prerequisite: Multiple Subject or Single Subject teaching credential or consent of instructor.

**MATH 505 Graduate Teaching Seminar (1) (CR/NC)**

Principles and practice in effective teaching of college-level mathematics. Issues related to present and future teaching experiences, including time management, professionalism, student assessment, grading, classroom management, and qualities of good mathematics teachers. Reflection on individual teaching, and consideration of improvements in instruction. Credit/No Credit grading only. Total credit limited to 2 units. 1 seminar. Prerequisite: Graduate standing or consent of instructor.

**MATH 520, 521 Applied Analysis I, II (4) (4)**

Advanced mathematical methods of analysis in science and engineering, integrated with modeling of physical phenomena. Topics include applications of complex analysis, Fourier analysis, ordinary and partial differential equations. Additional topics to be drawn from perturbation methods, asymptotic analysis, dynamical systems, numerical methods, optimization, and the calculus of variations. 4 lectures. **MATH 520** prerequisite: MATH 408, MATH 412 and graduate standing, or consent of instructor. Recommended: MATH 418. **MATH 521** prerequisite: MATH 520.

**MATH 530 Discrete Mathematics with Applications I (4)**

Methods of discrete mathematics with applications. Generating functions and Lagrange inversion, partition theory, permutation statistics and q-analogues, posets and Möbius inversion. Additional topics including lattice paths and basic hypergeometric series. 4 lectures. Not open to students with credit in MATH 435. Prerequisite: MATH 248 with a grade of C- or better and MATH 336 and graduate standing, or consent of instructor.

**MATH 531 Discrete Mathematics with Applications II (4)**

Methods of discrete mathematics with applications. Polya theory, codes, designs, matroids, the combinatorics of symmetric functions, and tableaux combinatorics. Additional topics including transversals and Latin squares, asymptotics, and discrete probability theory. 4 lectures. Not open to students with credit in MATH 436. Prerequisite: MATH 530 and MATH 482 or concurrent enrollment in MATH 482, or consent of instructor.

**MATH 540 Topology I (4)**

Introduction to general topological spaces with emphasis on surfaces and manifolds. Open and closed sets, continuity, compactness, connectedness. Quotient spaces. 4 lectures. Not open to students with credit in MATH 440. Prerequisite: MATH 412, concurrent enrollment in or completion of MATH 481, and graduate standing, or consent of instructor.

**MATH 541 Topology II (4)**

Introduction to general topological spaces with emphasis on surfaces and manifolds. Fundamental group. Triangulations of spaces, classification of surfaces. Other topics may include covering spaces, simplicial homology, homotopy theory and topics from differential topology. 4 lectures. Not open to students with credit in MATH 441. Prerequisite: MATH 540 and graduate standing, or consent of instructor. Recommended: MATH 304.

**MATH 550 Real Analysis (4)**

Introduction to Lebesgue measure and integration, convergence theorems,  $L_1$  spaces, Radon-Nikodym Theorem and Fubini's Theorem. 4 seminars. Prerequisite: Satisfactory completion of the Graduate Written Examination in Analysis or consent of the Graduate Committee.

**MATH 560 Field Theory (4)**

Polynomial rings, field extensions, normal and separable extensions, automorphisms of fields, fundamental theorem of Galois theory, solvable groups, solution by radicals, insolubility of the quintic. 4 lectures. Prerequisite: Satisfactory completion of the Graduate Written Examination in Algebra or consent of the Graduate Committee.

**MATH 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Graduate standing or consent of instructor.

**MATH 580 Seminar (1-4)**

Built around topics in advanced mathematics chosen according to the common interests and needs of the students enrolled. Each seminar will have a subtitle according to the nature of the content. Total credit limited to 12 units. 1-4 seminars. Prerequisite: Graduate standing and consent of instructor.

**MATH 599 Thesis (3)**

Serious research endeavor devoted to the development, pedagogy or learning of mathematics. Course to be taken twice for a total of 6 units. Prerequisite: Graduate standing and consent of instructor. *Formerly MATH 596.*

**2009-11 Cal Poly Catalog****Mathematics Department****Flowchart****BS MATHEMATICS**

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                      ☐ USCP

\* = Required in Major; also satisfies GE

Course sequencing: See flowcharts at

[www.csmadvising.calpoly.edu](http://www.csmadvising.calpoly.edu)

Note: No major, support or concentration courses may be taken as credit/no credit.

**MAJOR COURSES**

MATH 141 Calculus I (B1)* .....	4
MATH 142 Calculus II (B1)* .....	4
MATH 143 Calculus III .....	4
MATH 202 Orientation to the Mathematics Major .....	1
MATH 206 Linear Algebra I.....	4
MATH 241 Calculus IV .....	4
MATH 242 Differential Equations I .....	4
MATH 248 Methods of Proof in Mathematics.....	4
MATH 306 Linear Algebra II .....	4
MATH 412 Introduction to Analysis I .....	4
MATH 459 Senior Seminar <i>or</i> MATH 460 Applied Math Senior Seminar .....	4
MATH 461 Senior Project I .....	2
MATH 462 Senior Project II.....	2
MATH 481 Abstract Algebra I.....	4
PHYS 141 General Physics IA.....	4
PHYS 132 General Physics II <i>or</i> PHYS 133 General Physics III (B3 & B4)* .....	4
General curriculum or concentration .....	48/56/52/52 <sup>1</sup>
	<b>105/113/109/109<sup>1</sup></b>

**GENERAL EDUCATION (GE)**

72 units required, 12 of which are specified in Major.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing.....	4

**Area B Science and Mathematics (4 units)**

B1 Mathematics/Stat * 8 units in Major/ Support .....	0
B2 Life Science .....	4
B3 Physical Science * 4 units in Support.....	0
B4 One lab taken with either a B2 or B3 course *in Major	

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4

D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4
<b>Area F Technology Elective (upper division) (4 units)</b>	<b>4</b>
	<b>60</b>
<b>FREE ELECTIVES .....</b>	<b>15/7/11/11<sup>2</sup></b>
	<b>180</b>

**General Curriculum in Mathematics or Concentrations (select one)****General Curriculum in Mathematics**

This is the pathway for students who do not wish to select a concentration.

CSC/CPE 101 Fund. of Computer Science I <i>or</i> CSC/CPE 235 Fundamentals of Computer Science for Scientists and Engineers I .....	4
STAT 301 Statistics I <i>or</i> STAT 325 Introduction to Probability Models .....	4
MATH 336 Combinatorial Mathematics .....	4
Tracks.....	24

Choose three tracks from the following list, with at least one track chosen from the first two tracks listed. A track consists of two paired courses representing depth of study with a particular focus.

MATH 413 <i>and</i> MATH 414
MATH 406 <i>and</i> MATH 482
MATH 304 <i>and</i> MATH 404
MATH 335 <i>and</i> MATH 435
MATH 344, <i>and</i> MATH 416 <i>or</i> MATH 418
MATH 350, <i>and</i> MATH 341 <i>or</i> MATH 344
MATH 408 <i>and</i> MATH 409
MATH 437 <i>and</i> MATH 453
MATH 440 <i>and</i> MATH 441
MATH 442 <i>and</i> MATH 443
MATH 451 <i>and</i> MATH 452

Approved Electives.....	12
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Select 12 units from the following:

MATH 304, 335, 341, 344, 350, 404, 406, 408, 409, 413, 414, 416, 418, 419, 435, 436, 437, 440, 441, 442, 443, 451, 452, 453, 470, 482; CSC/CPE 102, 103, 236, 349; PHYS 132, 133, 211, 301, 302, 322, 323, 405, 408; STAT 301, 302, 325, 425, 426, 427
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**Applied Mathematics Concentration**

CSC/CPE 101 Fund. of Computer Science I <i>or</i> CSC/CPE 235 Fundamentals of Computer Science for Scientists and Engineers I .....	4
MATH 304 Vector Analysis.....	4
MATH 344 Linear Analysis II.....	4
MATH 350 <i>or</i> CSC/CPE 102 <i>or</i> CSC/CPE 236 .....	4

<sup>1</sup> General Curriculum/Applied Concentration/Pure Concentration/  
Mathematics Teaching Concentration.

<sup>2</sup> Free electives will vary, depending on concentration chosen.

MATH 413 Introduction to Analysis II.....	4	MATH 423 Advanced Mathematics for Teaching	4
MATH 451 Numerical Analysis I.....	4	MATH 442 Euclidean Geometry .....	4
STAT 301 Statistics I or STAT 325 Introduction to Probability Models .....	4	MATH 443 Modern Geometries.....	4
Tracks <i>Corrected effective Summer 2009</i> .....	<del>12</del> 16	MATH 482 Abstract Algebra II.....	4
Choose two tracks from the following list. A track consists of two paired courses representing depth of study with a particular focus.		Select 4 units from the following:.....	4
MATH 408 and MATH 409		CSC/CPE 102, 236;	
MATH 416 and MATH 418		MATH 304, 335, 344, 406, 408, 413, 416, 435, 437, 440, 451, 470;	
MATH 452 and MATH 453		PHYS 132, 133, 302	
<sup>1</sup> Approved electives .....	12		
Select 12 units from one of the following categories, with at least one course at the 300 level or above. Other choices are also possible, and should be pre-approved in consultation with academic advisor.			
1. ASTR 301, 302, 326			
PHYS 132, 133, 211, 301, 302, 303, 317, 322, 323, 405, 408, 412, 417			
2. STAT 302, 323, 324, 325, 330, 416, 417, 418, 419, 421, 423, 425, 426, 430			
3. CSC/CPE 102 or 236, 103, 225, 349, 357, 448			
4. ME 211, 212, 302, 326, 341 <i>Added 4/20/11</i>			
5. ECON 311, 313, 408			
	56		
<b>Pure Mathematics Concentration</b>			
MATH 336 Combinatorial Mathematics.....	4		
MATH 408 Complex Analysis I .....	4		
MATH 413 Introduction to Analysis II.....	4		
MATH 440 Topology I .....	4		
MATH 482 Abstract Algebra II.....	4		
Select 12 units from the following: .....	12		
MATH 406, 409, 414, 435, 441			
Select 8 units from the following .....	8		
CSC/CPE 101 or CSC/CPE 235 (4)			
MATH 350 (4)			
STAT 301 or STAT 325 (4)			
Select 12 units from the following .....	12		
MATH 304, 335, 341, 344, 350, 404, 406, 409, 414, 416, 418, 435, 436, 437, 441, 451, 452, 453, 470			
	52		
<b>Mathematics Teaching Concentration</b>			
CSC/CPE 101 Fundamentals of Computer Science I or CSC/CPE 235 Fundamentals of Computer Science for Scientists and Engineers I.....	4		
SCM 300 Early Field Experience, Science/Math.....	4		
MATH 300 Technology in Mathematics Education	4		
STAT 301 Statistics I .....	4		
STAT 302 or STAT 325 or STAT 425.....	4		
MATH 336 Combinatorial Mathematics.....	4		
MATH 341 Theory of Numbers.....	4		
MATH 419 Intro to the History of Mathematics.....	4		

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.



## 2009-11 Cal Poly Catalog

### Mechanical Engineering Department

## ME—MECHANICAL ENGINEERING

### ME 134 Introduction to Mechanical Engineering (1)

Introduction to mechanical engineering and its application in professional practice. Includes design, analysis, testing and dissection of mechanical engineering systems, from simple machines to more complicated systems. 1 laboratory.

### ME 151 Engineering Design Communication I (2)

Communication of designs to manufacturing using basic definitions of points, lines and planes in space. Pictorials, orthographic projection, section views and auxiliary views. Techniques from geometry, vectors, analysis, and spatial definitions integrated to provide information to both the design and manufacturing processes. 1 lecture, 1 laboratory.

### ME 152 Engineering Design Communication II (2)

Use of advanced communication principles to communicate project designs to manufacturing processes. Projects evaluated in terms of meeting design criteria. Techniques of advanced communication including weld symbols, threaded fasteners, dimensioning and tolerancing. Use of computers to enhance these processes. 1 lecture, 1 laboratory. Prerequisite: ME 151.

### ME 211 Engineering Statics (3)

Analysis of forces on engineering structures in equilibrium. Properties of forces, moments, couples, and resultants. Equilibrium conditions, friction, centroids, area moments of inertia. Introduction to mathematical modeling and problem solving. Vector mathematics where appropriate. 3 lectures. Prerequisite: MATH 241 (or concurrently), PHYS 131 or PHYS 141. *Change effective Winter 2011.*

### ME 212 Engineering Dynamics (3)

Analysis of motions of particles and rigid bodies encountered in engineering. Velocity, acceleration, relative motion, work, energy, impulse, and momentum. Further development of mathematical modeling and problem solving. Vector mathematics where appropriate. 3 lectures. Prerequisite: MATH 241, ME 211.

### ME 234 Philosophy of Design (3)

General approach to the meaning of engineering design. Conceptual blocks, creativity, design process, design considerations and elements. 3 lectures.

### ME 236 Thermal Measurements (3)

Introduction to principles of experimental measurement, including practical instrument reading, data collection, and uncertainty analysis. Techniques for measuring temperature, pressure, and other parameters. Introduction to theory and practice of writing lab reports and communication of experimental data. 2 lectures, 1 laboratory. Prerequisite: CHEM 125, ENGL 134, PHYS 132.

### ME 240 Additional Engineering Laboratory (1) (CR/NC)

Special assignments undertaken by students who need or wish to acquire abilities supplementary to their standard pattern of courses. Assignments must be primarily of shop or laboratory nature. Work is done by the student with a minimum of faculty supervision. Credit/No Credit grading only. Total credit limited to 12 units. 1 laboratory.

### ME 251 Intermediate Solid Modeling (1)

Continuation of solid modeling introduced in ME 152, using current software and hardware. Creation of more involved part models with varied configurations and dynamic assembly models. Working drawings produced from the models. Introduction to mass and inertia using the chosen software. Emphasis of group work and peer review in the production of parts for assemblies. 1 laboratory. Prerequisite: ME 152 or equivalent. *Formerly ME 153.*

### ME 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### ME 302 Thermodynamics I (3)

Properties of working fluids and fundamental relations for processes involving the transfer of energy. First and second laws of thermodynamics, irreversibility and availability. 3 lectures. Prerequisite: PHYS 132, ME 212 or CHEM 128.

### ME 303 Thermodynamics II (3)

Vapor and gas power cycles, refrigeration cycles, thermodynamic relations, psychrometrics, and chemical reactions. 3 lectures. Prerequisite: ME 236, ME 302.

### ME 305 Introduction to Mechatronics (4)

Introduction to microcontrollers and assembly language programming. Emphasis on components and techniques for interfacing that are typical of embedded microcontroller applications (A/D conversion, D/A conversion, interrupts, timers, and pulse-width modulation). Laboratory exercises involve real-time interfacing of microcontrollers to external mechanical and/or electromechanical devices. 3 lectures, 1 laboratory. Prerequisite: EE 321 and EE 361, or consent of instructor.

### ME 318 Mechanical Vibrations (4)

Free and forced vibration response of single and multiple degree of freedom systems. Experimental studies of the dynamic behavior of structures and machines. Instrumentation methods utilized in field and laboratory. 3 lectures, 1 laboratory. Prerequisite: MATH 344, ME 326, EE 201.

### ME 320 Consumer Energy Guide (4)

#### GE Area F

Interdisciplinary connection of everyday consumer decisions with energy costs, security, and global warming. Energy consumption by home appliances and automobiles. Methods to reduce the individual "energy footprint" with renewable energy, purchasing carbon offsets, and behavioral modifications. 4 lectures. Prerequisite: Junior standing and completion of GE Areas A and B. Fulfills GE Area F.

### ME 321 Solar Energy (4)

#### GE Area F

Methods of utilizing solar energy. Energy concepts, collection and storage systems; greenhouse effect. Commercial and residential building applications. Solar power generation and recent technical developments. International achievements in solar energy with emphasis on solar energy application in developing countries for water purification and other life support functions. 4 lectures. Prerequisite: Junior standing, PHYS 131 or PHYS 123, and completion of GE Area B. Fulfills GE Area F.

### ME 326 Intermediate Dynamics (4)

Continuation of ME 212. Additional analysis of planar motion of rigid bodies with particular attention to the kinematics of mechanisms. Rotating reference frames. Introduction to three dimensional dynamics. Dynamic simulation of mechanisms. ~~4 lectures~~ 3 lectures, 1 activity. Prerequisite: MATH 242 MATH 244 (or concurrent), ME 212, CSC 231 or CSC 234 or CPE/CSC 101. *Change effective Winter 2011.*

### ME 328 Introduction to Design (4)

Design of machine parts by stress and deflection. Effects of fluctuating stresses and stress concentration. Design of shafts and other machine parts. Modern industrial design practice using standard components and design layout drawings. 3 lectures, 1 laboratory. Prerequisite: CE 207, ME 152, MATE 210, CSC 231 or CSC 234, ME 212.

### ME 329 Intermediate Design (4)

Design of mechanical equipment and systems using various machine elements and components such as threaded fasteners, power screws, springs, gears, bearings, clutches, prime movers, etc. Decision modeling based on technical and economic feasibility. 3 lectures, 1 laboratory. Prerequisite: ME 318 (or concurrent), ME 328.

### ME 341 Fluid Mechanics I (3)

Fluid statics. Conservation equations of fluid dynamics. Viscous flow, boundary layer concepts, lift and drag, compressible flow, turbomachinery. 3 lectures. Prerequisite: ME 212.

### ME 343 Heat Transfer (4)

Basic principles of heat transfer. Conduction, convection, radiation, and combined modes. Optional thermal engineering design project. 4 lectures. Prerequisite: ME 341, ME 302 or CHEM 305, MATH 244, CSC 231 or CSC 234.

### ME 346 Thermal Science Laboratory (1)

Heat transfer and thermodynamic experiments covering combined free convection and radiation, transient conduction, energy conversion, heat exchanger, polytropic blowdown, steam turbine, and refrigeration cycles. 1 laboratory. Prerequisite: ME 303, ME 341, ME 343.

**ME 347 Fluid Mechanics II (4)**

Conservation equations of fluid dynamics. Viscous flow, boundary layer concepts, lift and drag, compressible flow, turbomachinery. Laboratory measurement of turbomachine performance, velocity profiles, boundary layers on surfaces. 3 lectures, 1 laboratory. Prerequisite: ME 236. ME 341, ME 302 or consent of instructor.

**ME 359 Fundamentals of HVAC Systems (4)**

Fundamentals of heating, ventilating and air-conditioning (HVAC) systems, human comfort and indoor air quality, primary and secondary systems and components. 3 lectures, 1 laboratory. Prerequisite: ME 302.

**ME 400 Special Problems for Advanced Undergraduates (1–4)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Consent of instructor.

**ME 401 Stress Analysis (4)**

Advanced strength of materials: behavior of disks, plates, and shells. Theory of elasticity. Energy methods. 3 lectures, 1 laboratory. Prerequisite: CE 207, MATH 344, ME 328 or consent of instructor.

**ME 402 Orthopedic Biomechanics (4)**

Biomechanical analysis of the musculoskeletal system. Emphasis on the use of statics, dynamics, strength of materials, viscoelasticity, and poroelasticity to analyze the mechanical loads acting on human joints, the mechanical properties of tissues, and the design of artificial joints. 3 lectures, 1 laboratory. Prerequisite: ME 328 or consent of instructor.

**ME 404 Applied Finite Element Analysis (4)**

Finite element based solutions to engineering problems with an emphasis on elastostatic problems in structural mechanics. The power and pitfalls associated with the finite element method highlighted through practical modeling assignments. Introduces the use of commercial finite element codes. 3 lectures, 1 laboratory. Prerequisite: ME 329 or CE 351 or **BMED 410**. Crosslisted as **BMED/CE/ME 404**. *Change effective Fall 2010.*

**ME 405 Mechatronics (4)**

Microprocessor applications in machine control and product design. Applied electronics. Drive technology; transducers and electromechanical systems. Real-time programming. Mechatronic design methodology. 3 lectures, 1 laboratory. Prerequisite: ME 305 and ME 329 (or concurrent), or CPE/EE 329 and CPE/EE 369, or consent of instructor.

**ME 410 Experimental Methods in Mechanical Design I (4)**

Bonded resistance strain gages for static and dynamic measurements; rosettes, bridge circuits, lead wire effects, special gages. Photoelastic and moiré fringe methods including birefringent coatings, shadow, and projection moiré. Applications in mechanical design and metrology. 3 lectures, 1 laboratory. Prerequisite: ME 328.

**ME 412 Composite Materials Analysis and Design (4)**

Behavior of unidirectional fiber composites. Properties of short-fiber composites, and orthotropic lamina. Analysis of laminated composites. Strength and hygrothermal behavior of composite materials. Structural optimization. 3 lectures, 1 laboratory. Prerequisite: AERO 331 ~~330~~ or ME 328. *Corrected effective Summer 2009.*

**ME 415 Energy Conversion (4)**

Engineering aspects of energy sources, conversion and storage. Topics selected from fossil fuel systems, nuclear power, thermoelectric systems, thermionic converters, fuel cells, magnetohydrodynamic generators, and geothermal, tidal, wind and ocean temperature energy conversion systems. 4 lectures. Prerequisite: ME 302.

**ME 416 Ground Vehicle Dynamics and Design (4)**

Design of ground vehicles for directional stability and control. Tire mechanics and their effects on vehicle performance. Simulation of vehicle dynamics using digital computer. Synthesis of steering mechanism and suspension system. 2 lectures, 2 laboratories. Prerequisite: ME 318, ME 328.

**ME 422 Mechanical Control Systems (4)**

Modeling and control of physical systems. Design of mechanical, hydraulic and electrical systems using time response, frequency response, state space, and computer simulation. 3 lectures, 1 laboratory. Prerequisite: ME 318.

**ME 423 Robotics: Fundamentals and Applications (4)**

Introduction to robots and their types. Homogeneous transformations. Kinematic equations and their solutions. Motion trajectories, statics, dynamics, and control

of robots. Robot programming. Actuators, sensors and vision systems. 3 lectures, 1 laboratory. Prerequisite: ME 326, ME 422.

**ME 424 Design of Piping Systems (4)**

Pipe specifications and pertinent codes. Valves, fittings, pumps and compressors. The transportation function of piping as related to power plants, refineries, slurry systems, pumping systems and drainage. Philosophy of system design. 3 lectures, 1 laboratory. Prerequisite: CE 207, ME 347, CSC 231, MATE 210.

**ME 428 Senior Design Project I (3)**

First of three courses taken sequentially in component and system design using real-world problems. Small teams study and apply techniques of the engineering design process including problem definition, concept generation, feasibility studies and decision making. Practice of professional skills including written and oral communication, teaming, project management, societal responsibility and ethics. 1 lecture, 2 laboratories. Prerequisite: ENGL 149, ME 329, ME 343, ME 347 or consent of instructor.

**ME 429 Senior Design Project II (2)**

Continuation of a project begun in ME 428. Activities focused on detail design, analysis and material procurement. 2 laboratories. Prerequisite: ME 428. *Formerly ME 481.*

**ME 430 Senior Design Project III (1)**

Completion of a project begun in ME 428 and continued in ME 429. Design verified through prototyping and testing. 1 laboratory. Prerequisite: ME 429.

**ME 431 Mechanical Design Techniques (4)**

Comprehensive study of various design methods and techniques. Techniques used to explore various structural concepts such as prestressing, shaping, sizing, etc. Simulation of systems using digital computer. Design criteria identification of design parameters and constraints. 3 lectures, 1 laboratory. Prerequisite: ME 329.

**ME 432 Petroleum Reservoir Engineering (4)**

Types of reservoirs and reservoir rocks. Measurement and interpretation of physical properties of reservoir rocks and fluids: porosity, permeability, compressibility, electrical resistivity, fluid saturation, viscosity, solution gas and PVT properties of reservoir fluids. Introduction to flow in porous media, reserve calculations for different reservoirs and computer applications. 3 lectures, 1 laboratory. Prerequisite: ME 341.

**ME 434 Enhanced Oil Recovery (4)**

Primary, secondary, and tertiary (enhanced) oil recovery methods. Waterflooding, polymerflooding, gas injection, steam injection, in-situ combustion, chemical flooding, miscible flooding. Performance calculations and computer applications in EOR. 4 lectures. Prerequisite: ME 302, ME 347, ME 343.

**ME 435 Drilling Engineering (4)**

Theory and practice of oilwell planning, drilling, well logging, and completion applied to the development of new oil and gas production, from onshore and offshore fields. 4 lectures. Prerequisite: ME 329, ME 347.

**ME 436 Petroleum Production Engineering (4)**

Design and operation of surface and subsurface equipment required in oil production. Processes and systems involved are rod pumping, gas lifting, acidizing, hydraulic fracturing, fluid gathering and storage, separation of oil, gas, water and sediment from produced fluid. Includes equipment used in enhanced oil recovery processes. 4 lectures. Prerequisite: ME 329, ME 347.

**ME 440 Thermal System Design (4)**

Design and optimization of thermal systems. Engineering economics, thermal component sizing, steady-state simulation, and optimization techniques applied to the design and performance analysis of thermal systems. 3 lectures, 1 laboratory. Prerequisite: ME 303, ME 347, ME 343.

**ME 441 Single Track Vehicle Design (4)**

Design of single track vehicles, including handling characteristics, ergonomics and human power, strength and stiffness considerations, braking and suspension. Laboratory focus on designing a single track vehicle, including fabrication of a handling prototype. 3 lectures, 1 laboratory. Prerequisite: ME 318, ME 329, or consent of instructor.

**ME 443 Turbomachinery (4)**

Performance characteristics of various types for liquids and for gases. Criteria for proper selection of type and main dimensions. Cavitation criteria. Gas

turbine cycles and performance. Two-dimensional cascades. Axial flow turbines and compressors. Centrifugal compressors and radial-inflow turbines. 4 lectures. Prerequisite: ME 303, ME 347, ME 343, MATH 344.

#### **ME 444 Combustion Engine Design (4)**

Application of design parameters to the various engine cycles. Aspects of the combustion processes. Emission regulation effects on engine design. Static and dynamic loading. 3 lectures, 1 laboratory. Prerequisite: ME 303, ME 343, ME 347.

#### **ME 445 Convective Heat and Mass Transfer (4)**

Forced convection in laminar and turbulent flow, free convection, diffusion, combined heat and mass transfer. 4 lectures. Prerequisite: ME 347, ME 343.

#### **ME 446 Advanced and Hybrid Vehicle Design (4)**

Systematic methodology to design and optimize hybrid powertrains. Exploration of conventional and hybrid powertrain subsystem models and application in a vehicle simulation, including internal combustion engines, electric motors and generators, transmissions, batteries, fuel cells, hydraulic reservoirs, ultracapacitors, flywheels, etc. Analytical modeling and optimization. 3 lectures, 1 laboratory. Prerequisite: ME 329 and ME 303.

#### **ME 450 Solar Power Systems (4)**

High and intermediate temperature systems for conversion of solar energy to mechanical power and heat. Thermal energy storage and total thermal energy system design. Recommended as a complement to ME 415. 3 lectures, 1 laboratory. Prerequisite: ME 343.

#### **ME 456 HVAC Air and Water Distribution System Design (4)**

Air and water distribution components and systems and the design of these systems with applications to the heating, ventilating and air-conditioning (HVAC) industry. 3 lectures, 1 laboratory. Prerequisite: ME 302, ME 347.

#### **ME 457 Refrigeration Principles and Design (4)**

Basic engineering principles of refrigeration processes including: vapor compression cycles, multipressure systems, absorption systems, steam jet cooling, air cycles, and low temperature refrigeration. 3 lectures, 1 laboratory. Prerequisite: ME 341, ME 343.

#### **ME 458 Building Heating and Cooling Loads (4)**

Building heating and cooling load calculations, estimating energy consumption and operating costs for heating, ventilating and air-conditioning system design and selection. 3 lectures, 1 laboratory. Prerequisite: ME 303, and ME 343.

#### **ME 459 HVAC Senior Design Project I (3)**

First quarter of a two quarter sequence. Team project work in designing heating, ventilating and air-conditioning (HVAC) systems. New developments, policies and practices in the HVAC industry. Professional ethics relevant for practicing engineers. 1 lecture, 2 laboratories. Prerequisite: ME 456, ME 458.

#### **ME 460 HVAC Senior Design Project II (2)**

Continuation of work begun in ME 459. Team project designing heating, ventilating and air-conditioning (HVAC) systems. 2 laboratories. Prerequisite: ME 459.

#### **ME 461, 462 Senior Project I, II (2) (3)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 150 hours total time. Prerequisite: Senior standing, ME 303, ME 343 and ME 329 (or concurrent).

#### **ME 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

#### **ME 471 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

#### **ME 488 Wind Energy Engineering (4)**

Engineering aspects of windpower systems including mechanical design, support structure design, aerodynamic analysis, wind field analysis, system concepts and analysis, and economics. 4 lectures. Prerequisite: ME 329, ME 347, ME 302.

#### **ME 493 Cooperative Education Experience (2) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 6 units. Prerequisite: Sophomore standing and consent of instructor.

#### **ME 494 Cooperative Education Experience (6) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 18 units. Prerequisite: Sophomore standing and consent of instructor.

#### **ME 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. No major credit allowed; total credit limited to 24 units. Prerequisite: Sophomore standing and consent of instructor.

#### **ME 500 Individual Study (1–3)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

#### **ME 501 Continuum Mechanics and Linear Elasticity (4)**

Introduction to continuum mechanics. Kinematics, stress, and balance laws. Constitutive theory for isotropic and anisotropic solids and viscous fluids. Applications including design of beams and pressure vessels, stress concentrations, fiber-reinforced composites, and non-homogeneous biological materials. 4 lectures. Prerequisite: ME 401 or CE 401 or consent of instructor. *Crosslisted as CE 511/ME 501.*

#### **ME 503 Inelastic Stress Analysis (4)**

Perfectly plastic and work hardening materials; von Mises and Tresca yield, isotropic and kinematic hardening flow rules, boundary-value problems. Finite elasticity: kinematics, Cauchy- and Green-elasticity, invariance, constraints, Neo-Hookean and Mooney-Rivlin materials, experimental approaches, non-uniqueness, anisotropy, residual stress, thermoelasticity, boundary-value problems. 4 lectures. Prerequisite: ME 501 or CE 511. *Crosslisted as CE 513/ME 503.*

#### **ME 504 Finite Element Analysis I (4)**

Linear finite element theory and analysis. Strong, weak and variational formulations. Physical and isoparametric spaces. Error estimates and numerical integration. Development of finite element algorithms. Use of commercial finite element codes to illustrate course concepts including modeling issues and limitations. 3 lectures, 1 laboratory. Prerequisite: CE/ME 404 and CE 511 or ME 501 or consent of instructor. *Crosslisted as CE/ME 504. Formerly ME 502.*

#### **ME 505 Finite Element Analysis II (4)**

Nonlinear and dynamic finite element theory and analysis. Variational formulations and their significance. Isoparametric formulation and numerical integration. Development of two and three-dimensional finite element algorithms. The limitations of FEA. 3 lectures, 1 laboratory. Prerequisite: CE/ME 504. *Crosslisted as CE/ME 505.*

#### **ME 506 System Dynamics (4)**

Unified approach for mathematical modeling and analysis of dynamic physical systems which may store energy in multiple energy domains. Emphasis on developing lumped-parameter linear system models from a set of primitive elements in a systematic manner. 4 lectures. Prerequisite: Graduate standing or consent of instructor.

#### **ME 507 Mechanical Control System Design (4)**

Application of principles of high-level design to mechanical control system implementation. Use of modified state transition logic in conjunction with object-oriented programming as design methodology. Real-time programming using above techniques for control of mechanical systems. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**ME 517 Advanced Vibrations (4)**

Vibration of complex engineering systems. Inertia and stiffness matrices. Natural frequencies and normal modes. Approximate solutions and computer techniques. Response to transient and periodic inputs. 3 lectures, 1 laboratory. Prerequisite: ME 318, graduate standing or consent of instructor.

**ME 518 Machinery Vibration and Rotor Dynamics (4)**

Vibrations relating to rotating machinery. Modeling of structural rotordynamic phenomena induced by shaft flexibility, bearings, and seals. Laboratory measurement of rotor system dynamic response and interpretation of machinery diagnostic information. Research project on a related topic. 3 lectures, 1 laboratory. Prerequisite: ME 318, graduate standing or consent of instructor.

**ME 531 Acoustics and Noise Control (4)**

Description of sound using normal modes and waves. Interaction between vibrating solids and sound fields. Sound absorption in enclosed spaces. Sound transmission through barriers. Applications in acoustic enclosures, room enclosures, room acoustics. Design of quiet machinery and transducers. 3 lectures, 1 laboratory. Prerequisite: ME 318, MATH 344.

**ME 540 Viscous Flow (4)**

Introduction to tensor calculus and indicial notation. Development of Reynolds' Transport Theory. Special forms of the governing equations of fluid motion. Internal flows and other classical solutions to the Navier-Stokes equations. 4 lectures. Prerequisite: ME 347, MATH 344 and graduate standing or consent of instructor.

**ME 541 Advanced Thermodynamics (4)**

Selected modern applications of thermodynamics which may include topics from: 1) equilibrium and kinetics as applied to combustion and air pollution, analysis and evaluation of techniques used to predict properties of gases and liquids, and 2) improvement of modern thermodynamic cycles by second law analysis. 4 lectures. Prerequisite: ME 303, ME 343, ME 347 and graduate standing or consent of instructor.

**ME 542 Dynamics and Thermodynamics of Compressible Flow (4)**

Control volume analysis of fluid-thermo equations for one-dimensional, compressible flow involving area change, normal shocks, friction, and heat transfer. Two-dimensional supersonic flow including linearization, method of characteristics, and oblique shocks. One-dimensional constant area, unsteady flow, 4 lectures. Prerequisite: ME 303, ME 343, ME 347, MATH 244, and graduate standing or consent of instructor.

**ME 551 Mechanical Systems Analysis (4)**

Various system modeling methods applied to mechanical systems. System stability studies and system optimization methods. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**ME 552 Advanced Heat Transfer I (4)**

Advanced principles of heat transfer. Classical solution techniques to problems in conduction and/or radiation. 4 lectures. Prerequisite: ME 343, ME 347, MATH 344, and graduate standing or consent of instructor.

**ME 553 Advanced Heat Transfer II (4)**

Advanced principles of heat transfer. Classical solution techniques to problems in convection. 4 lectures. Prerequisite: ME 343, ME 347, MATH 344, and graduate standing or consent of instructor.

**ME 554 Computational Heat Transfer (4)**

Numerical solutions of classical, industrial, and experimental problems in conduction, convection, and radiation heat transfer. 3 lectures, 1 laboratory. Prerequisite: ME 343, ME 347, MATH 418, graduate standing or consent of instructor.

**ME 555 Micro Systems Laboratory (2)**

Design, fabrication, and testing of a microfluidic device. Utilization of a rapid prototype soft lithography processing technique to create micro channels, valves, mixing chambers, etc. for controlling fluid flow dynamics. 2 laboratories. Prerequisite: Senior or graduate standing or consent of instructor. Corequisite: MATE 550. *Crosslisted as MATE/ME 555.*

**ME 563 Graduate Seminar (1)**

Current developments in mechanical engineering. Participation by graduate students, faculty and guests. 1 seminar. Prerequisite: Graduate standing in mechanical engineering program.

**ME 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 8 units; may be repeated in same term. 1-4 seminars. Prerequisite: Graduate standing or consent of instructor.

**ME 571 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 8 units; may be repeated in same term. 1-4 laboratories. Prerequisite: Graduate standing or consent of instructor.

**ME 579 Fluid Power Control (4)**

Design, analysis, and control of fluid power systems. Analysis of fluid power system components such as valves, actuators, pumps and motors. System response and stability. Dynamic modeling and computer simulation 3 lectures, 1 laboratory. Prerequisite: ME 422.

**ME 593 Cooperative Education Experience (2) (CR/NC)**

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**ME 594 Cooperative Education Experience (6) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**ME 595 Cooperative Education Experience (12) (CR/NC)**

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**ME 599 Design Project (Thesis) (1-9)**

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis. Prerequisite: Graduate standing.

**2009-11 Cal Poly Catalog****Mechanical Engineering Department****Flowchart****BS MECHANICAL ENGINEERING**

□ 60 units upper division □ GWR

□ 2.0 GPA □ USCP

\* = Required in Support; also satisfies GE

Note: No major, support or concentration courses  
may be taken as credit/no credit.**MAJOR COURSES**

ME 134 Introduction to Mechanical Engineering....	1
ME 151 Engineering Design Communication I .....	2
ME 152 Engineering Design Communication II .....	2
ME 211 Engineering Statics .....	3
ME 212 Engineering Dynamics .....	3
ME 234 Philosophy of Design .....	3
ME 236 Thermal Measurements .....	3
<sup>3</sup> ME 251 Intermediate Solid Modeling .....	1
ME 302 Thermodynamics I .....	3
ME 303 Thermodynamics II .....	3
ME 318 Mechanical Vibrations .....	4
ME 326 Intermediate Dynamics .....	4
ME 328 Introduction to Design .....	4
ME 329 Intermediate Design .....	4
ME 341 Fluid Mechanics I .....	3
ME 343 Heat Transfer .....	4
ME 346 Thermal Science Laboratory .....	1
ME 347 Fluid Mechanics II .....	4
ME 422 Mechanical Control Systems .....	4
ME 440 Thermal System Design .....	4
Concentration (see below) .....	21/22
	<b>81/82</b>

**SUPPORT COURSES**

BIO 213 Life Science for Engineers and ENGR/	
BRAE 213 Bioengineering Fundamentals (B2)*	4
CE 204 Mechanics of Materials I .....	3
CE 207 Mechanics of Materials II .....	3
CHEM 124 Gen Chem for Engineering I (B3/B4)*	4
CHEM 125 Gen Chem for Engineering II .....	4
CSC 231 or CSC 234 or CPE/CSC 101 (6/23/09) ...	2
EE 201, 251 Electric Circuit Theory and Lab .....	3,1
EE 321, 361 Electronics and Lab .....	3,1
ENGL 149 Technical Writing for Engineers (A3)*	4
IME 142 Mfg Processes: Materials Joining .....	2
IME 143 Mfg Processes: Material Removal .....	2
MATE 210 Materials Engineering and MATE 215	
Materials Laboratory I .....	3,1
MATH 141, 142 Calculus I, II (B1)* .....	4,4
MATH 143 Calculus III (Add'l Area B)* .....	4
MATH 241 Calculus IV .....	4
MATH 244 Linear Analysis I .....	4
MATH 344 Linear Analysis II (B6)* .....	4
PHYS 131 General Physics (Add'l Area B)* .....	4

PHYS 132, 133 General Physics II, III .....	4,4
Manufacturing Processes elective .....	1
(IME 141 or IT 341)	

**77****GENERAL EDUCATION (GE)**

72 units required, 32 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 8 units required at the 300 level.

**Area A Communication (8 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing * 4	
units in Support .....	0

**Area B Science and Mathematics (no add'l units req'd)**

B1 Mathematics/Statistics * 8 units in Support .....	0
B2 Life Science * 4 units in Support .....	0
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with either a B2 or B3 course	
B5 (requirement for Liberal Arts students only)	
B6 Upper-division Area B * 4 units in Support .....	0
Additional Area B units* 8 units in Support .....	0

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4

**40****FREE ELECTIVES..... 0****198-199****CONCENTRATIONS (select one)****General Concentration**

ME 428, 429, 430 Sr. Design Project I, II, III .....	3,2,1
EE 255, 295 Energy Conversion Electromagnetics	
and Lab .....	3,1
<sup>1,2</sup> Technical electives selected from emphasis area ...	12

*Select at least 8 units of ME courses from:*ME 305, 359, 401, 402, 405, 410, 412, 415,  
416, 423, 424, 431, 432, 434, 435, 436, 441,<sup>1</sup> Consultation with advisor is recommended prior to selecting technical  
electives; bear in mind your selections may impact pursuit of post-  
baccalaureate studies and/or goals.<sup>2</sup> Notes:a) ME 470, 471, 570 and 571 are variable topics courses and may or  
may not count as ME electives. Please contact instructor for  
additional information.b) ME 400 and ME 500 are independent study classes and may be  
acceptable for technical elective credit. A course substitution form is  
required.c) Exceptions to this policy are possible through consultation with the  
department chair.<sup>3</sup> ME 271 (Intermediate Solid Modeling) may substitute. (7/23/13)

443, 444, 445, 446, 450, 456, 457, 458, 488,  
 506, 507, 517, 518, 531, 540, 541, 542, 551,  
 552, 553, 554, 579;  
 ME/CE 404, ME 501/CE 511, ME 503/CE 513,  
 ME/CE 504, ME/CE 505;  
 ME/MATE 555

*Select up to 4 units of non-ME courses from:*

Any upper division or graduate level course in  
 the College of Engineering with the exception  
 of GE Area F, senior project, thesis, special  
 problems, and coop courses.

Total units for General Concentration:	22
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#### **Heating, Ventilating, Air-Conditioning and Refrigerating Concentration (HVAC&R)**

ME 359 Fundamentals of HVAC Systems .....	4
ME 456 HVAC Air and Water Distribution System Design .....	4
ME 457 Refrigeration Principles and Design .....	4
ME 458 Building Heating and Cooling Loads .....	4
ME 459, 460 HVAC Senior Design Project I, II .....	3,2
	21

#### **Mechatronics Concentration**

ME 305 Introduction to Mechatronics .....	4
ME 405 Mechatronics .....	4
ME 423 Robotics: Fundamentals and Applications	4
ME 428, 429, 430 Sr. Design Project I, II, III .....	3,2,1
<sup>1</sup> CPE 336/IME 356/ME 506 .....	4
	22

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<sup>1</sup> Elective based on interests of students.



**2009-11 Cal Poly Catalog****Biological Sciences Department****BS MICROBIOLOGY**      **Flowchart**

☐ 60 units upper division

☐ GWR

☐ 2.0 GPA

☐ USCP

\* = Required in Major/Support; also satisfies GE

Course sequencing: See flowcharts at

[www.csmadvising.calpoly.edu](http://www.csmadvising.calpoly.edu)

Note: No major, support or concentration courses may be taken as credit/no credit.

**MAJOR COURSES**

BIO 160 Diversity & the History of Life .....	4
BIO 161 Introduction to Cellular & Molecular Biology (B2&B4)* .....	4
BIO 263 Introductory Ecology and Evolution.....	4
BIO 351 Principles of Genetics .....	5
BIO 426 Immunology.....	4
BIO 452 Cell Biology.....	4
MCRO 224 General Microbiology I .....	5
MCRO 225 General Microbiology II .....	5
MCRO 402 General Virology .....	4
MCRO 423 Medical Microbiology .....	5
MCRO 424 Microbial Physiology.....	5
BIO 461 Senior Project – Research Proposal or BIO 462 Senior Project - Research .....	2
<sup>1</sup> Approved electives.....	18
Limited to a total of 4 units from BIO 400, 450, 462, and 463. At least 10 units must be upper division (300-400 level).	
<i>Biotechnology</i>	
MCRO 433;	
ASCI 403;	
BIO/CHEM 375, 441, 476;	
BOT/HCS 450;	
EHS 425;	
BRAE 448;	
CHEM 331, 372, 373, 474, 478;	
SCM 201	
<i>Food Microbiology</i>	
MCRO 421;	
DSCI 402, 434, 444;	
FSN 230, 275, 335, 341, 364, 368, 374, 474	
<i>Medical and Public Health Microbiology</i>	
MCRO 320, 342; BIO 162, 432, 433;	
CHEM 331, 349, 377, 477;	
VS/ASCI 203, 312, 321, 438, 440;	
KINE 301;	
ZOO 425, 428	
<i>Microbial Ecology and Evolution</i>	
MCRO 436;	
BIO 325, 414, 443; CHEM 341, 342;	
ENVE 434;	
SS 422	
<i>Other electives for Microbiology Majors</i>	
BIO 361, 400, 434, 450, 462, 463;	
BOT 323;	

CHEM 318, 319, 419, 472;

MATH 151, 162;

PPSC 311, 441;

SCM 302, 451; (3/13/13)

STAT 313, 419, 421;

ZOO 335, 336, 436

Total units for Major Courses:

**69**<sup>2</sup> **SUPPORT COURSES**

CHEM 127 General Chemistry (B3&B4)* .....	4
CHEM 128, 129 General Chemistry I, II .....	4, 4
CHEM 316 Organic Chemistry I.....	5
CHEM 317 Organic Chemistry II .....	5
<sup>3</sup> CHEM 371 Biochemical Principles.....	5
MATH 161 Calculus for the Life Sciences I (B1)*	4
PHYS 121, 122, 123 College Physics I, II, III.....	4, 4, 4
STAT 218 Applied Statistics-Life Sciences (B1)*	4
	<b>47</b>

**GENERAL EDUCATION (GE)**

72 units required, 16 of which are specified in Major/Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

Area A Communication (12 units)

A1 Expository Writing ..... 4 |A2 Oral Communication ..... 4 |A3 Reasoning, Argumentation, and Writing ..... 4 |**Area B Science and Mathematics (no add'l units req'd)**B1 Mathematics/Statistics \* 8 units in Support..... 0 |B2 Life Science \* 4 units in Major..... 0 |B3 Physical Science \* 4 units in Support..... 0 |

B4 One lab taken with either a B2 or B3 course

**Area C Arts and Humanities (20 units)**C1 Literature ..... 4 |C2 Philosophy ..... 4 |C3 Fine/Performing Arts ..... 4 |C4 Upper-division elective ..... 4 |Area C elective (Choose one course from C1-C4) 4 |**Area D/E Society and the Individual (20 units)**D1 The American Experience (40404) ..... 4 |D2 Political Economy ..... 4 |D3 Comparative Social Institutions ..... 4 |D4 Self Development (CSU Area E) ..... 4 |D5 Upper-division elective ..... 4 |**Area F Technology Elective (upper division) (4 units)****56****FREE ELECTIVES.....****8****180**<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.<sup>2</sup> Students planning to attend graduate or professional schools are strongly advised to meet with their advisors to ensure that they meet necessary prerequisites for entry into these programs. Additional courses in math and chemistry may be necessary.<sup>3</sup> CHEM 313 may be substituted, ~~with advisor approval~~, for students not planning to pursue graduate school, or a health professions career. (11/5/13)

## 2009-11 Cal Poly Catalog

### Military Science Department

#### Military Science Minor

The minor emphasizes the following personal and technical skills: time, personnel, and resource management under duress; knowledge of U.S. military heritage, customs, and courtesies; planning and briefing under time constraints; current national defense issues; equal opportunity, sexual harassment, and military ethics; military justice; physical fitness; map reading and orienteering; leadership, management, and counseling skills under duress; oral, visual, and written communication skills in accordance with Army norms; small unit tactics. It provides marketable skills to students interested in government service, personnel management, and law enforcement. The Military Science Minor is limited to contracted ROTC cadets only.

A minimum GPA of 2.5 is required in all units counted for completion of the minor. (Updated 3/24/11)

#### Required core

MSL 203 Foundations of Leadership III.....	2
MSL 240/HIST 320/HIST 321/HIST 322.....	4
(4/1/10)	
MSL 301 Tactical Leadership I.....	3
MSL 302 Tactical Leadership II .....	3
MSL 303 Applied Leadership.....	3
MSL 401 Developmental Leadership I .....	3
MSL 402 Developmental Leadership II.....	3
MSL 403 Adaptive Leadership .....	3

#### Approved electives..... 6

Select 6 units from the following:

MSL 101, 102, 103, 110, 111, 112, 201, 202,  
212, 229, 310, 312, 314 (ROTC only), 410, 412  
(4/10/12)

MSL/RPTA 275 (3/8/12)

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**2009-11 Cal Poly Catalog****Modern Languages & Literatures Department****BA MODERN LANGUAGES & LITERATURES**

- ☐ 60 units upper division      ☐ GWR  
 ☐ 2.0 GPA                      ☐ USCP

\* = Required in Major; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES****Primary Language**

SPAN 121 Fundamentals of Spanish I .....	4
SPAN 122 Fundamentals of Spanish II <i>or</i> SPAN 123 Spanish for Heritage Speakers .....	4
SPAN 124 Composition in Spanish <i>or</i> SPAN 203 Intermediate Spanish III (9/11/13) .....	4
SPAN 205 Introduction to Spanish Linguistics .....	4
SPAN 233 Intro. to Hispanic Readings (C1)* .....	4
SPAN 301 Advanced Composition in Spanish .....	4
SPAN 305 Significant Writers in Spanish .....	4
SPAN 402 Advanced Linguistics in Spanish .....	4
SPAN 410 Advanced Literature in Spanish .....	4
SPAN 416 Don Quixote .....	4
MLL 210 Intro. to Research Methods .....	4
MLL 460 Senior Project .....	4
Primary language/culture electives (300-400 level)	12

Select 12 units from the following:

AG/BUS/EDES/ENGR/HUM/SCM/UNIV 350;  
 AGB 318;  
 ANT 325, 330, 360, 401, 415;  
 ART 311, 312, 313, 315, 318;  
 ART/WGS 316;  
 BUS 402, 403, 410;  
 CD 350; CD/PSY 306;  
 COMS 308, 311, 315, 416, 421;  
 DANC 321;  
 ECON 330; ECON/HNRS 303;  
 EDUC 423, 433;  
 ENGL 301, 302, 326, 346, 390, 391, 459,  
 495, 497, 498, 499, 503; ENGL/HNRS 380;  
 ES 300, 321, 322, 323, 326, 330, 340, 380;  
 ES/NR 360;  
 FR 301<sup>†</sup>, 302<sup>†</sup>, 305<sup>††</sup>, 322, 350<sup>††</sup>, 470<sup>††</sup>;  
 FSN 322;  
 GEOG 308, 360, 370;  
 GER 301<sup>†</sup>, 302<sup>†</sup>, 305<sup>††</sup>, 350<sup>††</sup>, 470<sup>††</sup>;  
 HIST 306, 310, 314, 316, 319, 323, 339, 340,  
 341, 416, 417, 418, 420, 437, 451, 452, 454;  
 HUM 310<sup>††</sup>, 312, 318; HUM/UNIV 361;  
 LS 310;  
 MLL 470<sup>††</sup>;  
 PHIL 312, 313, 315, 320, 336, 350, 423;  
 POLS 310, 322, 324, 325, 339, 346, 429;  
 PSY 315, 458; PSY/WGS 314;  
 RELS 304, 306, 307, 310, 311;  
 RELS/WGS 370;  
 RPTA 314;

SOC 309, 313, 315, 316, 350, 431;  
 SOC/WGS 311;  
 SPAN 302, 305<sup>††</sup>, 307<sup>††</sup>, 340, 350<sup>††</sup>, 410<sup>††</sup>, 470<sup>††</sup>;  
 TH 350, 390;  
 WGS 320, 450; WGS/ES 350 (5/22/12)

**Secondary Language Concentration**

Select secondary language in either French, German or other language as approved by Department Chair.

Introductory courses (101, 102, 103) .....	12
Intermediate courses (121, 122, 233) .....	12
<sup>1</sup> Advanced language course (300-400 level) .....	4
	<b>88</b>

**GENERAL EDUCATION (GE)**

72 units required, 4 of which are specified in Major.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (20 units)**

B1 Mathematics/Statistics .....	8
B2 Life Science .....	4
B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	
B5 elective	
Area B elective (select one course from B1-B5) ...	4

**Area C Arts and Humanities (12 units)**

C1 Literature *4 units in Major .....	0
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective ( <del>not in Spanish</del> ) (Not SPAN, FR, GER) 4/13/09 .....	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

<b>Area F Technology Elective (upper division) .....</b>	<b>4</b>
	<b>68</b>

<b><sup>2</sup> FREE ELECTIVES .....</b>	<b>24</b>
(minimum 8 units must be 300-400 level)	
	<b>180</b>

<sup>†</sup> May be used as an elective, if not being used as part of required courses.  
 May not be counted twice.

<sup>††</sup> May be counted multiple times if taken with different subtitles.

<sup>1</sup> Advanced language course (300-400 level) *or* HUM 310 Humanities in World Cultures (either "Culture of France" *or* "Culture of Germany"). (6/21/10)

<sup>2</sup> If upper-division GE courses are used to satisfy Major or Support requirements, additional upper division coursework may be required to satisfy the University's 60-unit upper division requirement.

## 2009-11 Cal Poly Catalog

### Music Department

## MU–MUSIC

### MU 100 Music Fundamentals (4)

Traditional music notation. Use of treble and bass staff for pitch and rhythm, harmonization using principal triads, major and minor, and common seventh chords. Performance of simple pieces individually and in groups using common classroom instruments. 3 lectures, 1 activity.

### MU 101 Introduction to Music Theory (4) GE C3

Introduction to the elements of music and their use by composers and performers. Notation of pitch and rhythm, scales, key signatures, intervals and chords. 3 lectures, 1 activity. Fulfills GE C3.

### MU 103 Music Theory I: Diatonic Materials (4)

Introduction to species counterpoint, structure of tonality, four-part writing of root position and inverted triads, cadences and melodic structure, harmonic progressions, harmonization of a melody and nonharmonic tones. Composition project. 4 lectures. Prerequisite: MU 101 or permission of instructor.

### MU 104 Musicianship I (2)

Introductory sight-singing; rhythmic performance and dictation in simple and compound meters; identification and performance of melodic and harmonic intervals and triads; dictation of major diatonic melodies and basic chord progressions. 2 activities. Prerequisite: MU 101 or consent of instructor. (Music majors may be concurrently enrolled in MU 101 and MU 104.)

### MU 105 Music Theory II: Chromatic Materials (4)

Construction and resolution of diatonic seventh chords, secondary dominants, augmented sixth, and Neapolitan chords. Modal mixture and modulation to closely-related keys. Binary, ternary, and variation forms. Introduction to 18<sup>th</sup>-century counterpoint. Composition project. 4 lectures. Prerequisite: MU 103.

### MU 106 Musicianship II (2)

Sight-singing in all forms of the minor mode; rhythmic performance and dictation in compound meters and syncopation; identification of triad inversions and cadence types; dictation of minor diatonic melodies and triadic chord progressions. 2 activities. Prerequisite: MU 104 or consent of instructor.

### MU 108 Musicianship III (2)

Sight-singing in major and minor modes in two or more parts; rhythmic dictation in 2 parts; identification of triadic chord progressions and root position seventh chords; identification of phrase structure; dictation of two-part melodies in major and minor modes. 2 activities. Prerequisite: MU 106 or consent of instructor.

### MU 114 Introduction to Composing (4)

Fundamental concepts in music composition. Creative projects. Compositional techniques, development, and structure. Analysis of examples from the literature. 3 lectures, 1 activity. Prerequisite: MU 101 or consent of instructor.

### MU 120 Music Appreciation (4) GE C3

Explores the world of music with emphasis on Western tradition. Language of music, the role of music in society. Historical context and major composers from the Middle Ages to the present. 3 lectures, 1 activity. Fulfills GE C3.

### MU 121 Introduction to Non-Western Musics (4)

Survey of selected non-Western music cultures. Emphasis on listening and understanding the ensemble type, aesthetic principle, musical style, and performance practice of each. 3 lectures, 1 activity. Prerequisite: Music major, minor, or consent of instructor.

### MU 149 Applied Study/Technique (1)

Individual instruction in performance with emphasis on the technical skills needed for the performance of repertoire. Total credit limited to 3 units. The Schedule of Classes will list topic selected. Prerequisite: Consent of instructor.

### MU 150 Applied Music (1)

Individual instruction in performance with emphasis on repertoire, technical skills, style, and interpretation. Total credit limited to 6 units. The Schedule of Classes will list topic selected. Prerequisite: Consent of instructor.

### MU 151 Beginning Piano (2)

Beginning piano for student with no background in keyboard instruments. Includes fundamentals of notation, keyboard techniques, tone production, sight-reading and facility. 1 lecture, 1 activity.

### MU 152 Elementary Class Piano (1)

Continuation of MU 151. Piano for students with the ability to play a simple Bach or Mozart Minuet. Total credit limited to 3 units. 1 activity. Prerequisite: MU 101 or MU 151 or equivalent. For non-music majors.

### MU 153 Intermediate Class Piano (1)

Continuation of MU 152. Students are expected to play at the level of the easier Clementi Sonatinas. Total credit limited to 3 units. 1 activity. Prerequisite: MU 152 or one year of piano instruction. For non-music majors.

### MU 154 Beginning Voice (1)

Beginning study of vocal and performance technique for the untrained singer. Includes the beginning study of the vocal mechanism and the fundamentals of notation. 1 activity.

### MU 155 Beginning Guitar (1)

Fundamentals of guitar technique and performance. Elements of classical, pop, and folk styles. Basics of staff and chord notations. No previous experience necessary. 1 activity.

### MU 161 Piano Skills I (1)

Preparation for Piano Proficiency Examination. Study of piano repertoire, sight-reading, transposition, harmonization of a melody, accompanying, improvisation of a melody, score-reading. 1 activity. Prerequisite: Consent of instructor.

### MU 162 Piano Skills II (1)

Continuation of MU 161. Preparation for Piano Proficiency Examination. Study of piano repertoire, sight-reading, transposition, harmonization of a melody, accompanying, improvisation of a melody, score-reading. 1 activity. Prerequisite: MU 161 or consent of instructor.

### MU 163 Piano Skills III (1)

Continuation of MU 162. Preparation for Piano Proficiency Examination. Study of piano repertoire, sight-reading, transposition, harmonization of a melody, accompanying, improvisation of a melody, score-reading. 1 activity. Prerequisite: MU 162 or consent of instructor.

### MU 170 University Jazz Band (1)

Study and public performance of music written for big band jazz. Limited to those who have had considerable experience playing musical instruments. The band performs concerts on campus and makes at least one tour annually. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor.

### MU 171 Instrumental Ensembles (1)

Open to qualified musicians. Rehearsal and public performances in large and small ensembles. The Schedule of Classes will list topic selected. Total credit limited to 6 units. 1 activity. Prerequisite: Consent of instructor.

### MU 172 Wind Orchestra (1)

Study and public performance of music written for large wind bands and percussion instruments. Open to all qualified students who perform on woodwind, brass. The Schedule of Classes will list topic selected. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor.

### MU 173 Wind Ensemble (1)

Study and public performance of music written for wind bands with limited doubling and flexible instrumentation. Open to all students who perform on woodwind, brass and percussion instruments on an advanced collegiate level. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor.

### MU 174 Symphony Orchestra (1)

Preparation and performance of orchestral music including both the standard repertoire and rarely performed works. Open to all qualified students. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor, based on audition.

### MU 175 Contemporary Music Ensemble (1)

Open to all instrumentalists who are interested in performing recent classical literature. Limited to students who are proficient on their instrument. Total credit limited to 6 units. 1 activity. Prerequisite: By audition or consent of instructor.

**MU 176 Mustang Band (1)**

Public performance of music and specially-designed shows written for marching band (woodwinds, brass, percussion, and flag team auxiliary). Limited to those students who have had marching experience with wind and percussion instruments, or flag, rifle or dance lines. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor.

**MU 177 Chamber Winds (1)**

Study and public performance of music written for small wind ensembles (10 to 20 players). Open to all students who perform woodwind, brass and percussion instruments on an advanced collegiate level. Total credit limited to 6 units. 1 activity. Prerequisite: Consent of instructor.

**MU 181 PolyPhonics (1)**

Study and public performance of music for mixed voices. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor.

**MU 183 Vocal Ensemble (1)**

Open to qualified singers. Rehearsal and performance of specialized vocal music. Total credit limited to 6 units. 1 activity. Prerequisite: Consent of instructor.

**MU 184 Music Production Workshop (2)**

Preparation of a musical theatre production for public presentation. Includes acting and stage management. Total credit limited to 6 units. 2 laboratories. Prerequisite: By audition or consent of instructor.

**MU 185 University Singers (1)**

Study and public performance of music for large mixed chorus. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor.

**MU 186 Early Music Ensemble (1)**

Study and public performance of vocal and instrumental music from 1200 to 1750. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor.

**MU 187 Vocal Jazz Ensemble (1)**

Study and performance of vocal jazz, including ensemble performance as well as solo performance and improvisation. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor.

**MU 189 Vocal Practicum (1)**

Study and implementation of performing techniques used by vocalists in a recital or concert setting. Total credit limited to 6 units. 1 activity. Prerequisite: MU 150, MU 250, MU 350 or MU 450, or consent of instructor.

**MU 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

**MU 210 Musicianship IV (1)**

Continuation of MU 108. Sightsinging with chromatic tones; rhythmic performance in changing meters; chord progressions with seventh chords and secondary dominants; seventh chord inversions; modulation to closely-related keys; identification of binary and ternary forms; and 2-part diatonic dictation. 1 activity. Prerequisite: MU 108 or consent of instructor.

**MU 211 Musicianship V (1)**

Continuation of MU 210. Sightsinging with chromatic tones; rhythmic performance and dictation in changing and irregular meters; chord progressions with Neapolitan and augmented sixth chords; modulatory progressions and dictations and identification of sonata, rondo, and variation forms. 1 activity. Prerequisite: MU 210 or consent of instructor.

**MU 212 Musicianship VI (1)**

Continuation of MU 211. Emphasis on previously acquired skills, plus performance and dictation of complex beat divisions; identification of contrapuntal genres; and modulatory dictation in 2 parts. 1 activity. Prerequisite: MU 211 or consent of instructor.

**MU 221 Jazz Styles (4)****GE C3 USCP**

Survey of Jazz as a significant American art form from 1900 to the present; its historical background and development in the United States; key elements, leading performers, and significant compositions in each style. Emphasis on listening skills. 3 lectures, 1 activity. Fulfills GE C3 and USCP.

**MU 229 Music of the 60s: War and Peace (4)****GE C3 USCP**

Explores wide spectrum of rock, folk and pop styles of the 60s. Relates music to social turmoil and historical trends, including Vietnam War, Civil Rights Movement, American Indian Movement, Chicano Movement, Free Speech Movement. 3 lectures, 1 activity. Fulfills GE C3 and USCP.

**MU 249 Applied Study/Technique (1)**

Individual instruction in performance with emphasis on the technical skills needed for the performance of repertoire. Total credit limited to 3 units. Prerequisite: Consent of instructor.

**MU 250 Applied Music (1)**

Individual instruction in performance with emphasis on repertoire, technical skills, style, and interpretation. Total credit limited to 6 units. The Schedule of Classes will list topic selected. Prerequisite: 3 units of MU 150 and consent of instructor.

**MU 251 Diction for Singers (1)**

The study of diction as it applies to singing in English, French, German, Italian, Spanish and the International Phonetic Alphabet. The Schedule of Classes will list topic selected. Total credit limited to 6 units. 1 activity. Prerequisite: Consent of instructor.

**MU 252 Intermediate Voice (1)**

Vocal and performance technique for experienced singers. Total credit limited to 3 units. 1 activity. Prerequisite: MU 154 or consent of instructor.

**MU 253 Advanced Class Piano (1)**

Advanced level piano techniques with emphasis on style, interpretation, sightreading, basic performance practices and the solution to general musical problems. Total credit limited to 3 units. 1 activity. Prerequisite: MU 153 or consent of instructor. For non-music majors.

**MU 255 Intermediate Guitar (1)**

Development of intermediate guitar techniques and performance. Elements of classical, pop, and folk styles. Intermediate skills, reading notes and chord charts. 1 activity. Prerequisite: MU 155 or consent of instructor.

**MU 259 Beginning Jazz Improvisation (2)**

Development of fundamentals of jazz improvisation including scales, arpeggios, patterns, swing feel, expressiveness, and motifs through in-class performance of written materials and improvisations with play-along recordings. Total credit limited to 6 units. 2 activities. Prerequisite: Facility on a musical instrument or singing ability; MU 101 or consent of instructor.

**MU 261 Piano Skills IV (1)**

Continuation of MU 163. Preparation for Piano Proficiency Examination. Study of piano repertoire, sightreading, transposition, harmonization of a melody, accompanying, and improvisation of a melody, score-reading. 1 activity. Prerequisite: MU 163 or consent of instructor.

**MU 262 Piano Skills V (1)**

Continuation of MU 261. Preparation for Piano Proficiency Examination. Study of piano repertoire, sightreading, transposition, harmonization of a melody, accompanying, improvisation of a melody, score-reading. 1 activity. Prerequisite: MU 261 or consent of instructor.

**MU 263 Piano Skills VI (1)**

Continuation of MU 262. Successful completion of this course represents fulfillment of the Piano Proficiency Examination. Study of piano repertoire, sightreading, transposition, harmonization of a melody, accompanying, improvisation of a melody, score-reading. 1 activity. Prerequisite: MU 262 or consent of instructor.

**MU 270 Selected Topics (1-4)**

Directed group study of selected topics. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

**MU 301 Counterpoint (4)**

Counterpoint as a compositional technique. Modal, tonal, and post-tonal practices. Composition project. 4 lectures. Prerequisite: MU 105.

**MU 303 Music Theory III: Advanced Chromaticism (4)**

Compositional procedures employed by composers of the Classical and Romantic periods. Chromatic third-related harmony, ninth, eleventh and thirteenth chords. Chromatic and enharmonic modulation. Sonata and rondo forms. Composition project. 4 lectures. Prerequisite: MU 105.



**MU 305 Music Theory IV: Contemporary Practices (4)**

Examination of 20<sup>th</sup>- and 21<sup>st</sup>-century compositional practices including impressionism, polytonality, non-serial atonality, serialism, timbre and form, minimalism, and the new eclecticism. Analysis and creative projects. 4 lectures. Prerequisite: MU 303 or permission of instructor.

**MU 311 Sound Design: Technologies (4)**

Fundamental tools of electroacoustic sound design. Concepts and application of music studio procedure, recording, synthesis, and MIDI. Studio projects. 3 lectures, 1 activity. Prerequisite: MU 101, MU 120 or consent of instructor.

**MU 312 Sound Design: Recording (4)**

Exploring creative use of recording technology. Analog and digital equipment for recording music. Analysis and creative projects. 3 lectures, 1 activity. Prerequisite: MU 311 or permission of instructor.

**MU 320 Music Research and Writing (4)**

Methodology for researching, analyzing, and writing about music. Exploration of investigative tools including library resources, periodicals, bibliographic tools, computerized search methods. Performance practice. 4 lectures. Prerequisite: MU 105 and ENGL 134. Recommended: MU 120; or permission of instructor.

**MU 324 Music and Society (4)****GE C4**

Exploration into the role of music historically and culturally. Emphasis on deeper understanding and appreciation of the context of music through topics of special interest. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 3 lectures, 1 activity. Prerequisite: Junior standing; completion of GE Area A and a foundation course in Area C. Fulfills GE C4 except for Music majors.

**MU 325 America's Music (4)****USCP**

Explorations of the many styles of America's music through lectures, readings, sound recordings, musical scores, and performance. Includes "Native American," "folk," "popular," and "fine art" traditions. How American music reflects the different cultural heritages, social contexts, and philosophies of its creators. 4 lectures. Prerequisite: MU 105. Recommended: MU 120. Fulfills USCP.

**MU 326 Cultural Concepts and Structures in Music (4)**

Exploring the definition, concepts, and structures of music in terms of theory, performance practice, and compositional procedures of selected non-Western cultures. 3 lectures, 1 activity. Prerequisite: MU 121 or consent of instructor.

**MU 328 Women in Music (4)****GE C4 USCP***Change effective Winter 2011*

Survey of women's contributions as composers and performers of western art and popular music; historical overview of the experiences and perception of women as musicians. 3 lectures, 1 activity. Prerequisite: Junior standing; completion of GE Area A and a foundation course in Area C. Fulfills GE C4 except for Music majors.

**MU 331 Music of the Middle Ages and Renaissance (4)**

Musical literature, styles, composers, theory, genres and notation of the Middle Ages and Renaissance. Relationship to historical trends. 4 lectures. Prerequisite: MU 320; Recommended: MU 120; or permission of instructor.

**MU 332 Music of the Baroque and Early Classic Eras (4)**

Survey of the history of western art music from 1600 to 1780. 4 lectures. Prerequisite: MU 320; Recommended: MU 120; or permission of instructor.

**MU 335 Survey of Keyboard Literature (4)**

Intensive survey of solo piano literature from early keyboard music through contemporary composers; emphasis upon composers' influences, stylistic characteristics, performance practices, and the development of the pianoforte. 4 lectures. Prerequisite: MU 105 or consent of instructor.

**MU 336 Jazz History and Theory (4)**

Survey of Jazz theoretical techniques. Emphasis upon historical context and development of Jazz through study and analysis of scores and historical performances. 4 lectures. Prerequisite: MU 105.

**MU 340 Conducting: Fundamentals (2)**

Principles and techniques of conducting with experience in score reading. 2 activities. Prerequisite: MU 105 or consent of instructor.

**MU 341 Conducting: Choral (2)**

Continuation of MU 340. Emphasis on choral literature. Score reading, rehearsal techniques, and musical details associated with vocal music. 2 activities. Prerequisite: MU 340.

**MU 342 Conducting: Instrumental (2)**

Continuation of MU 340. Emphasis on band and orchestra literature. Score reading, rehearsal techniques, and musical details associated with instrumental music. 2 activities. Prerequisite: MU 340 and MU 341.

**MU 349 Applied Study/Technique (1)**

Individual instruction in performance with emphasis on the technical skills needed for the performance of repertoire. Total credit limited to 3 units. The Schedule of Classes will list topic selected. Prerequisite: Consent of instructor.

**MU 350 Applied Music (1)**

Individual instruction in performance and composition. Total credit limited to 6 units. The Schedule of Classes will list topic selected. Prerequisite: Consent of instructor.

**MU 351 Jazz and Popular Music Arranging (2)**

Arranging for small and large jazz ensembles. Score and part preparation. 2 activities. Prerequisite: MU 105.

**MU 352 Orchestration (4)**

Ranges, transposition, technical capabilities, and scoring of vocal ensembles, band, and orchestra instruments. Creative project. 3 lectures, 1 activity. Prerequisite: MU 105.

**MU 360 Music for Classroom Teachers (4)**

Development of skills for fostering creative music experiences in the classroom. Exploration of various approaches to motivating children musically. Study of folk songs for singing, playing instruments, and learning about music as well as for their ethnic and cultural significance. 3 lectures, 1 activity. Prerequisite: MU 100 or MU 101.

**MU 361 Instruments (1)**

Fundamentals of playing and teaching woodwind, brass, string, and percussion instruments. The Schedule of Classes will list topic selected. Total credit limited to 6 units. 1 activity. Prerequisite: Junior standing and consent of instructor.

**MU 365 Music in the Elementary School (4)**

Study and application of Orff, Dalcroze, Kodály, Manhattanville, and Suzuki. Philosophy, objectives and methodologies for implementing an effective school music program. Includes fieldwork. 3 lectures, 1 activity. Prerequisite: MU 105; junior standing.

**MU 366 Piano Pedagogy (2)**

Survey of elementary, intermediate and advanced teaching methods and literature; private and group instruction; studio policies. 2 activities. Prerequisite: MU 105 or consent of instructor.

**MU 370 University Jazz Band (1)**

Study and public performance of music written for big band jazz. Limited to those who have had considerable experience playing musical instruments. The band performs concerts on campus and makes at least one tour annually. Total credit limited to 6 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor.

**MU 371 Instrumental Ensemble (1)**

Open to qualified musicians. Rehearsal and public performance in large and small ensembles. The Schedule of Classes will list topic selected. Total credit limited to 6 units. 1 activity. Prerequisite: Junior standing and consent of instructor.

**MU 372 Wind Orchestra (1)**

Study and public performance of music written for large wind bands. Open to all qualified students who perform on woodwind, brass and percussion instruments. The Schedule of Classes will list topic selected. Total credit limited to 6 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor.

**MU 373 Wind Ensemble (1)**

Study and public performance of music written for wind bands with limited doubling and flexible instrumentation. Open to all students who perform on woodwind, brass and percussion instruments on an advanced collegiate level. Total credit limited to 6 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor.



**MU 374 Symphony Orchestra (1)**

Preparation and performance of orchestral music including both the standard repertoire and rarely performed works. Open to all qualified students. Total credit limited to 6 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor, based on audition.

**MU 375 Contemporary Music Ensemble (1)**

Open to all instrumentalists who are interested in performing recent classical literature. Total credit limited to 6 units. 1 activity. Prerequisite: Junior standing; by audition or consent of instructor.

**MU 376 Mustang Band (1)**

Public performance of music and specially-designed shows written for marching band (woodwinds, brass, percussion, and flag team auxiliary). Limited to those students who have had marching experience with wind and percussion instruments, or flag, rifle or dance lines. Total credit limited to 6 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor.

**MU 377 Chamber Winds (1)**

Study and public performance of music written for small wind ensembles (10 to 20 players). Open to all students who perform woodwind, brass and percussion instruments on an advanced collegiate level. Total credit limited to 6 units. 1 activity. Prerequisite: Consent of instructor; junior standing.

**MU 381 PolyPhonics (1)**

Study and public performance of music for mixed voices. Total credit limited to 6 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor.

**MU 383 Vocal Ensemble (1)**

Open to qualified singers. Rehearsal and performance of specialized vocal music. Total credit limited to 6 units. 1 activity. Prerequisite: Junior standing and consent of instructor.

**MU 384 Music Production Workshop (2)**

Preparation of a musical theatre production for public presentation, including acting and stage management. Total credit limited to 6 units. 2 laboratories. Prerequisite: Junior standing and by audition, or consent of instructor.

**MU 385 University Singers (1)**

Study and public performance of music for large mixed chorus. Total credit limited to 6 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor.

**MU 386 Early Music Ensemble (1)**

Study and public performance of vocal and instrumental music from 1200 to 1750. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor; junior standing.

**MU 387 Vocal Jazz Ensemble (1)**

Study and performance of vocal jazz, including ensemble performance as well as solo performance and improvisation. Total credit limited to 6 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor.

**MU 389 Vocal Practicum (1)**

Study and implementation of performing techniques used by vocalists in a recital or concert setting. Total credit limited to 6 units. 1 activity. Prerequisite: MU 150, MU 250, MU 350 or MU 450, or consent of instructor.

**MU 400 Special Problems for Advanced Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Junior standing and consent of department head.

**MU 411 Sound Design: Synthesis (4)**

Compositional application of sound synthesis techniques. Realization of computer music. Creative projects. 3 lectures, 1 activity. Prerequisite: MU 312.

**MU 412 Sound Design: Composition and Production (4)**

Production of electroacoustic music in media. Program analysis, technical planning, composition, and product development. 3 lectures, 1 activity. Prerequisite: MU 312.

**MU 431 Music of the Classic and Romantic Eras (4)**

Survey of the history of western art music from 1780 to 1900. 4 lectures. Prerequisite: MU 320; Recommended: MU 120; or permission of instructor.

**MU 432 Music of the Modern Era (4)**

Composers, important works, and significant trends in the Western European and American classical tradition during the 20<sup>th</sup> and 21<sup>st</sup> Centuries. 4 lectures. Prerequisite: MU 320; Recommended: MU 120; or permission of instructor.

**MU 449 Applied Study/Technique (1)**

Individual instruction in performance with emphasis on the technical skills needed for the performance of repertoire. Total credit limited to 3 units. The Schedule of Classes will list topic selected. Prerequisite: Consent of instructor.

**MU 450 Applied Music (1)**

Individual instruction in performance and composition. Total credit limited to 6 units. The Schedule of Classes will list topic selected. Prerequisite: Consent of instructor.

**MU 461 Senior Project (3)**

Selection and completion of a project under faculty supervision. Minimum of 90 hours total time. Results presented in a recital, creative work, formal report, or a combination of all three. Prerequisite: Senior standing and consent of department head.

**MU 465 Choral Literature and Rehearsal Techniques (4)**

Survey of choral literature especially suited for secondary schools. Philosophy and strategy for developing a school program. Musical as well as non-musical techniques for effective rehearsal. 3 lectures, 1 activity. Prerequisite: MU 341, or consent of instructor.

**MU 466 Instrumental Literature and Rehearsal Techniques (4)**

Survey of instrumental literature especially suited for secondary schools. Philosophy and strategy for developing a school program. Musical as well as non-musical techniques for effective rehearsal. 3 seminars, 1 activity. Prerequisite: MU 342, or consent of instructor.

**MU 470 Music History: Selected Advanced Topics (4)**

Intensive study of selected topics in music history through the use of readings, recordings, scores, and class presentations. The Schedule of Classes will list title selected. Total credit limited to 8 units. 3 lectures, 1 activity. Prerequisite: MU 331, MU 332, MU 431, MU 432, or consent of instructor.

**2009-11 Cal Poly Catalog****Music Department****BA MUSIC**

□ 60 units upper division

□ GWR

□ 2.0 GPA

□ USCP

*Note: No major or support courses may be taken as credit/no credit.***MAJOR COURSES**

MU 103 Music Theory I: Diatonic Materials .....	4
MU 104 Musicianship I .....	2
MU 105 Music Theory II: Chromatic Materials .....	4
MU 106 Musicianship II .....	2
MU 108 Musicianship III .....	2
MU 121 Introduction to Non-Western Music .....	4
MU 303 Music Theory III: Adv. Chromaticism .....	4
MU 305 Music Theory IV: Contemporary Practices .....	4
MU 311 Sound Design: Technologies .....	4
MU 320 Music Research and Writing .....	4
MU 325 (USCP)/MU 326/MU 336/MU 470 .....	4
MU 331 Music Middle Ages and Renaissance .....	4
MU 332 Music Baroque and Early Classic Eras .....	4
MU 431 Music of the Classic and Romantic Eras .....	4
MU 432 Music of the Modern Era .....	4
MU 461 Senior Project .....	3
<sup>1</sup> Approved music lecture courses (300–400 level) ....	12
<i>Select 12 units from: MU 301, 312, 324, 325, 326, 328, 335, 336, 340, 341, 342, 352, 360, 365, 411, 412, 465, 466, 470</i>	
Major Ensemble at 100-level .....	6
<i>Select 6 units from: MU 170, 171, 172, 173, 174, 175, 177, 181, 183, 185, 186, 187, 188</i>	
Major Ensemble at 300-level .....	3
<i>Select 3 units from: MU 370, 371, 372, 373, 374, 375, 377, 381, 383, 385, 386, 387, 388</i>	
Applied Study .....	9
<i>Select 9 units from: MU 150, 250, 350, or 450</i>	
<b>(4/19/13)</b>	<b>87</b>

**GENERAL EDUCATION (GE)**

72 units required.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (20 units)**

B1 Mathematics/Statistics .....	8
B2 Life Science .....	4
B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	
B5 elective	
Area B elective (select one course from B1-B5) ...	4

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4

C3 Fine/Performing Arts .....	4
C4 Upper-division elective (not in Music) .....	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division) .....****72**

**FREE ELECTIVES..... 21**  
**180**

<sup>1</sup> MU 325/326/336/470 can satisfy this requirement if not previously used to satisfy another required music course.

## 2009-11 Cal Poly Catalog

### Food Science and Nutrition Department

#### BS NUTRITION

☐ 60 units upper division ☐ GWR  
☐ 2.0 GPA ☐ USCP

\* = Required in Major; also satisfies GE

Note: No major, support or concentration courses may be taken as credit/no credit.

#### MAJOR COURSES

FSN 101 Orientation/Food Science/Nutrition Majors	1
FSN 121 Fundamentals of Food.....	4
FSN 210 Nutrition.....	4
FSN 230 Elements of Food Processing.....	4
FSN 250 Food and Nutrition: Customs and Culture (D4)* (USCP).....	4
FSN 310 Maternal and Child Nutrition.....	4
FSN 315 Nutrition in Aging.....	4
FSN 328, 329 Nutrient Metabolism I, II.....	4,4
FSN 415 Nutrition Education and Communications	4
FSN 461 Senior Project I.....	3
MCRO 221 Microbiology or MCRO 224 General Microbiology I (B2 & B4)*.....	4
CHEM 127 General Chemistry I (B3&B4)*.....	4
CHEM 128 General Chemistry II.....	4
<sup>1</sup> CHEM 312 Survey of Organic Chemistry or CHEM 216 Introduction to Organic Chemistry I or CHEM 316 Organic Chemistry I (transfer equivalents CHEM 212, <del>216</del> ) (9/5/12).....	5
<sup>1</sup> CHEM 313 Surv Biochemistry & Biotechnology or CHEM 371 Biochemical Principles.....	5
ECON 201 Survey of Economics (D2)*.....	4
MATH 118 Pre-Calculus Algebra (B1)*.....	4
(MATH 116 & 117 substitute)	
STAT 218 Applied Statistics Life Sciences (B1)*	4
BIO 161 Intro to Cell and Molecular Biology.....	4
Concentration courses (see below).....	60
	<b>138</b>

#### GENERAL EDUCATION (GE)

72 units required, 24 of which are specified in Major.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

#### Area A Communication (12 units)

A1 Expository Writing.....	4
A2 Oral Communication.....	4
A3 Reasoning, Argumentation, and Writing.....	4

#### Area B Science and Mathematics (no additional units req'd)

B1 Mathematics/Statistics * 8 units in Major.....	0
B2 Life Science * 4 units in Major.....	0
B3 Physical Science * 4 units in Major.....	0
B4 One lab taken with either a B2 or B3 course	

#### Area C Arts and Humanities (20 units)

C1 Literature.....	4
C2 Philosophy.....	4
C3 Fine/Performing Arts.....	4
C4 Upper-division elective.....	4

Area C elective (Choose one course from C1-C4) 4

#### Area D/E Society and the Individual (12 units)

D1 The American Experience (40404).....	4
D2 Political Economy * 4 units in Major.....	0
D3 Comp. Social Institutions.....	4
D4 Self Dev. (CSU Area E) * 4 units in Major....	0
D5 Upper-division elective.....	4

Area F Technology Elective (upper division) (4 units) 4

**48**

FREE ELECTIVES..... **0**

**186**

#### CONCENTRATIONS (select one)

##### Applied Nutrition Concentration

FSN 321 Culinary Mgt: Principles and Practice.....	4
FSN 343, 344 Institutional Foodservice I, II.....	3,3
FSN 416 Community Nutrition.....	4
FSN 417 Nutrition Counseling.....	4
FSN 420 Critical Evaluation of Nutrition Research	4
FSN 426 Food Systems Management.....	4
FSN 429, 430 Clinical Nutrition I, II.....	4,4
BIO 302 Human Genetics or BIO 303 Survey of Genetics.....	4
BUS 212 Financial Actg for Nonbusiness Majors	4
MCRO 421 Food Microbiology.....	4
PSY 201/202 General Psychology.....	4
ZOO 331, 332 Human Anatomy/Physiology I, II	5,5
	<b>60</b>

##### Nutrition and Food Industries Concentration

FSN 275 Principles of Food Safety and Hazard Analysis.....	4
FSN 311 Sensory Evaluation of Food.....	4
FSN 364 Food Chemistry.....	4
FSN 368 Food Analysis.....	4
FSN 374 Food Laws and Regulations.....	4
FSN 408 Food Comp. Science and Product Dev. ....	4
FSN 410 Nutr Implications of Food Ind Practices	4
FSN 420 Critical Evaluation of Nutrition Research	4
AGB 301 Agricultural Marketing.....	4
Select one from: ASCI 211; FSN 204, 244, 341; or DSCI 231 (3) and DSCI 232 (1).....	4
Select one from: ASCI 231, DSCI 230, FRSC 230, VGSC 230.....	4
<sup>2</sup> Advisor approved electives. Select from:.....	16
AGC 407; AGED 404; ASCI 211, 384, 415; DSCI 231, 232; ENGL 210, 310; FSN 204, 244, 270, 304, 330, 334, 335, 341, 444, 474; JOUR 203, 205, 312, 320, 331, 342, 407; MCRO 421; PHYS 104; PM 330; PSY 201/202; SCOM 301	
	<b>60</b>

<sup>1</sup> Most Nutrition majors should take the lower numbered courses. Students choosing the Nutrition Science concentration may need to take higher numbered courses, depending on their career goals and advisor-approved electives. Students selecting CHEM 216 or CHEM 316 generally also take CHEM 317. See advisor. (9/5/12)

<sup>2</sup> Please consult the FSN advising materials and catalog for prerequisites.

**Nutrition Science Concentration**

FSN 416 Community Nutrition .....	4
FSN 429 Clinical Nutrition I.....	4
FSN 430 Clinical Nutrition II.....	4
BIO 302/BIO 351/BIO 303 .....	4
PHYS 121 College Physics I.....	4
ZOO 331, 332 Human Anatomy/Physiology I, II ....	5,5
<sup>1</sup> Advisor approved electives. Select from: .....	30
ASCI 403, 503; BIO 160, 162, 253, 305, 405, 426, 452, 476; BUS 207, 212; CHEM 128, 129, 217, 218, 231, 317, 318, 319, 331, 372, 373, 375, 377, 458, 473, 474, 477; COMS 418; ECON 303; FSN 417, 420; KINE 280, 301, 302, 303, 304, 305, 308, 354, 402, 405, 406, 408, 445, 446; MATH 161/141, 162/142, 143; MCRO 225, 320, 342, 402, 421, 423, 433; PHIL 339; PHYS 122, 123; PSY 201/202, 256, 310, 317, 318, 330, 340, 405, 460, 472; SCM 101, 363, 451; SOC 326; ZOO 422, 425, 428; one quarter of foreign language (9/5/12)	

60

<sup>1</sup> Please consult the FSN advising materials and catalog for prerequisites.

## Academic Minors

**Business  
Economics  
Industrial Technology  
Packaging**

### Business Minor

College Advising Center  
Business Bldg. (03), Room 100  
805 756-2601

This minor provides non-business students with an introduction to the body of knowledge expected of persons pursuing careers in business. A business minor gives a student a competitive edge when applying for certain jobs, by providing concepts, tools and skills which enhance one's progress in a career. In addition, students who plan on a career in the non-business sector gain a greater appreciation of the challenges and opportunities facing business, now and in the future.

Enrollment is limited and selection is made based upon the applicant's performance in the prerequisite courses listed below. After admission to the minor, the student must complete the remaining required courses while satisfying specified academic performance standards in all minor courses.

**Prerequisites.** The following courses must be taken *before* admission to the minor.

BUS 207 Legal Responsibilities of Business (4)  
BUS 214 Financial Accounting (4)  
ECON 221 Microeconomics (4)  
ECON 222 Macroeconomics (D2) (4)  
MATH 221 Calculus for Business and Economics (B1) (4)  
STAT 251 Statistical Inference for Management I (B1) (4)  
STAT 252 Statistical Inference for Management II (B1) (5)

Required courses	Units
BUS 215 Managerial Accounting .....	4
BUS 342 Fundamentals of Corporate Finance.....	4
BUS 346 Principles of Marketing .....	4
IT 371 Decision Making in Supply Chain, Services, and Project Management.....	4
BUS 387 Organizational Behavior.....	4
BUS 391 Management Information Systems .....	4
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### Economics Minor

Business Bldg. (03), Room 407  
805 756-2783

This minor is designed to give students from other majors a general competency in economics. Students are encouraged to meet with the advisor of the Economics Minor to develop a course of study that complements their major curriculum. For more information, contact the Economics Area office.

Required courses	Units
ECON 221 Microeconomics .....	4
ECON 222 Macroeconomics (D2) .....	4
ECON 311 Intermediate Microeconomics .....	4
<b>Electives</b> .....	12
Upper division ECON courses, 8 units of which must be at the 400 level.	
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### Environmental Studies Minor

Please see the College of Science and Mathematics for more information on this interdisciplinary minor.

## Packaging Minor

Industrial Technology  
Business Bldg. (03), Room 405  
805 756-2676

The purpose of this interdisciplinary minor is to complement the student's degree major with a planned curriculum in packaging. The program is designed to capitalize on theories and skills learned in other disciplines thereby uniquely preparing students for success as packaging professionals in positions ranging from highly technical research and development through purchasing, production, sales and management.

Students gain the skills needed for the design of package forms and graphics, the specifications of materials and machinery to be used, the evaluation of package systems, as well as the planning and coordinating of packaging requirements. These specialized skills result from an integration of knowledge gained through the packaging curriculum with that of the major discipline. A significant understanding of packaging issues and their impact on the industry is also gained.

	<i>Units</i>
<b>Required courses (19-21)</b>	
CHEM 110 World of Chemistry - Essentials <i>or</i>	
CHEM 111 Survey of Chemistry (B3 & B4) .....	4/5
FSN 230 Elements of Food Processing <i>or</i>	
FSN 334 Food Packaging .....	4/3
IT 330 Fundamentals of Packaging (Area F) .....	4
IT 435 Packaging Development .....	4
PHYS 104 Introductory Physics (B3) <i>or</i>	
PHYS 121 College Physics I (B3&B4) <i>or</i>	
PSC 101 The Physical Environment: Matter and Energy (B3&B4) (2/27/12) .....	4
<b>Advisor approved electives</b> .....	7-8
<i>Select 7-8 units from the following list.</i>	
FSN 335 Food Quality Assurance (4)	
FSN 354 Packaging Function in Food Processing (3)	
GRC 211 Substrates, Inks and Toners (4)	
GRC 337 Consumer Packaging (3)	
IT 341 Plastic Processes and Applications (4)	
IT 408 Paper and Paperboard Packaging (4)	
IT 409 Machinery for Packaging (4)	
IT 435 Package Development (4)	
IT 457 Radio Frequency Identification (4)	
IT 475 Packaging Performance Testing (4)	

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## Industrial Technology Minor

Industrial Technology  
Business Bldg. (03), Room 405  
805 756-2676

This minor is an interdisciplinary program. Students learn about the technical, social and business issues related to the use of new technology and how the technology is integrated into corporate operations. The minor appeals to students who are majoring in nontechnical disciplines.

	<i>Units</i>
<b>Technology Issues (Required course)</b>	
BUS 311 Managing Technology in the International Legal Environment .....	4
<b>Materials and Processes electives (select three) .....</b>	12
IT 137 Electrical/Electronic Systems (4)	
IT 150 Industrial Power Systems (4)	
IT 233 Decision Making and Problem Solving Using CAD (4)	
IT 260 Manufacturing Processes (4)	
IT 329 Industrial Materials (4)	
IT 330 Fundamentals of Packaging (4) (Area F)	
IT 336 Textiles Technology (4) (Area F)	
IT 341 Plastics Processes and Applications (4) (Area F)	
IT 411 Industrial Safety and Quality Program Leadership (4)	
<b>Management and IT elective (select one) .....</b>	4
IT 371 Decision Making in Supply Chain, Services, and Project Management (4)	
BUS 387 Organizational Behavior (4)	
IT 403 Quality Systems Management (4)	
IT 410 Operations Planning and Control (4)	
IT 428 Commercialization of New Technologies (4)	
<b>Humanities and Social Issues (select one) .....</b>	4
HUM 303 Values and Technology (4) (C4)	
IME 320 Human Factors and Technology (4) (Area F)	

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## 2009-11 Cal Poly Catalog

### Philosophy Department

## PHIL—PHILOSOPHY

### PHIL 101 Introduction to Philosophy (4)

Foundational methods and central issues in contemporary philosophy including logic, epistemology, metaphysics and ethics. Required of all philosophy majors. Open to all majors and philosophy minors. 4 lectures. NOTE: This is not a GE course and will not count for GE credit.

### PHIL 126 Logic and Argumentative Writing (4) GE A3

Principles of argument analysis, evaluation and construction. Deductive and inductive reasoning, including analogical arguments, universal and statistical generalizations, and causal inferences. Principles of organizing and writing argumentative essays. Moral dimensions of rational discourse. 4 lectures. Prerequisite: Completion of GE Areas A1 and A2. Fulfills GE A3.

### PHIL 225 Symbolic Logic (4)

The nature of deductive logical systems. Methods of notation, translation and proof in the sentential, predicate and relational calculi including indirect and conditional methods of proof. 4 lectures. Prerequisite: Completion of GE Area A3.

### PHIL 230 Philosophical Classics: **Knowledge and Reality** (4) GE C2

Critical examination of primary philosophical texts, from the ancient and modern periods, with focus on the nature of reality, and the sources and limits of human knowledge. 4 lectures. Prerequisite: Completion of GE Area A. Crosslisted as HNRS/PHIL 230. Fulfills GE C2. *Change effective Spring 2010.*

### PHIL 230 Philosophical Classics: **Metaphysics and Epistemology** (4) GE C2

Study of several classic works from the history of philosophy on issues in metaphysics and epistemology. At least one will be from the Ancient period, and at least one from the Modern era. No more than one from the twentieth century. 4 lectures. Prerequisite: Completion of GE Area A. Crosslisted as HNRS/PHIL 230. Fulfills GE C2.

### PHIL 231 Philosophical Classics: **Ethics and Political Philosophy** (4) GE C2

Readings from primary philosophical texts, from the ancient and modern periods, with focus on the identification, evaluation and contemporary relevance of the central ethical and political themes and arguments presented in them. 4 lectures. Prerequisite: Completion of GE Area A. Crosslisted as HNRS/PHIL 231. Fulfills GE C2.

### PHIL 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### PHIL 311 Greek Philosophy (4) GE C4

Beginnings of Western philosophy and science. The Presocratics, Socrates, Plato, and Aristotle. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

### PHIL 312 Medieval Philosophy (4) GE C4

Development of Western philosophy from Augustine to Ockham, including Anselm, Abelard, Roger Bacon, Bonaventure, Aquinas, and Duns Scotus. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

### PHIL 313 Early Modern Rationalism (4) GE C4

Development of Western philosophy from the late Renaissance through Leibniz, with special emphasis upon the epistemology and metaphysics of the Continental Rationalists. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

### PHIL 314 Early Modern Empiricism (4) GE C4

Development of Western philosophy from the Renaissance through Mill, with special emphasis on British Empiricism. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

### PHIL 315 Kant and 19<sup>th</sup> Century **European** Philosophy (4) GE C4

Primary issues and concepts found in German philosophy from 1780 to 1900, with emphasis on Kant, Hegel, and Nietzsche. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors. (*Corrected 7/18/12*)

### PHIL 316 20<sup>th</sup> Century European Philosophy (4) GE C4

Recent movements within the Continental tradition, including French and German existentialism, phenomenology, and post-metaphysical philosophy. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

### PHIL 317 History of Analytic Philosophy (4) GE C4

Major developments within 20<sup>th</sup> century British and American philosophy, with focus chiefly around Analytic philosophy. Other schools, such as Pragmatism, may be included, as may some philosophers outside of Britain and America whose work was influential in those countries. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

### PHIL 320 Asian Philosophy (4) GE C4

Philosophies developed in India, South Asia, China and Japan, including the logical and epistemological presuppositions of the Six Schools of Hindu metaphysics, Buddhist philosophy, Confucian moral philosophy, Taoist metaphysics and social ecology. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

### PHIL 321 Philosophy of Science (4) GE C4

The rational foundations of inquiry and explanation in the physical, biological and social sciences. Justification of scientific claims, the difference between science and pseudoscience, the relationship between science and other fields of investigation. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

### PHIL 322 Philosophy of Technology (4) GE C4

Analyses of the philosophical foundations and implications of technology. Technology and the human condition, technology and philosophical ethics, technology and political philosophy, technology and the metaphysics of human nature, and the relationship between science and technology. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

### PHIL 331 Ethics (4) GE C4

Analyses of various traditional and contemporary positions on the difference between right and wrong, if there is one. Theories of metaethics and normative ethics including the divine command theory, relativism, intuitionism, noncognitivism, virtue ethics, egoism, utilitarianism and duty-based ethics. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

### PHIL 332 History of Ethics (4) GE C4

The history of moral thought from Homer and the Pre-Socratics to the 20<sup>th</sup> century, and focus on theories of moral goodness and rightness of action. Related issues and areas of thought, e.g. metaphysics, theology, science, politics, psychology freedom/determinism to be considered, where they shed light on moral thought. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

### PHIL 333 Political Philosophy (4) GE C4

Analyses of the philosophical foundations of political ideologies, including theories of political authority, legitimacy, obligation, and rights, and of the proper function of the state, and the relation of these theories to issues in metaphysics, theory of knowledge, and ethics. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

### PHIL 334 Philosophy of Law (4) GE C4

Normative and analytic questions about law. Nature of law and legal systems. Justification of law. Moral obligation to obey the law. Nature and justification of punishment. Guilt and legal responsibility. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2, and POLS 112. Fulfills GE C4 except for Philosophy majors.

### PHIL 335 Social Ethics (4) GE C4 USCP

Examination of contemporary moral problems, solutions to these problems, and the arguments for these solutions, with emphasis on two or more of the

following sample problem areas: abortion, suicide and euthanasia, capital punishment, family ethics, race relations, social justice, war, women's issues. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors. Fulfills USCP.

**PHIL 336 Feminist Ethics, Gender and Society (4) GE C4 USCP**

Critical examination of the relations between gender, ethnicity, society and ethics from feminist perspectives, with special attention paid to problems in contemporary applied ethics. Joint focus on theory and application. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors. Fulfills USCP.

**PHIL 337 Business Ethics (4) GE C4**

Critical examination of ethical problems that arise in business. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

**PHIL 338 Ethics and Education (4) GE C4**

Critical discussion of moral issues as a means to the educational goals of autonomy and freedom. Critical examination of major ethical theories. Examination of classroom approaches to discussions of ethical values and moral controversy in education. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

**PHIL 339 Biomedical Ethics (4) GE C4**

Critical examination of problems in biomedical ethics, proposed solutions to these problems, and the arguments for such solutions. Emphasis on two or more of the following sample problem areas: concepts of health and disease, human experimentation, informed consent, behavior control, genetic intervention, new birth technologies, euthanasia and physician-assisted dying. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

**PHIL 340 Environmental Ethics (4) GE C4**

Analyses of various positions on the moral status of nonhuman entities and problems such as the treatment of animals, wilderness preservation, population, pollution and global warming. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

**PHIL 341 Professional Ethics (4) GE C4**

Moral problems as they arise in professions such as law, medicine, engineering, research and education: deception, paternalism, confidentiality, discrimination and others. Consideration of various professional codes of ethics. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

**PHIL 342 Philosophy of Religion (4) GE C4**

Inquiry into the rational and nonrational bases of religious claims. Arguments for and against the existence of God. Discussion of miracles, revelation, the definition of God, the problem of evil, the relation of faith and reason, the nature of religious experience, the verification of religious claims. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

**PHIL 350 Aesthetics (4) GE C4**

Critical examination of philosophical views of art from both a historical and contemporary perspective. Treatment of theories from Plato and Aristotle through those of the twentieth century. Discussion of the problems raised by modern art. The relation between aesthetic values and metaphysics, epistemology, ethics and politics. 4 lectures. Prerequisite: Junior standing; completion of GE Areas A and C2. Fulfills GE C4 except for Philosophy majors.

**PHIL 400 Special Problems for Advanced Undergraduates (1–2)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

**PHIL 411 Metaphysics (4)**

Traditional and current ideas and arguments about substance, the relation of universals to particulars, space and time, events, causation and necessity, the self and free will. 3 lectures, research paper. Prerequisite: PHIL 230.

**PHIL 412 Epistemology (4)**

Analysis of the concept of knowledge. Development of competing theories of epistemic justification and truth. Inquiry into relationship between knowledge,

belief, justification and truth. Examination of skepticism. 3 lectures, research paper. Prerequisite: PHIL 230.

**PHIL 420 Philosophy of Biology (4)**

Philosophical implications and assumptions of evolutionary theory, the problem of reduction, feminist critiques, demarcation issues and the differences between biology and other sciences. Ethical and social issues, including Creationism and "intelligent design" theories, eugenics, sociobiology, and ecology. 4 lectures. Prerequisite: PHIL 230 or PHIL 231 and completion of GE Area B2.

**PHIL 421 Philosophy of Space, Time and Matter (4)**

Investigation of the philosophical foundations and interpretation of relativity theory and elementary quantum mechanics. Emphasis on philosophical issues relevant to contemporary philosophy of science such as scientific realism. Some discussion of very recent theories of space, time, and matter. 3 lectures, research paper. Prerequisite: Completion of GE Area A and PHIL 230 or PHIL 321.

**PHIL 422 Philosophy of Mind (4)**

Classic and current work in the problems and issues of the nature and unity of the self, consciousness, mental representations, and action, and of the relation of philosophy of mind to psychology, linguistics and computer science. 3 lectures, research paper. Prerequisite: PHIL 230 or PHIL 231.

**PHIL 423 Philosophy of Language (4)**

Traditional and contemporary philosophical issues that arise from the structure of language. Relevant concepts include: syntax, semantics, pragmatics, meaning, reference, truth, identity, thought, reality. Important distinctions: use/mention, relations/properties of relations, sentences/statements/-propositions. 3 lectures, research paper. Prerequisite: PHIL 230 or PHIL 231.

**PHIL 429 Special Topics in the History of Philosophy (4)**

Advanced discussion of selected topics in the history of philosophy. Examination and analysis of important philosophical movements (e.g., positivism, postmodernism) or alternatively, of particular philosophers or philosophical works of exceptional importance (e.g., David Hume; Kant's *Critique of Pure Reason*). The Schedule of Classes will list topic selected. Total credit limited to 12 units. 3 lectures, research paper. Prerequisite: PHIL 230.

**PHIL 439 Selected Problems in Ethics and Political Philosophy (4)**

Advanced discussion of selected topics in ethics and political philosophy. Examination and analysis of significant ethical or political theories (e.g., utilitarianism, contractarianism) or alternatively, of particular philosophers or philosophical works of exceptional importance (e.g., John Stuart Mill; John Rawls' *A Theory of Justice*). The Schedule of Classes will list topic selected. 3 lectures, research paper. Prerequisite: PHIL 231 and PHIL 331 or PHIL 333.

**PHIL 449 Selected Topics in Recent Philosophy (4)**

Advanced discussion of selected topics in recent philosophy. Examination and analysis of important recent movements in central philosophical areas (e.g., metaphysics, epistemology, philosophy of science, philosophy of language, philosophy of mind) or, alternatively, of particular philosophers or philosophical works of exceptional recent importance. The Schedule of Classes will list topic selected. Total credit limited to 12 units credit; may be repeated in same term. 3 lectures, 1 research paper. Prerequisite: Completion of GE Area A and PHIL 230.

**PHIL 460, 461 Senior Project I, II (2) (2)**

Selection, development and completion of a project under faculty supervision. Results presented in a formal thesis. Minimum of 60 hours per quarter. Student must complete requirements for PHIL 460 and also receive a passing score on the senior examination in order to enroll in PHIL 461. **PHIL 460 is graded on a CR/NC basis. Work in PHIL 461 is given a letter grade.** Prerequisite: Senior standing, consent of instructor. *Change effective Spring 2010.*

**PHIL 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

**2009-11 Cal Poly Catalog****Philosophy Department****BA PHILOSOPHY**

□ 60 units upper division

□ GWR

□ 2.0 GPA

□ USCP

\* = Required in Major; also satisfies GE

Note: No major, support or concentration courses  
may be taken as credit/no credit.**MAJOR COURSES**

PHIL 101 Introduction to Philosophy .....	4
PHIL 225 Symbolic Logic <i>or</i> PHIL 241 Symbolic Logic I (11/15/11) .....	4
PHIL 230 Philosophical Classics: <del>Metaphysics and Epistemology</del> Knowledge and Reality (C2)* .....	4
(Change effective Spring 2010)	
PHIL 231 Philosophical Classics: Ethics and Political Philosophy .....	4
PHIL 321 Philosophy of Science .....	4
PHIL 331 Ethics .....	4
PHIL 411 Metaphysics .....	4
PHIL 412 Epistemology .....	4
PHIL 460 Senior Project I .....	2
PHIL 461 Senior Project II .....	2
History of philosophy electives .....	16
<i>Select four of the following:</i>	
PHIL 311 Greek Philosophy (4)	
PHIL 312 Medieval Philosophy (4)	
PHIL 313 Early Modern Rationalism (4)	
PHIL 314 Early Modern Empiricism (4)	
PHIL 315 Kant and 19 <sup>th</sup> Century European Philosophy (4)	
PHIL 316 20 <sup>th</sup> Century European Philosophy (4)	
PHIL 317 History of Analytic Philosophy (4)	
Concentration (see below) or 300–400 level PHIL electives .....	20
(At least 12 units must be 400 level)	
	<b>72</b>

**GENERAL EDUCATION (GE)**

72 units required, 4 of which are specified in Major.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (20 units)**

B1 Mathematics/Statistics .....	8
B2 Life Science .....	4
B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	
B5 elective	
Area B elective (select one course from B1-B5) ...	4

**Area C Arts and Humanities (12 units)**

C1 Literature .....	4
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C2 Philosophy * 4 units in Major .....	0
C3 Fine/Performing Arts .....	4
C4 Upper-division elective (not in PHIL) .....	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective (not PHIL courses) ....	4

**Area F Technology Elective (upper division)**

(4 units) .....	4
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	<b>68</b>
<b>FREE ELECTIVES</b> .....	<b>40</b>
	<b>180</b>

**CONCENTRATION OR ELECTIVES***Select either the following concentration or 20 units of  
300–400 level PHIL electives.***Ethics and Society Concentration** ..... 20*Select five of the following courses:*

PHIL 322 Philosophy of Technology (4)
PHIL 332 History of Ethics (4)
PHIL 333 Political Philosophy (4)
PHIL 334 Philosophy of Law (4)
PHIL 335 Social Ethics (4) (USCP)
PHIL 336 Feminist Ethics, Gender and Society (4) (USCP)
PHIL 337 Business Ethics (4)
PHIL 338 Ethics and Education (4)
PHIL 339 Biomedical Ethics (4)
PHIL 340 Environmental Ethics (4)
PHIL 341 Professional Ethics (4)
PHIL 439 Selected Problems in Ethics and Political Philosophy (4)

**Philosophy Electives**

300–400 level PHIL electives .....	20
(At least 12 units must be 400 level)	

**2009-11 Cal Poly Catalog****Art and Design Department****PHOTOGRAPHY MINOR**

Courses consist of a required core and advisor approved electives. Students, working with an advisor, select their area(s) of interest. Advisors are: Sky Bergman, Robert Howell, and Eric Johnson.

**Required Core** *Units***Select three courses from the following: ..... 12**

ART 121 Basic Digital Photography (4)

ART 182 Photographic Manipulation and  
Design (4) ~~or~~

ART 222 Black and White Photography (4)

ART 224 Introduction to Artificial Lighting (4)

ART 227 Lifestyle Photography (4)

ART 314 History of Photography (C4) (If selected,  
course may not be selected again below) (4)

(1/19/10)

**Select three courses from the following: ..... 12**

ART 314 (C4), 324, 325, 329, 383, 427, 484, 486

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**2009-11 Cal Poly Catalog****Physics Department****BA PHYSICS****Flowchart**

☐ 60 units upper division

☐ GWR

☐ 2.0 GPA

☐ USCP

\* = Required in Major; also satisfies GE

Course sequencing: See flowcharts at

[www.csmadvising.calpoly.edu](http://www.csmadvising.calpoly.edu)Note: No major or support courses  
may be taken as credit/no credit.**MAJOR COURSES**

PHYS 141 General Physics IA.....	4
PHYS 132 General Physics II (B3 & B4)* .....	4
PHYS 133 General Physics III.....	4
PHYS 206 Instrumentation in Experimental Physics	3
PHYS 211 Modern Physics I .....	4
PHYS 212 Modern Physics II.....	4
PHYS 256 Electrical Measurements Laboratory .....	1
PHYS 301 Thermal Physics I .....	4
PHYS 302 Classical Mechanics I .....	4
PHYS 322 Vibrations and Waves .....	3
PHYS 405 Quantum Mechanics I or	
PHYS 412 Solid State Physics .....	3-4
PHYS 461 Senior Project I or	
PHYS 463 Senior Project - Lab Research I.....	2
Select one from the following: .....	3-4
HIST 350 The Scientific Revolution, c. 1500-1800 (4) (D5) (5/24/12)	
<sup>1</sup> PHIL 321 Philosophy of Science (4) (C4*),	
<sup>1</sup> PHIL 421 Phil. of Space, Time and Matter (4),	
or SCM 451 Ethics in the Sciences (3)	
CHEM 127 General Chemistry .....	4
CHEM 128 General Chemistry .....	4
MATH 141 Calculus I (B1) * .....	4
MATH 142 Calculus II (B1)* .....	4
MATH 143 Calculus III .....	4
MATH 241 Calculus IV .....	4
MATH 244 Linear Analysis I .....	4
MATH/STAT elective (300-400 level; MATH 344 recommended) .....	4
Physics electives (300-400 level).....	16
Select at least one of the following:	
PHYS 323, 340, 341, 342, 357, 417, 422, 423, 452, ASTR 444 (12/15/10)	
In addition, choose courses with the prefixes PHYS, ASTR or GEOL (but no more than 6 units from each of ASTR and GEOL)	

**91-93****GENERAL EDUCATION (GE)**

72 units required, 16 of which are specified in Major.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing.....	4

**Area B Science and Mathematics (4 units)**

B1 Mathematics/Statistics * 8 in Major .....	0
B2 Life Science.....	4
B3 Physical Science * 4 in Major .....	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division) (4 units)**

	60
<b>FREE ELECTIVES</b> .....	<b>27-29</b> <sup>†</sup>
	<b>180</b>

<sup>†</sup> Care must be taken when selecting electives to ensure compliance with the "60 unit upper division" requirement.<sup>1</sup> Note (C2) prerequisites for these courses.



## 2009-11 Cal Poly Catalog

### Physics Department

#### PHYS–PHYSICS

##### **PHYS 104 Introductory Physics (4) GE B3**

Elementary introduction to mechanics, gases, liquids and solids, heat, vibrations and waves, light, electricity and magnetism. Intended to provide non-science students with an understanding of basic physical concepts. Not open to students who have credit in a college physics course. 4 lectures. Prerequisite: Passing score on ELM examination, or an ELM exemption, or credit in MATH 104. Fulfills GE B3.

##### **PHYS 107 Introduction to Meteorology (4) GE B3**

Physics of Earth's atmosphere. Topics include the physical basis for temperature, wind generation, atmospheric circulation, humidity, adiabatic processes, cloud formation, cyclone development, precipitation, and storm growth. Other topics include the variety of storms and their effects, satellite imaging, and air pollution and its possible effect on global temperature change. 4 lectures. Prerequisite: Passing score on ELM examination, or an ELM exemption, or credit in MATH 104. Fulfills GE B3.

##### **PHYS 111 Contemporary Physics for Nonscientists (4) GE B3**

Exploration of the key concepts of quantum mechanics and Einstein's special and general theories of relativity. Particle-wave duality, Heisenberg's uncertainty principle, Schrodinger's cat, warped spacetime, black holes. 4 lectures. Fulfills GE B3.

##### **PHYS 115 Physics of Sound and Music (4) GE B3**

Fundamental physical principals of sound production in musical instruments; woodwind, brass, strings, piano and percussion. Generation and interference of mechanical and sound waves; overtone series, musical scales and Fourier spectra of complex waves. Electronic sound recording and production. Hearing and voice. Auditorium and room acoustics. 4 lectures. Prerequisite: Passing score on the ELM examination for MATH 116 eligibility, or an ELM exemption, or MATH 104. Fulfills GE B3.

##### **PHYS 118 Introductory College Physics (4)**

Introductory course in physics emphasizing motion, force, torque, momentum, and energy. Applications to human motion and metabolism. Primarily for students in kinesiology. Not open to students with credit in PHYS 121 or PHYS 131 or PHYS 141. 4 lectures. Prerequisite: MATH 118 and high school trigonometry, or MATH 119. *Change effective Winter 2010.*

##### **PHYS 121 College Physics I (4) GE B3 & B4**

Introductory course in mechanics emphasizing motion, force, and energy. Not open to students having a grade of C- or better in PHYS 131 or PHYS 141. 3 lectures, 1 laboratory. Prerequisite: MATH 118 and high school trigonometry, or MATH 119. Fulfills GE B3 & B4.

##### **PHYS 122 College Physics II (4) GE B3 & B4**

Continuation of PHYS 121. Topics include properties of materials, fluids, waves and vibrations, sound, heat, light and optics. Not open for credit to students having a grade of C- or better in PHYS 132. 3 lectures, 1 laboratory. Prerequisite: PHYS 118, PHYS 121, **PHYS 131**, or PHYS 141. Fulfills GE B3 & B4. *Change effective Spring 2011.*

##### **PHYS 123 College Physics III (4)**

Continuation of PHYS 121 and 122. Electrostatics, electric current, magnetic fields and induction. Elements of modern physics. Not open for credit to students having a grade of C- or better in PHYS 133. 3 lectures, 1 laboratory. Prerequisite: PHYS 118, PHYS 121, **PHYS 131**, or **PHYS 141**. Recommended: PHYS 122. *Change effective Spring 2011.*

##### **PHYS 131 General Physics I (4) GE B3 & B4**

Fundamental principles of mechanics. Vectors, particle kinematics. Equilibrium of a rigid body. Work and energy, linear momentum, rotational kinematics and dynamics. Primarily for engineering students, and for students majoring in the physical sciences. Not open to students with credit in PHYS 141. 3 lectures, 1 laboratory. Prerequisite: MATH 141 with grade C- or better and MATH 142 or MATH 182 (or concurrent enrollment). Recommended: high school physics. For ME and AERO students only. *Crosslisted as HNRS/PHYS 131.* Fulfills GE B3 & B4.

##### **PHYS 132 General Physics II (4) GE B3 & B4**

Oscillations, waves in elastic media, sound waves. Temperature, heat and the first law of thermodynamics. Kinetic theory of matter, second law of thermodynamics. Geometrical and physical optics. 3 lectures, 1 laboratory. Prerequisite: PHYS 131 or HNRS 131 or PHYS 141. *Crosslisted as HNRS/PHYS 132.* Fulfills GE B3 & B4.

##### **PHYS 133 General Physics III (4) GE B3 & B4**

Charge and matter, electric field, electric potential, dielectrics, capacitance, current and resistance, electromotive force and circuits, magnetic fields, magnetic field of a moving charge, induced emf. 3 lectures, 1 laboratory. Prerequisite: PHYS 131 or HNRS 131 or PHYS 141, and MATH 142. Fulfills GE B3 & B4.

##### **PHYS 141 General Physics IA (4) GE B3**

Fundamental principles of mechanics. Vectors, particle kinematics. Equilibrium of a rigid body. Work and energy, linear momentum, rotational kinematics and dynamics. Primarily for engineering and science students. Not open to students with credit in PHYS 131. 4 lectures. Prerequisite: MATH 141 with grade C- or better and MATH 142 or MATH 182 (or concurrent enrollment). Recommended: High school physics. *Crosslisted as HNRS 134/PHYS 141.* Fulfills GE B3.

##### **PHYS 200 Special Problems for Undergraduates (1–2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

##### **PHYS 201 Learning Center Tutor (1) (CR/NC)**

Act as a tutor in the Physics Learning Center. Help students with problem solving techniques and introductory physics course material. Total credit limited to 3 units, with a maximum of 1 unit per quarter. Credit/No Credit grading only. Prerequisite: PHYS 133 and consent of instructor.

##### **PHYS 202 Physics on the Computer (4)**

Introduction to using computers for solving problems in physics: differential equations, matrix manipulations, simulations and numerical techniques, nonlinear dynamics. 4 lectures. Prerequisite: PHYS 133, and MATH 241 or MATH 244 (preferred) and computer literacy.

##### **PHYS 206 Instrumentation in Experimental Physics (3)**

L-R-C circuits and electronic circuit elements emphasizing the applications of analog and digital electronics to instrumentation in modern physics. 3 lectures. Prerequisite: PHYS 133, MATH 143, and concurrent enrollment in PHYS 256.

##### **PHYS 211 Modern Physics I (4)**

Special relativity, fundamental principles of quantum mechanics, emphasizing the modern description of atomic phenomena. Kinetic theory, wave particle duality, Bohr theory, Schrodinger equation, elementary atomic structure. 4 lectures. Prerequisite: PHYS 123, or PHYS 132 and PHYS 133, and MATH 241.

##### **PHYS 212 Modern Physics II (4)**

Applications of quantum physics to atoms, nuclei, and elementary particles. Quantum statistics, principles of the laser. Topics in solid state physics such as the free electron theory of metals, bonding in solids and energy bands. Nuclear structure and nuclear energy. 4 lectures. Prerequisite: PHYS 211.

##### **PHYS 256 Electrical Measurements Laboratory (1)**

Experimental studies of circuit analysis and electronics; introduction to digital techniques; instrumentation. 1 laboratory. Prerequisite: PHYS 133, MATH 143, and concurrent PHYS 206.

##### **PHYS 270 Selected Topics (1–4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### **PHYS 301 Thermal Physics I (3/4)**

Thermodynamics and statistical mechanics. Entropy, temperature, ensembles, partition functions, chemical potential, free energy. Selected applications including paramagnetism, ideal gas, Fermi-Dirac and Bose-Einstein distributions. *Correction: 3 lectures through Winter 2010; 4 lectures –change effective Spring 2010.* Prerequisite: PHYS 132, PHYS 211, MATH 241.

##### **PHYS 302 Classical Mechanics I (4)**

Laws of motion, kinematics and dynamics of a particle. Work and energy. Linear and angular momentum. Use of numerical methods for solving problems. Oscillatory motion (damped and forced oscillation). Coupled oscillators. Newton's Law of gravity, orbital motion, and central force



problems. 4 lectures. Prerequisite: PHYS 131 or PHYS 141, MATH 242 or MATH 244 or MATH 344 (preferred).

### PHYS 303 Classical Mechanics II (3)

Dynamics of a rigid body. Three-dimensional motion of a rigid body. Introduction to Lagrange's and Hamilton's equations. 3 lectures. Prerequisite: PHYS 302. Concurrent: MATH 344.

### PHYS 310 Physics of Energy (3)

Physics and mathematics applied to broad energy topics. Efficient usage, transportation, solar energy, nuclear fission and fusion. Plasma, hydrogen economy, fuel cells, wind wave, tidal, and geothermal energy. Transmission, storage, fossils. National planning, and energy economics. 3 lectures. Prerequisite: PHYS 133.

### PHYS 313 Introduction to Atmospheric Physics (3)

Properties of the atmosphere, atmospheric motions, solar and terrestrial radiation. Emphasis on conservation laws of momentum, energy and mass applied to understanding the Earth's atmospheric motions. 3 lectures. Prerequisite: PHYS 132 or PHYS 122 and MATH 241. Recommended: MATH 304.

### PHYS 315 Introduction to Lasers and Laser Applications (3)

Interaction of radiation with matter, theory of laser action, characteristics and modification of laser output, types of lasers. Holography and other applications. 3 lectures. Prerequisite: PHYS 133, or PHYS 123 and MATH 143. Recommended: PHYS 211.

### PHYS 317 Special Theory of Relativity (3)

Fundamental experiments and basic postulates of special relativity. Simultaneity, length and time measurements. Lorentz transformations. Four-Vectors. Space-time diagrams. Relativistic mechanics and electromagnetism. 3 lectures. Prerequisite: PHYS 211.

### PHYS 322 Vibrations and Waves (3)

Introduction to vibrations and waves and their applications. Harmonic oscillator, waves, complex notation, superposition, interference, coherence, Fourier analysis. Applications may include sound, optics, quantum mechanics, and electromagnetic radiation. 3 lectures. Prerequisite: PHYS 132, MATH 244. Recommended: MATH 344.

### PHYS 323 Optics (4)

Geometric optics, lens systems, aberration, physical optics and polarization. 3 lectures, 1 laboratory. Prerequisite: PHYS 133, MATH 241. Recommended: PHYS 322.

### PHYS 340 Quantum Physics Laboratory I (2)

Experimental studies of the quantum properties of atoms and nuclei. Measurements of fundamental constants. Statistics and data analysis. 1 lecture, 1 laboratory. Prerequisite: PHYS 212 and PHYS 256.

### PHYS 341, 342 Quantum Physics Laboratory II, III (2) (1)

Advanced experimental studies of quantum properties of atoms and nuclei. Interactions with radiation, particles and fields. Courses must be taken in numerical order. PHYS 341: 2 laboratories; PHYS 342: 1 laboratory. Prerequisite: PHYS 340.

### PHYS 357 Advanced Instrumentation in Experimental Physics (3)

Advanced analog and digital electronics, computer interfacing to experiments, robotics. 2 lectures, 1 laboratory. Prerequisite: PHYS 206 and PHYS 256.

### PHYS 363 Undergraduate Seminar (2)

Study and oral presentation of physics topics of interest to students and faculty. Discussion of projects and research by students and faculty. 2 seminars.

### PHYS 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigations, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

### PHYS 401 Thermal Physics II (3)

Additional topics in thermodynamics and statistical physics, including chemical equilibrium, phase transitions, transport processes, and cryogenics. 3 lectures. Prerequisite: PHYS 301.

### PHYS 403 Nuclear and Particle Physics (3)

Advanced nuclear physics topics. The two-nucleon problem at low energy. The deuteron. Subnuclear particles and their structure. Elementary particles. Symmetries and conservation laws. Parity, charge conjugation and time reversal

invariance. Hadronic interactions. The weak interaction. 3 lectures. Prerequisite: PHYS 212 and PHYS 405.

### PHYS 405 Quantum Mechanics I (4)

Wave nature of matter and the basic postulates of quantum mechanics. The wave function, operators, and their interpretation. Schrodinger's equation and its solutions in one and more dimensions. The hydrogen atom and the periodic table. 4 lectures. Prerequisite: PHYS 211, MATH 244. Recommended: PHYS 212, PHYS 322, MATH 344.

### PHYS 406 Quantum Mechanics II (3)

Angular momentum operators and problems in three dimensions including the hydrogen atom. The elements of matrix mechanics and spin wave functions. Perturbation theory. 3 lectures. Prerequisite: PHYS 405.

### PHYS 408 Electromagnetic Fields and Waves I (4)

Electric and magnetic field theory using vector analysis. Electric fields, dielectric materials, magnetic fields, induced emf, magnetic materials, Maxwell's equations, wave equation. 4 lectures. Prerequisite: MATH 304. *Change effective Winter 2011.*

### PHYS 409 Electromagnetic Fields and Waves II (3)

Wave equation, plane electromagnetic waves, guided waves. Dipole radiation, radiation from an accelerated charge. Special relativity. 3 lectures. Prerequisite: PHYS 408. Recommended: PHYS 322. *Change effective Winter 2011.*

### PHYS 408, 409 Electromagnetic Fields and Waves I, II (4) (4) (3)

~~Electric and magnetic field theory using vector analysis. Electric fields, dielectric materials, magnetic fields, induced emf's, magnetic materials, Maxwell's equations, wave equation, plane electromagnetic waves. Dipole radiation, radiation from an accelerated charge. 4 lectures, 3 lectures. Prerequisite: MATH 304. Recommended for PHYS 409: PHYS 322. *Change effective Winter 2011 (see above).*~~

### PHYS 410 Physics of the Solid Earth (3)

Gravity and the figure of the Earth. Body wave seismology, structure and composition of the Earth, heat flow and heat sources, Earth tides, rotational dynamics, the geomagnetic field and its source, paleomagnetism. 3 lectures. Prerequisite: PHYS 133 and MATH 244 or equivalent.

### PHYS 412 Solid State Physics (3)

### GE B6 with PHYS 452

Properties of solids including the structural, mechanical, thermal, and electronic properties, energy band theory and the properties of metals and semiconductors. 3 lectures. Prerequisite: PHYS 211 or MATE 340, MATH 244. Fulfills GE B6 with PHYS 452.

### PHYS 413 Advanced Topics in Solid State Physics (3)

Semiconducting devices, including junction and field-effect transistors, LED's, and diode lasers. Magnetic properties of solids. Superconductivity, including discussion of high-temperature superconductors. Other topics of current interest in solid state physics. 3 lectures. Prerequisite: PHYS 412.

### PHYS 417 Nonlinear Dynamical Systems (4)

### GE B6

Analysis of linear and nonlinear dynamical systems with emphasis on geometrical methods and visualization techniques. Fixed points, phase plane analysis, bifurcations and limit cycles. Laboratory component includes data acquisition and analysis using computers, numerical simulations of dynamical systems, and analysis of discrete systems. 3 lectures, 1 laboratory. Prerequisite: MATH 242 or MATH 244, and junior standing. Fulfills GE B6.

### PHYS 422 Polymer Electronics Laboratory (1)

Experimental procedures in polymer electronics. Investigation of the characteristics of a polymer electronic device. 1 laboratory. Prerequisite: EE 347 *with a C- grade or better* or MATE 340 or CHEM 319 or PHYS 340. *Crosslisted as EE/PHYS 422. (Change effective Spring 2010)*

### PHYS 423 Advanced Optics (4)

Advanced topics of modern optics. May include: fiber optics, Fourier optics, quantum optics, lasers, holography, non-linear optics. 3 lectures, 1 laboratory. Prerequisite: PHYS 323.

### PHYS 424 Theoretical Physics (3)

Contour integration in the complex plane, properties of the delta function, properties of some common functions of theoretical physics, Green's function techniques for solving differential equations. 3 lectures. Prerequisite: PHYS 133, MATH 304, MATH 344.

**PHYS 452 Solid State Physics Laboratory (1)      GE B6 with PHYS 412**

Selected experiments on X-ray diffraction, Hall effect, optical absorption, thermo-electric effect, photovoltaic cells, diode characteristics, and superconductivity. 1 laboratory. Prerequisite or concurrent: PHYS 412. Fulfills GE B6 with PHYS 412.

**PHYS 461, 462 Senior Project I, II (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

Prerequisite: Consent of instructor.

**PHYS 463, 464 Senior Project - Laboratory Research I, II (2) (2)**

Selection and completion of a laboratory research project under faculty supervision. Projects typical of problems which graduates will encounter in industry or graduate school. Project results are presented in a formal report. Minimum 120 hours total time. 2 laboratories. Prerequisite: Consent of instructor.

**PHYS 470 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**PHYS 471 Selected Advanced Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

**PHYS 485 Cooperative Education Experience (6) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 12 units; major credit limited to 2 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**PHYS 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 12 units; major credit limited to 2 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**2009-11 Cal Poly Catalog****Physics Department****BS PHYSICS****Flowchart**

□ 60 units upper division

□ GWR

□ 2.0 GPA

□ USCP

\* = Required in Major; also satisfies GE

Course sequencing: See flowcharts at

[www.csmadvising.calpoly.edu](http://www.csmadvising.calpoly.edu)

Note: No major, support or concentration courses may be taken as credit/no credit.

**MAJOR COURSES**

PHYS 141 General Physics IA.....	4
PHYS 132 General Physics II (B3 & B4)* .....	4
PHYS 133 General Physics III.....	4
PHYS 202 Physics on the Computer.....	4
PHYS 206 Instrumentation in Experimental Phys. ....	3
PHYS 211 Modern Physics I .....	4
PHYS 212 Modern Physics II.....	4
PHYS 256 Electrical Measurements Laboratory ....	1
PHYS 301 Thermal Physics I.....	4
PHYS 302 Classical Mechanics I .....	4
<sup>1</sup> PHYS 322 Vibrations and Waves .....	3
PHYS 340 Quantum Physics Laboratory I.....	2
PHYS 341 Quantum Physics Laboratory II .....	2
PHYS 405 Quantum Mechanics I .....	4
PHYS 408 Electromagnetic Fields and Waves I ....	4
PHYS 461 Senior Project I or	
PHYS 463 Senior Project – Lab Research I.....	2
PHYS 462 Senior Project II or	
PHYS 464 Senior Project – Lab Research II.....	2
CHEM 127 General Chemistry .....	4
CHEM 128 General Chemistry .....	4
MATH 141 Calculus I (B1)* .....	4
MATH 142 Calculus II (B1)* .....	4
MATH 143 Calculus III .....	4
MATH 241 Calculus IV .....	4
MATH 244 Linear Analysis I .....	4
MATH 304 Vector Analysis .....	4
MATH 344 Linear Analysis II .....	4
Advanced Physics electives or Concentration	
courses (see below) .....	21
	<b>112</b>

**GENERAL EDUCATION (GE)**

72 units required, 12 of which are specified in Major.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing.....	4

**Area B Science and Mathematics (4 units)**

B1 Mathematics/Statistics * 8 units in Major.....	0
B2 Life Science .....	4

B3 Physical Science \* 4 units in Major ..... 0

B4 One lab taken with either a B2 or B3 course

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division) (4 units)**

	<b>60</b>
<b>FREE ELECTIVES</b> .....	<b>8</b>
	<b>180</b>

**ADVANCED PHYSICS ELECTIVES OR CONCENTRATION**Select *either* the advanced physics electives *or* one of the concentrations.**Advanced Physics Electives**Select two from: PHYS 323, 342, 357, 417, 422, 423, 452, **ASTR 444. (12/15/10)**

Select one from: PHYS 424 or MATH 418.

Select courses at the 300 or 400 level with the prefixes PHYS, ASTR (but not ASTR 324), GEOL, MATH, STAT, CSC (but not CSC 302 nor CSC 310). One of the following may also be chosen: CSC 101, 231, 234, **235**. At least 9 of these elective units must have the PHYS prefix. All courses must be taken for a letter grade. **(11/22/11)**

For students anticipating an industrial career, PHYS 323, 357, 412, 413, 423, and 452 are suggested.

For students anticipating graduate work in physics PHYS 303, 401, 406, 409, 424, and MATH 408 are suggested. PHYS 357 is suggested for students who anticipate becoming experimental physicists.

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<sup>1</sup> Students in Electro-optics Concentration should take PHYS 323 instead of PHYS 322.

**Electronics Concentration**

Students are not be allowed to enroll in EE 228 until they have a) completed PHYS 357 and MATH 344, and b) received the approval of advisors in both Physics and Electrical Engineering. Students are then allowed to enroll in EE courses with physics courses substituting for EE prerequisites.

**PHYS 357 Advanced Instrumentation in**

Experimental Physics .....	3
EE 228 Continuous-Time Signals and Systems.....	4
EE 302 Classical Control Systems.....	3
EE 328 Discrete Time Signals and Systems .....	3
EE 342 Control Systems Laboratory .....	1
EE 368 Signals and Systems Laboratory .....	1
EE 336 Microprocessor System Design <i>or</i> EE 306 and EE 346 Semiconductor Device Electronics and Laboratory .....	4
Elective chosen from Advanced Physics Electives .....	2
(see above)	
	<hr/> 21

**Electro-optics Concentration**

Students following this concentration should take PHYS 323 instead of PHYS 322 as a major requirement.

Students are not allowed to enroll in EE 228 until they have a) completed PHYS 357 and MATH 344, and b) received approval of advisors in both Physics and Electrical Engineering. Students are then allowed to enroll in EE courses with physics courses substituting for EE prerequisites.

PHYS 357 Advanced Instrumentation in Exp Physics	3
PHYS 423 Advanced Optics .....	4
EE 228 Continuous-Time Signals and Systems.....	4
EE 403 Fiber Optics Communication .....	3
EE 418 Photonic Engineering.....	3
EE 443 Fiber Optics Laboratory.....	1
EE 458 Photonic Engineering Laboratory .....	1
Elective chosen from Advanced Physics Electives .....	2
	<hr/> 21

**2009-11 Cal Poly Catalog****Political Science Department****BA POLITICAL SCIENCE**

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                      ☐ USCP

\* = Required in Support; also satisfies GE

*Note: No major, support or concentration courses may be taken as credit/no credit.*

**MAJOR COURSES**

POLS 112 American and California Govt (D1)* .....	4
POLS 180 Political Inquiry .....	4
POLS 225 Introduction to International Relations ...	4
POLS 229 Introduction to Comparative Politics .....	4
POLS 230 Basic Concepts of Political Thought .....	4
POLS 359 Research Design <del>360 Political Analysis</del> 6/25/09	4
POLS 361 Quantitative Methodology .....	4
POLS 481 Senior Project Seminar <i>or</i> POLS 461, 462 Senior Project I, II .....	4
Political science electives (300–400 level) .....	12
Concentration courses <i>or</i> individualized course of study .....	28
	<b>72</b>

**SUPPORT COURSES**

HIST 110/111 Western Civilization .....	4
Geography/Anthropology/Sociology elective (300– 400 level) .....	4
ENGL 302, ENGL 310 or English GE C4 course ...	4
STAT 221 Intro to Probability and Statistics (B1)*	5
	<b>17</b>

**GENERAL EDUCATION (GE)**

72 units required, 8 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (16 units)**

B1 Mathematics/Statistics * 4 units in Support plus	4
B2 Life Science .....	4
B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	
B5 elective	
Area B elective (select one course from B1-B5) ...	4

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

**Area D/E Society and the Individual (16 units)**

D1 American Exp. (40404) * 4 units in Major .....	0
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4

D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective (Not POLS courses) ...	4
<b>Area F Technology Elective (upper division) .....</b>	<b>4</b>
	<b>64</b>
<b>FREE ELECTIVES .....</b>	<b>27</b>
	<b>180</b>

**CONCENTRATIONS (select one)**

Select a concentration or individualized course of study.

**American Politics Concentration**

POLS 315 The American Presidency .....	4
POLS 319 United States Congress .....	4
POLS 341 Constitutional Law .....	4
Choose any three of the following .....	12
POLS 316 Political Participation (4)	
POLS 317 Campaigns and Elections (4)	
POLS 348 <del>336</del> Early American Political Thought <i>or</i> POLS 349 <del>337</del> Contemporary American Political Thought (4) <i>Effective Spring 2010</i>	
POLS 375 California Politics (4)	
POLS 419 Social Movements/Political Protest (4)	
POLS 471 Urban Politics (4)	

<sup>1</sup> Approved elective. <i>Select one course from:</i> .....	4
POLS 386 (4 units maximum), 451, 456, 459 or any unused course in this concentration	
	<b>28</b>

**Global Politics Concentration**

POLS 308 Political Violence and Conflict Resolution <i>or</i> POLS 381 Peace and War .....	4
POLS 320 Comparative Political Analysis <i>or</i> POLS 324 International Relations Theory .....	4
POLS 328 Politics of Developing Countries <i>or</i> POLS 383 Politics of the European Union .....	4
POLS 382 Comparative Foreign Policy <i>or</i> POLS 420 Contemporary U.S. Foreign Policy .....	4
POLS 322 International Political Activism <i>or</i> POLS 426 International Organizations and Law <i>or</i> POLS 427 Politics of the Global Economy .....	4
POLS 428 Issues and Topics in Comparative Politics <i>or</i> POLS 429 Issues and Topics in International Relations .....	4

<sup>1</sup> Approved elective. <i>Select one course from:</i> .....	4
POLS 285, 321, 380, 386 (4 units maximum), or any unused course in this concentration	
	<b>28</b>

**Pre-Law Concentration**

POLS 245 Judicial Process .....	4
POLS 341 American Constitutional Law .....	4
POLS 334 Jurisprudence .....	4
POLS 343 Civil Rights in America .....	4
POLS 344 Civil Liberties .....	4

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>1</sup> Approved electives. <i>Select two courses from:</i> .....	8
BUS 207, 308, 409, 410, 473;	
ES 380; JOUR 302; LS 214; NR 404; PHIL 334;	
POLS 295, 340, 386 (4 units maximum), 426;	
PSY 375; SOC 402, 406, 412	
(3/21/13)	<hr/> 28
<b>Individualized Course of Study</b> .....	28

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<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.



## 2009-11 Cal Poly Catalog

### Political Science Department

## POLS–POLITICAL SCIENCE

### POLS 111 California Constitution and Government (1)

Basic aspects of California state government. Satisfies GE D1 for students who have passed both AP US Government and US History exams, or transfer students who have received advice in writing from the Office of Academic Records to take POLS 111. 1 lecture.

### POLS 112 American and California Government (4) GE D1

Study of governmental institutions, politics, issues and political behavior in the United States and California in constitutional, historical, social and cultural perspectives. Meets the U.S. government and California state/local government requirement. 4 lectures. Fulfills GE D1.

### POLS 180 Political Inquiry (4)

Introduction to the scope, language, concepts and approaches employed in political science and the social sciences. Includes emphasis on basic methodological and research strategies for assessing political issues, events, the dynamics of political change and philosophy of science. 4 lectures.

### POLS 225 Introduction to International Relations (4)

Introduction to the basic concepts, issues, and theories surrounding the study of international politics. Changes in the nature of conflict, power, and national interests in the post-Cold War era. Role of states, non-governmental actors, and international organizations in the global arena. 4 lectures.

### POLS 229 Introduction to Comparative Politics (4)

Introduction to basic concepts, issues, and theories in comparative politics. Use of the comparative method. Legitimacy, political culture and socialization, parliamentary and presidential institutions, judicial structures, electoral laws, party systems, federal and unitary governance, corporatism and pluralism. 4 lectures.

### POLS 230 Basic Concepts of Political Thought (4)

Introduction to political theory. Focuses on concepts like: authority, liberty, equality, law, justice, community, rights, citizenship, property, class conflict, and constitutionalism. Readings from major thinkers, such as Plato, Aristotle, Augustine, Aquinas, Machiavelli, Locke, Hobbes, Rousseau, Marx, Nietzsche, Rawls, and others. 4 lectures. Prerequisite: POLS 112.

### POLS 245 Judicial Process (4)

The nature of the legal system. Topics may include: private and public law, civil and criminal law, trial and appellate courts, criminal procedure, judges, attorneys, and juries. 4 lectures. Prerequisite: POLS 112, or consent of instructor. Formerly POLS 345.

### POLS 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### POLS 285 Model United Nations (4)

Introduction to the United Nations and major issues that confront it. Preparation for participation in collegiate Model United Nations conferences. Rules of procedure and debate, preparation of country position papers, and arguing a legal case. 4 lectures. Prerequisite: One course in POLS or consent of instructor.

### POLS 295 Foundations of Mock Trial (4)

Introduction to evidence, trial procedure, objections, and witness examination. Preparation for intercollegiate mock trial competitions (held in winter and spring). Extensive hands-on experience in researching, preparing, and arguing a legal case. 4 lectures. Prerequisite: Completion of GE Area D1 and consent of instructor.

### POLS 308 Political Violence and Conflict Resolution (4)

Causes, methods, and consequences of non-state groups that use violent means to pursue revolutionary, separatist, or ideological goals both domestically and internationally. Dynamics of ethnic conflict, terrorist movements, paramilitary groups, insurgencies, and narco-trafficking. Processes of conflict resolution in divided societies through military responses, negotiated settlements, democracy, and peacekeeping missions. 4 lectures. Prerequisite: POLS 229, or consent of instructor.

### POLS 310 Politics of Ethnicity and Gender (4)

USCP

Analysis of factors that affect the changing role of women and major ethnic groups in American politics. ~~Involvement, organization and role of minority groups in the political process.~~ Examination of the social construction of difference, exploring how gender, race, and class are shaped by social, cultural, and political contexts. 4 lectures. Prerequisite: POLS 112, or consent of instructor. Fulfills USCP. *Change effective Winter 2010.*

### POLS 315 The American Presidency (4)

Nature and problems of contemporary presidential leadership emphasizing the impact of bureaucracy, Congress, public opinion, the courts, interest groups, and the party system upon the presidency and national policy making. 4 lectures. Prerequisite: POLS 112, or consent of instructor.

### POLS 316 Political Participation (4)

Role of political participation as manifested through political parties and interest groups in a democracy. Degree of consensus and conflict in present day political participation including influence on public policies. 4 lectures. Prerequisite: POLS 112, or consent of instructor.

### POLS 317 Campaigns and Elections (4)

Origins and dimensions of public opinion. Focus on contemporary political campaigns and elections in the U.S. Impact of political ideology, mass media, high technology, pressure groups on electoral outcomes. Voting behavior and other forms of political participation in the U.S. 4 lectures. Prerequisite: POLS 112, or consent of instructor.

### POLS 319 United States Congress (4)

Theory and practice of representative government in the United States. Organization, procedures and consequences of the legislative process in Congress and state legislatures. 4 lectures. Prerequisite: POLS 112, or consent of instructor.

### POLS 320 Comparative Political Analysis (4)

Survey of theories and methods in the field of comparative politics. Recognition of how history structures current politics. Application of abstract principles to contemporary or historical problems to illustrate the practical uses of comparative analysis. Evaluation of assorted issues to compare culturalist, institutionalist, and rationalist approaches. 4 lectures. Prerequisite: POLS 229, or consent of instructor.

### POLS 321 Comparative Political Culture (4)

Survey of major political cultures such as contemporary democratic, civic and political cultures in Confucianism and Islam. The mutual influence between culture, politics, and society. The role of political culture in the industrialization process, and the post-colonial and post-communist contexts. 4 lectures. Prerequisite: POLS 229.

### POLS 322 International Political Activism (4)

Mobilization, organization, and implementation of domestic and transnational social movements in Europe, South America, Asia, and Africa. Concepts, theories, and underlying themes of collective activism in international politics, as well as its outcome, and political and historical significance. 4 lectures. Prerequisite: POLS 229.

### POLS 324 International Relations Theory (4)

Survey of theoretical approaches to the study of international political processes and problems. Foreign policies and politics in relations between states. Conflicts and adjustments. Analyses of selected problems to elucidate differences between realist, liberal, socialist, constructivist, and other theories. 4 lectures. Prerequisite: POLS 225, or consent of instructor.

### POLS 325 Global Political Issues (4)

GE D5

Concepts and theories in international relations and contemporary global issues. Application of principles of international relations to political issues and subjects which affect our lives. 4 lectures. Prerequisite: Junior standing; completion of GE Area A, and one course from two of the three subfields of Area D1, Area D2, and/or Area D3, or consent of instructor. Fulfills GE D5 except for Political Science majors.

### POLS 328 Politics of Developing Areas (4)

A detailed survey of the domestic politics of developing countries from a comparative perspective. Assessment of theories of development with appropriate examples taken from particular areas and countries. Repeatable to 8 units with different subtitles (e.g., "Latin America," "East Asia," "Africa"). The Schedule of Classes will list topic selected. 4 lectures. Prerequisite: POLS 225 or POLS 229.

**POLS 329 Ancient and Medieval Political Thought (4)**

Political theory from ancient Greece, ancient Rome, and the Medieval period. Readings from major authors, such as Plato, Aristotle, Augustine, Aquinas, and others. 4 lectures. Prerequisite: POLS 230 or consent of instructor.

**POLS 330 Modern Political Thought (4)**

Theories of political participation and the relationship between the individual and the state as developed in the works of influential thinkers such as Locke, Rousseau, Mill and Marx. 4 lectures. Prerequisite: POLS 230, or consent of instructor.

**POLS 331 Contemporary Political Thought (4)**

Ideas of major contemporary political thinkers, such as Wolff, Singer, Rawls, Strauss, MacKinnon, Beauvoir, Dewey, Walzer and others in historical context, compared and contrasted. 4 lectures. Prerequisite: POLS 230 or consent of instructor.

**POLS 333 World Food Systems (4)****GE Area F**

Integrated, interdisciplinary study of the technologies of global food production, environmental and social issues related to the application of those technologies, and moral and ethical issues associated with global food production and distribution. Emphasis on the politics of change. 4 lectures. Prerequisite: Junior standing and completion of GE Area B, or consent of instructor. *Crosslisted as POLS/UNIV 333. Fulfills GE Area F.*

**POLS 334 Jurisprudence (4)**

Normative and analytical problems concerning law. Nature of law and legal systems including liberty and justice. Topics may include the connection between law and morality, feminist and critical race perspectives, crime and punishment, and economic analysis of the law. 4 lectures. Prerequisite: POLS 112 and POLS 230, or consent of instructor.

**POLS 336 Early American Political Thought (4)**

The central political ideas of America's leading thinkers from the arrival of the *Mayflower* to the Civil War. Selections may include readings of American political ideas from Winthrop, Paine, Publius, Hamilton, de Tocqueville, Douglass, Calhoun, Thoreau, and Lincoln, among others. 4 lectures. Prerequisite: POLS 112, POLS 230, or consent of instructor. *Change effective Spring 2010; see POLS 348.*

**POLS 337 Contemporary American Political Thought (4)**

The central political ideas of America's leading thinkers from the Civil War to the present. 4 lectures. Prerequisite: POLS 112, POLS 230, or consent of instructor. *Change effective Spring 2010; see POLS 349.*

**POLS 338 Critical Issues in American Politics (4)****GE D5**

Examination of significant social, legal, economic and political issues that face the country and how the basic institutions of government—national, state, local—are responding to them; assessment of policies to correct these problems. 4 lectures. Prerequisite: Junior standing; completion of GE Area A, one course from Area D1, and one course from either Area D2 or D3, or consent of instructor. Fulfills GE D5 except for Political Science majors.

**POLS 339 Comparative Political Regimes (4)****GE D5**

A comparative examination of governing institutions used throughout the world. Emphasis on the diversity of governmental designs found within both authoritarian and democratic regimes. 4 lectures. Prerequisite: Junior standing; completion of GE Area A and one course from two of the three subfields of Area D1, D2, and/or D3, or consent of instructor. Fulfills GE D5 except for Political Science majors.

**POLS 341 American Constitutional Law (4)**

United States Supreme Court decisions in the areas of separation of powers, judicial review, commerce clause, federalism, due process. 4 lectures. Prerequisite: POLS 112, or consent of instructor.

**POLS 343 Civil Rights in America (4)****USCP**

Case-based examination of discrimination based on race, ethnic, gender, and sexual orientation in the United States. Emphasis on the Supreme Court's interpretation of the Equal Protection Clause. 4 lectures. Prerequisite: POLS 112, or consent of instructor. Fulfills USCP.

**POLS 344 Civil Liberties (4)**

Role of Supreme Court as interpreter of civil liberties. Topics may include freedom of expression and religion, search and seizure, due process of law. 4 lectures. Prerequisite: POLS 112, or consent of instructor.

**POLS 346 Politics in Literature (4)**

Political concepts and values examined, based on literary sources. Recent topics include: power, justice, violence and social responsibility. Authors whose works have been examined include: Brecht, Camus, Dostoevsky, Miller, Vonnegut, and Dorfman. Both plays and novels are used. 4 lectures. Prerequisite: POLS 112 or consent of instructor.

**POLS 347 Politics and Popular Culture (4)**

Intersection of politics and mass media. How political actors use popular culture to establish issue agendas, convey political concepts, symbolism, rhetoric and values. 4 lectures. Prerequisite: POLS 112 or consent of instructor.

**POLS 348 Early American Political Thought (4)****GE D5**

The central political ideas of America's leading thinkers from the arrival of the *Mayflower* to the Civil War. Selections may include readings of American political ideas from Winthrop, Paine, Publius, Hamilton, de Tocqueville, Douglass, Calhoun, Thoreau, and Lincoln, among others. 4 lectures. Prerequisite: **Completion of GE Area A, one course from Area D1, and one course from either Area D2 or D3, or consent of instructor. Fulfills GE D5 except for Political Science majors. Change effective Spring 2010.**

**POLS 349 Contemporary American Political Thought (4)****GE D5**

The central political ideas of America's leading thinkers from the Civil War to the present. 4 lectures. Prerequisite: **Completion of GE Area A, one course from Area D1, and one course from either Area D2 or D3, or consent of instructor. Fulfills GE D5 except for Political Science majors. Change effective Spring 2010.**

**POLS 351 Public Administration (4)**

Development of the management functions in government. Survey of administrative concepts and cases. Attention given to national, state and local administrative systems. Case studies and simulations. 4 lectures. Prerequisite: POLS 112, or consent of instructor.

**POLS 359-360 Research Design Political Analysis (4)**

Methodology and research design used in **political qualitative and quantitative** analysis. Examination of multiple methods used to analyze political phenomena in the political science discipline. 4 lectures. Prerequisite: POLS 180, or consent of instructor. *Change Summer 2009.*

**POLS 361 Quantitative Methodology (4)**

Survey of quantitative methodology in political science, up to and including multiple regression. Laboratory computer instruction to facilitate understanding of quantitative approaches to political research. 3 seminars, 1 activity. Prerequisite: POLS 360, STAT 221 or consent of instructor.

**POLS 375 California Politics (4)**

Political culture, processes, behavior, institutions, public policy and distribution of power in California state and substate governments. 4 lectures. Prerequisite: POLS 112, or consent of instructor.

**POLS 380 Religion and Politics in the Israeli-Palestinian Conflict (4)**

The root causes of the Israeli-Palestinian conflict and its current manifestation. Possibilities for solutions from the perspectives of religious studies and political science. 4 lectures. Prerequisite: POLS 225 or POLS 229 or RELS 201. *Crosslisted as POLS/RELS 380.*

**POLS 381 Peace and War (4)**

Dynamics of interstate peace and war. Topics include: military strategy, the military-industrial complex, arms races and disarmament, diplomacy, deterrence and pre-emption, collective security and alliance behavior, civil-military relations, post-conflict reconstruction, and the role of international law and organizations. 4 lectures. Prerequisite: POLS 225 or consent of instructor.

**POLS 382 Comparative Foreign Policy (4)**

Systematic analysis of the international and domestic pressures leading different states to take particular foreign policy stances, with appropriate examples taken from different regions of the world. Discussion of contemporary foreign policy issues and responses. 4 lectures. Prerequisite: POLS 225 or consent of instructor.

**POLS 383 Politics of the European Union (4)**

History and development of the European Union in the context of theories of regional integration. Overview of institutional and policymaking machinery of the EU. Current issues facing member states. Impact of EU on US interests and world politics more generally. 4 lectures. Prerequisite: POLS 225 or consent of instructor.

**POLS 385 Advanced Model United Nations (2) (CR/NC)**

Preparation for participation in collegiate Model United Nations conferences. Rules of procedure and debate, preparation of country position papers, and resolution writing. Discussion of current issues of concern to the United Nations. Credit/No Credit grading only. Total credit limited to 6 units. 2 lectures. Prerequisite: POLS 285 or consent of instructor.

**POLS 386 Government Internship (2–12) (CR/NC)**

Supervised work experience in a government or related public agency. Intern will function as an employee subject to all the duties and responsibilities of employees engaged in comparable work. 30 hours of work experience per unit of credit. Total credit limited to 12 units. Credit/No Credit grading. Recommended preparation: Junior standing with a minimum 2.5 GPA.

**POLS 395 Advanced Mock Trial (2) (CR/NC)**

Advanced preparation for participation in intercollegiate mock trial competitions. Emphasis on advanced topics and techniques related to evidence, trial procedure, objections, and witness examination. Extensive hands-on practice in arguing a legal case. Credit/No Credit grading only. Total credit limited to 4 units. 2 lectures. Prerequisite: POLS 295 or consent of instructor.

**POLS 400 Special Problems for Advanced Undergraduates (1–4)**

Individual investigation, research, study, or survey of selected problems. Total credit limited to 4 units. Prerequisite: Consent of department chair.

**POLS 419 Social Movements and Political Protest (4)**

Selected U.S. social movements, including abolitionism, feminism, civil rights, gay rights, the Christian right, and environmentalism. Political opportunities and constraints that impact collective political action, and effects of grassroots struggles for justice in U.S. politics and society. 4 lectures. Prerequisite: POLS 112 and junior standing, or consent of instructor.

**POLS 420 Contemporary U.S. Foreign Policy (4)**

Formulation and conduct of U.S. foreign policy. Analysis of the theory and elements of U.S. strategy; diplomacy, propaganda, economic operations, psychological warfare, and military strategies. 4 lectures. Prerequisite: POLS 225, or consent of instructor.

**POLS 426 International Organizations and Law (4)**

Transnational politics and strategies supporting and opposing different dimensions of globalization. Topics include international law and the use of force, challenges to the primacy of the nation-state, and movement toward a global culture as expressed in the development of human rights law. 4 lectures. Prerequisite: POLS 225 or POLS 324, or consent of instructor.

**POLS 427 Politics of the Global Economy (4)**

Political conflicts surrounding the trading, financial, and security structures of the international economy. Motivations, resources, and responses of states, international organizations, multinational corporations and other nonstate actors as they address economic, political, environmental, and security issues within these structures. Desirability and inevitability of globalization. 3 lectures and a research paper. Prerequisite: POLS 225, completion of GE D2, or consent of instructor.

**POLS 428 Issues and Topics in Comparative Politics (4)**

Selected topics and issues in the field of comparative politics. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 lectures. Prerequisite: POLS 229 or consent of instructor.

**POLS 429 Issues and Topics in International Relations (4)**

Selected topics and issues in the field of international relations. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 lectures. Prerequisite: POLS 225 or consent of instructor.

**POLS 430 Advanced Topics in Political Theory (4)**

In-depth examination of a theme or thinker in political theory. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 lectures. Prerequisite: POLS 230 or consent of instructor.

**POLS 451 Technology and Public Policy (4)**

Techniques for performing technical assessment and impact analysis in communication, transportation, health technologies, aerospace, electronics and other new technologies. Case studies on contemporary problems stemming from the relationship of technology and politics. 3 lectures and a research paper. Prerequisite: POLS 112, or consent of instructor.

**POLS 456 Politics and Economic Policy (4)**

Goals of economic policy, based on efficiency, equity, and other values. Theories of market failure and government regulation. Influence of electoral calculations, bureaucracy, and interest group pressures on government approaches to address market failures. Government intervention in the marketplace, and intervention by economic interests into politics, and how this challenges democracy 3 lectures and a research paper. Prerequisite: POLS 112, completion of GE D2; or consent of instructor.

**POLS 459 The Politics of Poverty (4)**

Analysis of the politics and policies associated with the American welfare state, focusing particularly on welfare and homelessness policies. Questions addressed concerning the causes of poverty and how social policy responds to poverty. 4 lectures. Prerequisite: POLS 112 and junior standing, or consent of instructor.

**POLS 461, 462 Senior Project I, II (2) (2)**

Selection and completion of a project under faculty supervision. Project results presented in a formal paper. Prerequisite: Senior standing (completion of 135 quarter hours), completion of required core courses and concentration. May not be taken CR/NC.

**POLS 470 Selected Advanced Topics (1–4)**

Directed courses on timely issues and topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1–4 lectures. Prerequisite: POLS 112, junior standing, or consent of instructor.

**POLS 471 Urban Politics (4)**

Theoretical approaches, concepts, and politics associated with urban governments. Urban power structures, the relationship between urban society and politics, and inter-governmental relations. 3 lectures and a research paper. Prerequisite: POLS 112, or consent of instructor.

**POLS 481 Senior Project Seminar (4)**

Selection, preparation and completion of senior project, focusing on current developments in the field of political science, with primary attention to American politics, public policy, international relations, or public administration. Project results presented in a formal paper. 3 seminars and a research paper. Prerequisite: Senior standing (completion of 135 quarter hours), completion of required core courses and concentration.

**POLS 500 Independent Study (1–4)**

Individual research, studies, or surveys under the supervision of the faculty. Total credit limited to 4 units. Prerequisite: Graduate standing with minimum of 12 core units.

**POLS 510 Research Design (4)**

Policy research problem definition, framing hypotheses, literature review, sampling, measurement, and approaches to analysis. 4 lectures. Prerequisite: Graduate standing or consent of instructor.

**POLS 515 Public Policy (4)**

Public policy making and contemporary policy issues, including markets; regulation; criminal justice; housing; environment; poverty; health care and education. 4 lectures. Prerequisite: Graduate standing, or consent of instructor.

**POLS 516 Public Finance (4)**

Economic and political factors affecting federal, state and local governments. Intergovernmental relations and policy considerations in finance, debt management and tax administration. 4 lectures. Prerequisite: POLS 515, or consent of instructor.

**POLS 517 Organizational Theory (4)**

Major theoretical approaches, concepts, case studies, and debates related to organizational theory. Emphasis on applications of concepts to public and non-profit organizations. 4 lectures. Prerequisite: POLS 515, or consent of instructor.

**POLS 518 Public Policy Analysis (5)**

Analysis of the social, economic, environmental, political contexts of public policy decisions. Public policy issues and use of concepts and tools related to monitoring and assessment **with particular emphasis on qualitative methods**. 4 lectures, 1 activity. Prerequisite: POLS 560 or consent of instructor. *Change effective Fall 2010.*

**POLS 550 Regulatory and Economic Policy (4)**

Theory, politics, and applications of government regulatory and economic policy, and skills and experience necessary to use this knowledge in applied policy making situations. 4 seminars. Prerequisite: POLS 510.

**POLS 560 Quantitative Methods (5)**

Social science methodology focusing on research design and quantitative methods used in policy and political research: multi-regression, non-linear techniques, diagnostics and time series. Advanced computer packages used to analyze challenging data sets. 4 lectures, 1 activity. Prerequisite: POLS 510, or consent of instructor.

**POLS 568 Topics and Issues in Public Policy (4)**

Selected advanced topics applicable to public policy problems. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 3 seminars and a research project. Prerequisite: POLS 510 or consent of instructor.

**POLS 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Graduate standing or consent of instructor.

**POLS 586 Policy Internship (4-8) (CR/NC)**

Supervised work experience in a government or related public agency. Intern will function as an employee engaged in comparable work. Credit/No Credit grading only. Total credit limited to 8 units. Prerequisite: Completion of 12 units of core courses in the Master of Public Policy Program.

**POLS 590 Graduate Seminar (4)**

Seminar designed as a culminating component to the Master of Public Policy Program. Individual research under the supervision of the faculty within a small discussion environment, leading to a graduate project or paper that demonstrates practical mastery of the MPP curriculum. Total credit limited to 8 units. 4 seminars. Prerequisite: POLS 560 and consent of academic program coordinator.

**POLS 595 Directed Readings for MPP Comprehensive Exams (2)**

Directed readings for Master of Public Policy (MPP) comprehensive exams. Regular consultation between advisor and student. The Schedule of Classes will list topic selected. Total credit limited to 4 units. 2 seminars. Prerequisite: POLS 590.

## 2009-11 Cal Poly Catalog

### Physics Department

#### PSC 461 Senior Project (2)

Selection and completion of a project under faculty supervision. Project results are presented in a formal report. Minimum of 60 hours total time.

## PSC—PHYSICAL SCIENCE

### PSC 101 The Physical Environment: Matter and Energy (4) GE B3 & B4

Introduction to the basic principles of physical science and application of these principles in modern society. Objects at rest and in motion, energy and power, fluids, heat, light, and sound. 3 lectures, 1 laboratory. Fulfills GE B3 & B4.

### PSC 102 The Physical Environment: Atoms and Molecules (4)

Introduction to the basic principles of the atomic, molecular, and sub-atomic behavior of matter, and applications of these principles in modern society. Electricity and magnetism, electrical nature of matter, organic and inorganic chemistry, modern physics, the nucleus. 3 lectures, 1 laboratory. Prerequisite: PSC 101.

### PSC 103 The Physical Environment: Earth and the Universe (4) GE B3

Introduction to the basic principles of the Earth sciences and astronomy, and applications of these principles in modern society. Structure and formation of the Earth, earthquakes, weather, oceanography, Solar System, stars, and cosmology. 3 lectures, 1 **laboratory activity**. Prerequisite: PSC 101. Fulfills GE B3. (*Change effective Spring 2010*)

### PSC 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

### PSC 201 Introduction to Physical Oceanography (4) GE B5

Ocean origin, evolution, and sea floor features. Sediments; sea water; the ocean and our climate. Ocean surface and deep currents; waves and tides; coastal ocean. Marine life, food production, organisms, environments and lifestyles. Coastal development, pollution and food. Ocean resources and law. 4 lectures. Fulfills GE B5.

### PSC 304 Applications of Physical Science (4)

Serious problems faced by technological societies worldwide, such as the destruction of ozone, runaway greenhouse effect, smog, acid rain, water pollution, nuclear radiation hazards, and the depletion of fossil fuels. 3 lectures, 1 activity. Prerequisite: PSC 101, PSC 102, PSC 103 or equivalent.

### PSC 305 Patterns of Change (4)

Patterns of change in the formation and evolution of the Universe, the Earth, and life. Topics include the Big Bang, radiometric dating, plate tectonics, the fossil record, biogeography, and the biochemical evidence that supports evolution. 3 lectures, 1 activity. Prerequisite: PSC 101 or PSC 103 or consent of instructor.

### PSC 307 Nuclear Weapons in the Post-9/11 World (4) GE Area F

Technology and basic science of fission/fusion weapons, uranium/plutonium, nuclear reactors, offensive/defensive missile systems, command/ control, verification, weapon effects, nuclear testing. Historical context of Cold War and proliferation, recent events, global norms, arms control treaties. 3 lectures, 1 seminar. Prerequisite: Junior standing and completion of GE Area B. Fulfills GE Area F.

### PSC 320 Energy, Society and the Environment (4) GE Area F

Science and technology of current and future energy sources along with associated environmental problems and societal response. Energy production, consumption, efficient usage, fossil fuels, nuclear, solar, other renewables. Risks, benefits, planning, economics. 3 lectures, 1 activity. Prerequisite: Junior standing and completion of GE Area B. Fulfills GE Area F.

### PSC 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

### PSC 424 Organizing and Teaching Science (4)

Techniques, aims and objectives in the teaching of physical and life sciences at the secondary level. Selection and organization of teaching material, including strategies for English language learners (ELL) and special needs students. Evaluation of results. 4 lectures. Prerequisite: Consent of instructor. *Crosslisted as BIO/PSC 424.*



## 2009-11 Cal Poly Catalog

### Psychology & Child Development Department

#### PSY-PSYCHOLOGY

##### **PSY 103 Pairing and Marriage (4)**

Functional approach to contemporary dating and pairing patterns with emphasis on developing communication during the early developmental stage of the paired relationships. 4 lectures.

##### **PSY 104 Effective Study Techniques (3) (CR/NC)**

Provides adequate instruction and practice in specific study skills such as note-taking, time-planning, memory, concentration, reading, test taking, self monitoring, and use of personal resources. Credit/No Credit grading only. 2 lectures, 1 activity.

##### **PSY 200 Special Problems for Undergraduates (1–4)**

Individual investigation, research, study or survey of selected problems in consultation and with prior approval of instructor. Written report required. Total credit limited to 4 units. Prerequisite: PSY 201 or PSY 202 and consent of department head.

##### **PSY 201 General Psychology (4)**

**GE D4**

Introduction to the psychological study of human beings. Applications and research in area such as psychobiology, perception, learning, motivation, consciousness, memory and cognition, personality, emotion, development, psychological assessment, social behavior, psychopathology and psychotherapy. A student may enroll for credit in either PSY 201 or PSY 202, but not both. 4 lectures. Fulfills GE D4.

##### **PSY 202 General Psychology (4)**

**GE D4**

Introduction to the psychological study of human beings. Applications and research in area such as psychobiology, perception, learning, motivation, consciousness, memory and cognition, personality, emotion, development, psychological assessment, social behavior, psychopathology and psychotherapy. A student may enroll for credit in either PSY 201 or PSY 202, but not both. 3 lectures, 1 discussion. Fulfills GE D4.

##### **PSY 204 Tutor Training and Certification (2) (CR/NC)**

Group study/tutorial certification program. Prepares students for certification with the College Reading and Learning Association (CRLA) tutor program. Emphasis on effective group study/tutorial strategies and techniques, communication skills, multicultural issues and disability awareness. Credit/No Credit grading only. 1 lecture, 1 activity.

##### **PSY 205 Human Sexuality (3) (CR/NC)**

Understanding development of personal sexuality. Sexual identity, biological aspects of sexuality, homosexuality, intimate relationships, communication, sexually transmitted diseases, sexual dysfunction, family planning, abortion. Emphasis on maintaining psychological and physical wellness. Credit/No Credit grading only. 3 lectures.

##### **PSY 212 Interpersonal Communication (4)**

Introduction to the interaction process in two-person (dyadic) communication settings. Emphasis on the functions of varying messages in the initiation, development, maintenance and termination of personal and professional relationships. 4 lectures. *Crosslisted as COMS/PSY 212.*

##### **PSY 251 Laboratory in Group Activities (1–3) (CR/NC)**

Skills and techniques of solving problems in large and small groups. Conducting and reporting meetings. Analyses of leadership dynamics in campus organizations. Credit/No Credit grading only. Total credit limited to 6 units. 1–3 activities.

##### **PSY 252 Social Psychology (4)**

How attitudes, beliefs, and behavior are affected by the social situation. Gender roles, prejudice, aggression, altruism, attitudes and persuasion, liking and loving, and group behavior. Use of social psychology to understand diversity issues, reduce racism and sexism and international conflict, improve relationships, and communicate persuasively. 4 lectures. Prerequisite: PSY 201 or PSY 202.

##### **PSY 254 Family Psychology (4)**

Introduction to research and theory on family relationships and behavior across the lifespan. Contextual influences, diversity of family forms, and topics such as love, mate selection, marital quality, parenting, gender, household work,

divorce, and remarriage. 4 lectures. Prerequisite: PSY 201 or PSY 202.

*Crosslisted as CD/PSY 254.*

##### **PSY 256 Developmental Psychology (4)**

Introduction to the scientific study of development with emphasis on the lifespan, from infancy to old age. Basic research and concepts in understanding social, emotional, cognitive, contextual, and diversity influences on development. 4 lectures. Prerequisite: PSY 201 or PSY 202.

##### **PSY 270 Selected Topics (1–4)**

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### **PSY 301 Psychology of Personal Development (4)**

Application of developmental psychology to self awareness. Includes communication skills, self modification skills and examination of life goals and values. 4 lectures. Prerequisite: PSY 201 or PSY 202.

##### **PSY 302 Behavior in Organizations (4)**

Characteristics of functioning organizations and their effects on individuals. Psychological issues relevant to the maintenance of the organization. Motivation, leadership, group phenomena, communication, decision-making, attitudes, personnel selection and organizational change. 4 lectures. Prerequisite: PSY 201 or PSY 202.

##### **PSY 305 Personality (4)**

Personality theories and research. Assessment, dynamics, and development of personality. Trait, behavioral, social learning, cognitive, humanistic, psychoanalytic and biological approaches. 4 lectures. Prerequisite: PSY 201 or PSY 202.

##### **PSY 306 Adolescence (4)**

Psychological analysis of the years from prepubescence to young adulthood. Current research on behavior and development during adolescence with emphasis on physical, affective, cognitive, sociocultural, historical, family, peer and school aspects of life during the post-child, pre-adult years. 4 lectures. Prerequisite: CD 207 or PSY 256, PSY 201 or PSY 202, junior standing. *Crosslisted as CD/PSY 306.*

##### **PSY 309 Psychology of Consciousness (4)**

Characteristics and functions of selected, qualitatively unique patterns of consciousness such as hypnosis, meditation, dreaming, drug experiences and parapsychological phenomena, with particular emphasis on adaptive and maladaptive expressions of these states of consciousness. 4 lectures. Prerequisite: PSY 201 or PSY 202.

##### **PSY 310 Psychology of Death (4)**

Psychological aspects of death, loss and grief, including scientific findings, person-culture transactions and expressions in the arts and humanities. Personal exploration and interdisciplinary application of psychology to issues such as death anxiety, dying processes, funerals, immortality beliefs, suicide, and grieving. 4 lectures. Prerequisite: PSY 201 or PSY 202, or consent of instructor.

##### **PSY 311 Environmental Psychology (4)**

**GE D5**

Interrelationship between behavior and the built and natural environments. Evaluating and understanding environments, environmental stress, and the human aspects of environmental problems. 4 lectures. Prerequisite: Junior standing; completion of Area A; any two lower-division GE Area D courses; PSY 201 or PSY 202 recommended. Fulfills GE D5 except for Psychology and Child Development majors.

##### **PSY 314 Psychology of Women (4)**

The lives of women from a psychological perspective. Topics include gender similarities and differences; masculinity, femininity, and androgyny; women's mental and physical health; female sexuality; women's roles in the workplace and the home; and harassment and violence against women. 4 lectures. Prerequisite: PSY 201 or PSY 202. *Crosslisted as PSY/WGS 314.*

##### **PSY 315 Psychology of Men (4)**

Central issues in male psychology including stereotypes, gender differences, sex-roles and their development, sex and role typing, male sexuality and models of masculinity. Health, mental and emotional disorders of men, and aging. 4 lectures. Prerequisite: PSY 201 or PSY 202.

##### **PSY 317 Psychology of Stress (4)**

Examines the relationship between stress and psychological and physical well-being. Research on the psychological factors influencing stress as well as a



description and critical evaluation of methods of stress reduction. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 318 Psychology of Aging (4)**

**GE D5**

Psychological and physiological aging in the context of the culture. Theories and research relating to the issues of stability and both positive and negative changes in perception, learning, memory, intelligence, personality, identity, motivation, sexuality, family relationships, career. Disorders, institutionalization, death and bereavement. 4 lectures. Prerequisite: Junior standing; completion of Area A; any two lower-division GE Area D courses; PSY 201 or PSY 202 recommended. Fulfills GE D5 except for Psychology and Child Development majors.

**PSY 319 Motivation and Emotion (4)**

Examination of the mechanistic and cognitive-based theories of motivation and emotion. Practical applications of each theory covered in an attempt to understand certain personal and societal behaviors. Research evaluating each theory and diversity consideration. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 323 The Helping Relationship (4)**

Basic skills and approaches common to helping relationships with children, adults, and families. Examines theoretical, empirical, and practical applications of helping. Differentiation between professional, paraprofessional, and nonprofessional helping relationships. 2 lectures, 2 activities. Prerequisite: Junior standing, cultural pluralism course, Psychology & Child Development majors only, or consent of instructor.

**PSY 325 Introduction to Positive Psychology (4)**

Scientific study of the enhancement of strengths and optimal functioning in humans. Basic research, assessment and helping concepts in understanding optimal functioning within diverse populations. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 329 Research Methods in Psychology (4)**

Introduction to research methods used in psychology and other behavioral sciences. Topics include the logic and ethics of research; experimental, correlational, and survey methodology; library search strategies; basic statistical procedures; and the format of the research report. 3 lectures, 1 activity. Prerequisite: PSY 201 or PSY 202, STAT 217 or ~~STAT 211~~ **STAT 251 or STAT 252**, or consent of instructor. *Change effective Winter 2011.*

**PSY 330 Behavioral Effects of Psychoactive Drugs (4)**

Pharmacokinetic, pharmacodynamic and behavioral effects of psychoactive drugs. Social and psychological issues related to drug use and misuse. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 333 Quantitative Research Methods for the Behavioral Sciences (3)**

Thorough introduction to the quantitative aspects of empirical research. Using SPSS statistical software, students will learn how to choose, conduct, and interpret analyses of research data from different behavioral science disciplines. 2 lectures, 1 activity. Prerequisite: PSY 329 or ~~SOC 333~~, and STAT 217 or **STAT 251**, or consent of instructor. *Change effective Winter 2011.*

**PSY 339 Psychology of Religion (4)**

Major psychological perspectives on religion, faith, and religious experience. Objective and subjective approaches to the study of religion as related to prayer, meditation, social attitudes, behavior, mental health, mysticism, religious orientation, and personal development. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 340 Biopsychology (4)**

**GE B5**

Relationship between physiological and behavioral processes such as learning and memory, language, sleep, and abnormal behavior. Information processing, biochemistry, and structural organization at the cellular and nervous system levels. 4 lectures. Prerequisite: PSY 201 or PSY 202. Fulfills GE B5.

**PSY 350 Teamwork (4)**

Group dynamics applied to teams. Topics include team development, basic team processes, conflict management, decision making, leadership, problem solving, and the impacts of diversity and culture on teams. Focus on effective use of teams in the workplace. Not open to students with credit for PSY 351. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 351 Group Dynamics (4)**

Dynamics of small groups. Topics include functions of groups, group structure, power, leadership, intragroup conflict, personal space and territoriality, groups as agents of societal and personal change. Demonstrations emphasizing

experiential learning in groups. Not open to students with credit for PSY 350. 2 lectures, 2 activities. Prerequisite: PSY 252 or PSY 323.

**PSY 352 Conflict Resolution: Violent and Nonviolent (4)**

**GE D5**

Psychological, situational, political, and cultural determinants of violence and nonviolence in interpersonal, intergroup, and international conflict. Self-assessment of conflict resolution attitudes, competencies, and behaviors. Negotiation, mediation, and other approaches to conflict management. Educational and structural approaches to violence prevention. 4 lectures. Prerequisite: Junior standing PSY 201/202, completion of GE Area A, and one course from Area D3. Fulfills GE D5 except for Psychology and Child Development majors.

**PSY 359 Applied Psychology Research Methods (4)**

Methods of testing hypotheses and evaluating social interventions in real-world settings. Interview, survey, correlation, field experimental, and quasi-experimental methods. Program evaluation. Experience with data collection and computer analysis. 3 lectures, 1 activity. Prerequisite: PSY 329.

**PSY 360 Applied Social Psychology (4)**

Applications of social psychology to education, business and industry, environmental problems, interpersonal and intergroup relations, health and welfare, mass communication, judicial systems, and politics. Analysis of social and organizational problems, methods of intervention, and program evaluation. 4 seminars. Prerequisite: PSY 252.

**PSY 366 Experimental Psychology (4)**

Research methodology and experimental design. Application of descriptive and inferential statistics to data from various content areas including development, animal and human learning, memory, cognition, and psychophysical processes. 3 lectures, 1 laboratory. Prerequisite: PSY 329, junior standing or consent of instructor.

**PSY 370 Introduction to Clinical and Counseling Psychology (4)**

Introduction to the fields of clinical and counseling psychology. History, education and training, theories, assessment, diagnosis, and treatment. Introduction to diverse settings, ethical principles, legal guidelines, credentialing and employment opportunities. 4 lectures. Prerequisite: Any two Psychology courses.

**PSY 375 Forensic Psychology (4)**

Application and practice of psychology in both the civil and criminal justice systems. Examination of police and investigative psychology, correctional psychology, expert witness testimony, psychological evaluations for the courts, understanding aggression. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 390 Career Planning (2) (CR/NC)**

Individual career and graduate school planning. Current employment issues for college graduates such as career profiles, trends and work environments. Credit/No Credit grading only. 2 seminars. Prerequisite: Junior standing or consent of instructor. *Crosslisted as CD/PSY 390.*

**PSY 400 Special Problems for Advanced Undergraduates (1-4)**

Individual investigation, research, study or survey of selected problems in consultation and with prior approval of instructor. Written report required. Total credit limited to 4 units. Prerequisite: PSY 201 or PSY 202.

**PSY 401 Special Problems: Experiential Learning (2-4) (CR/NC)**

Supervised experience in various community, governmental, educational, or research settings. Especially designed for individuals in applied settings requiring additional hours or a pre-fieldwork training experience. Applied psychological, developmental, or educational experiences determined by participating institution, supervising faculty member, and student. Cannot be substituted for PSY 448, PSY 449, PSY 453, or PSY 454. Credit/No Credit grading only. Total credit limited to 4 units. Prerequisite: Psychology major or gerontology minor, junior standing, and consent of instructor.

**PSY 405 Abnormal Psychology (4)**

Normal and abnormal behavior in everyday life. Anxiety, somatoform, dissociative, mood, childhood, personality, psychotic, cognitive, eating, and substance use disorders and their treatment. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 410 History and Systems of Psychology (4)**

Survey of the philosophical and scientific roots of modern psychology, pioneer laboratories, systems, and schools of psychology, the refining of experimental methods, and applications of psychology in testing and psychological services. Examination of contributions by women and minorities in psychology. 4

seminars. Prerequisite: PSY 201 or PSY 202, PSY 305, PSY 458 or consent of instructor.

**PSY 413 Parent-Child Relationships (4)**

Application of major theories to understanding of parent-child relations. Examination of primary prevention strategies and programs. Review of current research and evaluation of literature on parent-child interactions. 4 lectures. Prerequisite: PSY 256, junior standing.

**PSY 419 Self and Identity (4)**

Concepts, theories, and research related to the development of the self across the lifespan. Examination of the influence of temperament, culture, individuation, self-esteem, self-awareness, roles and identity on maturity. 4 seminars. Prerequisite: PSY 256 or PSY 305 and senior standing.

**PSY 420 Social and Emotional Development (4)**

Analysis of the development of social interaction and emotional processes across the lifespan. Research and theories on such behaviors as attachment and love, empathy and altruism, competition and aggression, peer relations and cooperation. 4 seminars. Prerequisite: PSY 256 or consent of instructor.

**PSY 421 Language and Cognitive Development (4)**

Examination of significant processes in the development of cognition across the lifespan. Theory and research regarding Piagetian theory, information processing, problem solving, creativity, and language development. Educational and counseling applications. 4 seminars. Prerequisite: PSY 201 or PSY 202.

**PSY 422 Lifespan Sexuality (4)**

Sexual interest, activity, and functioning from birth through the late adult years. Influence of sexual roles, attitudes, and adaptation during the life span. Sexual practices in our society. Therapies for enhancing a comfortable sexuality. 4 lectures. Prerequisite: PSY 201 or PSY 202, or PSY 205, and junior standing.

**PSY 430 Sensation and Perception (4)**

Principles of sensory systems, psychophysics, attention and the perception of color, shape, movement, space, and time. Survey of the development of perception through the lifespan. 4 lectures. Prerequisite: PSY 201 or PSY 202.

**PSY 431 Assessing Children's Development and Environments (4)**

Current developmental and environmental assessments used in childcare and educational settings and in research. Practice using, creating, and evaluating child assessments. 3 lectures, 1 activity. Prerequisite: CD 304 and CD 305 or two of the following: PSY 419, PSY 420, PSY 421. *Crosslisted as CD/PSY 431.*

**PSY 432 Psychological Testing (4)**

Theory and practice of psychological measurement and testing. Principles of test construction, administration, and interpretation. Survey of common testing domains such as intelligence, scholastic aptitude and achievement, and personality. 4 lectures. Prerequisite: PSY 201 or PSY 202, junior standing.

**PSY 444 The Atypical Infant (4)**

Exploration of issues pertinent to the development of atypical infants. Relationship of theory and research to intervention efforts with handicapped, developmentally delayed infants, and other at-risk infants. 3 seminars, 1 activity. Prerequisite: Junior standing, PSY 256, and EDUC 440 or consent of instructor. *Crosslisted as EDUC/PSY 444.*

**PSY 448, 449 Research Internship I, II (5) (5) (CR/NC)**

Faculty-supervised research experience on various topics in psychology. Student apprenticeship with a department faculty member to conduct research. Responsibilities include some or all of the following: collecting data, entering and/or analyzing data, electronic literature search, report writing. Credit/No Credit grading only. Prerequisite: PSY 329, PSY 333, Psychology major, junior standing, and consent of instructor. Recommended: PSY 366.

**PSY 450 Family Intervention (4)**

Basic elements of marriage and family therapy and crisis intervention. Emphasis on concepts, goals, and techniques of various family therapy approaches and family crisis intervention. 4 lectures. Prerequisite: PSY 254, or graduate standing.

**PSY 453, 454 Supervised Fieldwork I, II (5) (5) (CR/NC)**

Supervised fieldwork experience in various community, governmental, and educational settings. Applied psychological, developmental, or educational experiences determined by participating institution, supervising faculty member, and student. Credit/No Credit grading only. Prerequisite: PSY 323, Psychology majors, junior standing, and consent of instructor.

**PSY 456 Behavioral Disorders in Children (4)**

Applications of psychological principles to childhood behavioral disorders. Aggression, delinquency, stress reactions, motivational, perceptual-attentional deficiencies, psychoses, anxiety disorders, biological dysfunctions, and retarded social and cognitive development. 4 seminars. Prerequisite: PSY 201 or PSY 202, junior standing.

**PSY 457 Memory and Cognition (4)**

Principles and theories of memory and cognition including processes; models of perception, attention and memory; concept formation; language; intelligence; problem-solving and decision making; creativity; applications to areas such as law, artificial intelligence, and education. 4 lectures. Prerequisite: PSY 201 or PSY 202, PSY 329 or consent of instructor.

**PSY 458 Learning (4)**

Theoretical and philosophical foundations of the experimental analysis of behavior. Principles of classical and operant conditioning including aversive control of behavior through punishment and avoidance learning and the theoretical basis for behavior therapy techniques and applications of learning principles in education and health settings. 4 lectures. Prerequisite: PSY 201 or PSY 202, junior standing.

**PSY 459 Lifespan Theories (4)**

Comparative study of theories that have been offered as explanations for lifespan development. Controversial issues, evaluations and applications of theories. Emphasis on biological, psychological, and social aspects of lifespan development. 4 seminars. Prerequisite: PSY 201 or PSY 202, junior standing.

**PSY 460 Child Abuse and Neglect (4)**

Issues in child maltreatment, including definitions and forms, causes, consequences, assessment, reporting, treatment, and prevention. Possible links among research, intervention, and public policy will be emphasized. 4 seminars. Prerequisite: PSY 201 or PSY 202 and junior standing.

**PSY 461 Senior Project Seminar (1) (CR/NC)**

Discussion of occupational and graduate school opportunities and of current issues in psychology for the purpose of defining professional objectives and individual projects for PSY 462. Senior project progress reports with class critique. Psychology majors only. Credit/No Credit grading only. 1 seminar. Prerequisite: PSY 329, PSY 448 or PSY 453, Graduation Writing Requirement.

**PSY 462 Senior Project (3)**

Design and completion of a faculty-supervised project in psychology. The project must be presented in a formal, written report. Minimum of 90 hours total time. Psychology majors only. Prerequisite: PSY 461.

**PSY 465 Cross-Cultural Issues in Psychology (4)**

Psychological, cultural, ecological and behavioral influences on human development in different cultural settings. Focuses on from one to three different cultures outside the U.S. in any given quarter. 4 seminars. Prerequisite: PSY 201 or PSY 202 and junior standing.

**PSY 470 Selected Advanced Topics (4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 4 seminars. Prerequisite: Junior standing and consent of instructor.

**PSY 472 Multicultural Psychology and Diversity (4)**

USCP

The impact of culture, ethnicity, and race on human behavior within the framework of psychological theory and research. Emphasis on ethnic minority groups within the U.S. including: African Americans, Native Americans, Asian Americans/Pacific Islanders, and Latino/a Americans. Not open to students in MS Psychology program. 4 seminars. Prerequisite: PSY 201 or PSY 202 and junior standing.

**PSY 485 Cooperative Education Experience (6) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 6 units; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**PSY 494 Psychology of Technological Change (4)**

Examines the impact of technological change on the psychological and social characteristics of people and organizations. Identifies personal, social and organizational factors which provide obstacles and opportunities for

technological change. Survey of methods of reducing the negative impact of change. 4 seminars. Prerequisite: PSY 201 or PSY 202 and senior standing.

**PSY 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 6 units; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**PSY 500 Individual Study (1-6)**

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Only 6 units may be applied to degree requirements. Prerequisite: Consent of department head, graduate major advisor and supervising faculty member.

**PSY 504 Psychopharmacology (4)**

Advanced course in brain-behavior relationships. Neuropathology of brain disorders including the neurochemical etiology and treatment of mental illness and chemical dependency. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**PSY 555 Counseling and Communication (4)**

Overview of the counseling profession, history, philosophy, theory, and ethics. Emphasis on developing interviewing, assessment and communication skills. Required practicum. 3 seminars, 1 activity. Prerequisite: EDUC/PSY 560; graduate standing or consent of instructor.

**PSY 556 Multicultural Counseling and Psychology (4)**

Psychological, cultural, and ecological analysis of the experiences and histories of various cultural groups within the United States. Development of personal self-awareness of multicultural issues and culturally relevant counseling skills. 3 seminars, 1 activity. Prerequisite: PSY 555.

**PSY 560 Individual Therapy: Theory and Application (4)**

Counseling theories and concepts applied to individuals. Develop skills in interviewing, assessment, intervention selection, termination and crisis intervention. Ethics and law included. 3 seminars, 1 activity. Prerequisite: PSY 305 or consent of instructor, graduate standing.

**PSY 564 Ethics and the Law: MF Therapy (4)**

Ethical, legal and case management issues related to individual, child, family and group therapy. Client rights and professional orientation to ethical standards and state regulation of clinical practice. 4 seminars. Prerequisite: EDUC/PSY 560, PSY 450 or consent of instructor.

**PSY 565 Diagnosis and Treatment: Psychopathology (4)**

Assessment of mental status. Diagnostic and statistical Manual of Mental Disorders, treatment planning, treatment case documentation and research applied to client psychopathology. 3 seminars, 1 activity. Prerequisite: EDUC/PSY 560, PSY 405, or consent of instructor.

**PSY 566 Group Therapy: Theory and Application (4)**

Group therapy theory, leadership and research applied to client assessment, screening, treatment selection, evaluation and termination. Ethics, law included. 2 seminars, 2 activity. Prerequisite: EDUC/PSY 560, or consent of instructor.

**PSY 568 Advanced Psychotherapies (4)**

Theory and application of advanced approaches in psychotherapy, including: cognitive-behavioral therapies, psychodynamic therapies and humanistic/existential therapies. The Schedule of Classes will list therapy selected. Total credit limited to 12 units. 4 seminars. Prerequisite: EDUC/PSY 560, PSY 565 or consent of instructor.

**PSY 569 Counseling Clinic Practicum (3) (CR/NC)**

Applied experience and instruction in assessment, diagnosis, treatment planning and treatment of individuals, couples, families and children under direct supervision of faculty in program clinic. Weekly meetings. Total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: PSY 450, PSY 555, PSY 565, or consent of instructor.

**PSY 570 Selected Topics in Psychology and Human Development (4)**

Directed group study of selected topics for advanced students. Open to graduate students and selected seniors. The Schedule of Classes will list title selected. Total credit limited to 8 units. 3 seminars, 1 activity. Prerequisite: Graduate standing or consent of instructor.

**PSY 571 Family Therapy: Theory and Application (4)**

Theory and application of process, structural and systems approaches to family and couple therapy. Assessment, diagnosis, treatment and follow-up of family and couple therapy with required supervised activities. Ethics and law related to family therapy. 3 seminars, 1 activity. Prerequisite: PSY 450, EDUC/PSY 555 or consent of instructor.

**PSY 572 Child and Adolescent Therapy: Theory and Application (4)**

Assessment, diagnosis, treatment planning and therapeutic modalities appropriate for children and adolescents. Seven hours of instruction in abuse and neglect of children with relevant ethics and law. Effective parenting approaches and integration of family treatment. 3 seminars, 1 activity. Prerequisite: PSY 405, PSY 456, PSY 555, EDUC/PSY 560 or consent of instructor.

**PSY 573 Field Experience: Counseling (6) (CR/NC)**

Practical application of guidance services and counseling in public schools, colleges and community settings. Weekly seminars with university staff included. Total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: PSY 569 and consent of M.S. program committee.

**PSY 574 Psychological Assessment (4)**

Administration, scoring and interpretation of psychological tests. Reliability and validity of psychological measures. Ethical and cultural issues in testing. 4 seminars. Prerequisite: Graduate standing.

**PSY 575 Gender, Couple and Sexual Dysfunction Therapy (4)**

Antecedents to sex-role identity, gender aware therapy, couple therapy, treatment of spousal abuse, assessment, diagnosis, treatment of sexual dysfunction. 4 seminars. Prerequisite: PSY 450 and PSY 560.

**PSY 576 Traineeship: Marital and Family Counseling (4) (CR/NC)**

Supervised experience in applied psychotherapeutic techniques, assessment, diagnosis and treatment of individual, marital, family and child relationship problems. Total credit limited to 16 units. Credit/No Credit grading only. Weekly seminar with on-site and university supervisors. Prerequisite: PSY 569, PSY 564 and consent of M.S. program committee.

**PSY 585 Research Methods for Counseling Psychology (4)**

Research methods relevant to practitioners in counseling psychology and human services. Basic understanding of descriptive and inferential statistics as well as applications related to these topics. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**PSY 588 Substance Abuse (4)**

Etiological, assessment, diagnostic, and treatment models of chemical dependency. Comparison of disease/medical, psychodynamic, cognitive/ behavioral, humanistic, existential, and sociocultural approaches. Differential diagnosis, comorbidity with other conditions, and associated factors. 4 seminars. Prerequisite: Graduate standing and PSY 565, PSY 574, or consent of instructor.

**PSY 599 Thesis (4)**

Completion of a thesis pertinent to the fields of psychology and human services. Prerequisite: PSY 585.

**2009-11 Cal Poly Catalog**  
**Psychology and Child Development**  
**Department**

**BS PSYCHOLOGY**

- ☐ 60 units upper division      ☐ GWR  
 ☐ 2.0 GPA                      ☐ USCP

\* = Required in Major/Support; also satisfies GE

Note: No major, support or concentration courses  
 may be taken as credit/no credit.

**MAJOR COURSES**

PSY 201/PSY 202 General Psychology (D4)*.....	4
PSY 252 Social Psychology .....	4
PSY 256 Developmental Psychology .....	4
PSY 305 Personality.....	4
PSY 323 The Helping Relationship .....	4
PSY 329 Research Methods in Psychology .....	4
PSY 333 Quant. Research Meth.-Behavioral Sci. ....	3
PSY 340 Biopsychology (B5)* .....	4
PSY 405 Abnormal Psychology .....	4
<i>Supervised Fieldwork and/or Research Internship.</i>	
Select two courses from the following:	
PSY 448, 449, 453, 454.....	5,5
PSY 457 Memory and Cognition .....	4
PSY 458 Learning .....	4
PSY 461 Senior Project Seminar.....	1
PSY 462 Senior Project.....	3
PSY 472 Multicultural Psychology and Diversity (USCP) .....	4
PSY electives (300–400 level) .....	12
Concentration or individualized course of study .....	28
	<b>101</b>

**SUPPORT COURSES**

BIO 302 Human Genetics .....	4
STAT 217/STAT 251/STAT 252 (B1)* .....	4
	<b>8</b>

**GENERAL EDUCATION (GE)**

72 units required, 12 of which are specified in Major/Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing.....	4

**Area B Science and Mathematics (12 units)**

B1 Mathematics/Statistics * 4 units in Support plus	4
B2 Life Science .....	4
B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	
B5 elective	
Area B elective (select one course from B1-B5)	
* 4 units in Major .....	0

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4

C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) * 4 units in Major .....	0
D5 Upper-division elective (Not PSY courses) .....	4

**Area F Technology Elective (upper division)**

(4 units) .....	4
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**60**

**FREE ELECTIVES .....**

**11**

**180**

**CONCENTRATIONS OR ELECTIVES (select one)**

**Applied Social Psychology Concentration**

PSY 302 Behavior in Organizations.....	4
PSY 360 Applied Social Psychology .....	4
Select two of the following:.....	8
PSY 311, 317, 350/351, 352, 359, 432, 465, 494	
Advisor approved concentration electives .....	12
	<b>28</b>

**Counseling and Family Psychology Concentration**

PSY 370 Intro. Clinical & Counseling Psychology	4
Select two of the following:.....	8
PSY 325, 330, 350/351, 375, 413, 432, 450, 456, 460 <b>12/15/09</b>	
Select one of the following.....	4
PSY 314 <b>or 324</b> , 315, 318, 465; <b>(8.5.13)</b>	
ES 320, 321, 322, 323, 380, 381;	
WGS 301, 320, 340, 370	
Advisor approved concentration electives .....	12
	<b>28</b>

**Developmental Psychology Concentration**

PSY 419 Self and Identity .....	4
PSY 420 Social and Emotional Development .....	4
PSY 421 Language and Cognitive Development ....	4
Select one of the following:.....	4
PSY/CD 431, PSY 310, 318, 413, 422, 456, 459, 460	
Advisor approved concentration electives .....	12
	<b>28</b>

**Individualized Course of Study..... 28**

*Courses are selected by the student with the approval of  
 the student's academic advisor and the department chair.  
 The ICS may include a Cal Poly minor, course  
 prerequisites for graduate study, foreign language  
 courses, and/or a coherent group of courses including a  
 minimum of two upper division psychology courses and  
 no more than nine units of lower division courses.*

**2009-11 Cal Poly Catalog****Psychology and Child Development  
Department****PSYCHOLOGY MINOR**

The minor provides students with a broad background in the principles of psychology in order to develop an appreciation of the human element in the world around them, complement their professional training, and enhance their personal development and interpersonal effectiveness. Students whose primary job responsibilities will require dealing with people should find employment opportunities increased and career advancement enhanced. Interested students are encouraged to contact the Psychology and Child Development Department for information and application forms. An application form must be approved by a Psychology Minor advisor. *Minimum of 16 units 300-400 level courses required.*

<b>Required courses</b>	<i>Units</i>
PSY 201/202 General Psychology (D4) .....	4
STAT 217/221/251 (B1) <i>or</i> STAT 321 (B6) .....	4-5
Select two of the following .....	8
PSY 252/PSY 254/PSY 256 (4) (only one can be counted in the minor)	
PSY 305 Personality (4)	
PSY 340 Biopsychology (4) (B5)	
PSY 405 Abnormal Psychology (4)	
<b>PSY elective courses (300–400 level) .....</b>	<b>12</b>
<sup>1</sup> PSY 305 Personality (4)	28-29
PSY 324 Psychology of Gender (4)	
<sup>1</sup> PSY 340 Biopsychology (4) (B5)	
<sup>1</sup> PSY 405 Abnormal Psychology (4)	
(1/27/15)	

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<sup>1</sup> If a course is taken to meet a requirement, it cannot be double-counted as an approved elective for the minor. (9/10/14)

**RANGELAND RESOURCES MINOR**

Earth and Soil Sciences

Bldg. 52, Room C43, (805) 756-2261

**Coordinator: Brent G. Hallock**

Managing productive and sustainable rangelands, incorporating knowledge of rangeland ecosystems and applying this to grazing animal systems are the main objectives of this interdisciplinary program. The Earth and Soil Sciences and the Animal Science Departments sponsor this minor. Students learn to develop ranch water quality plans and a holistic approach to management. The courses provide knowledge and experience regarding the interactions of plants, animals, water, and soil to improve rangeland health. Careers associated with this minor are rangeland specialists, ecologists, wildland managers, ranchers, and environmental specialists. This minor offers sufficient courses to allow students to meet the educational requirements for Certified Rangeland Manager.

Before being admitted to the program, students must have successfully completed the following courses:

BOT 121 *or* BIO 162, GE Area B1 MATH course, SS 121.

**Required courses.** At least one-half of the units must be 300-400 level. Select courses with advisor approval.

*Range Resource Area* ..... 7-8

ASCI 329 (4) ~~(3)~~ and AG 360 (4)

(*Winter 2011*)

*Rangeland Animal Management Area.*

Select one course from: ..... 4

ASCI 223/311/339; BIO 427

*Rangeland Plant Physiology Area* ..... 4

BIO 435

*Rangeland Ecology Area.* Select one course from: 4

BOT 326; NR 306; PPSC 321

*Rangeland Measurements Area.*

Select one course from: ..... 4

BIO 419; CRSC 411; ERSC 202; SS 321/440

*Rangeland Policy/Planning Area.* 3

Select one course from:

ASCI 476; CRP 342/404/408; NR 404/408; SS 433

26-27



**2009-11 Cal Poly Catalog****Recreation, Parks, and Tourism  
Administration Department****BS Recreation, Parks, and Tourism  
Administration**

☐ 60 units upper division ☐ GWR  
☐ 2.0 GPA ☐ USCP

\* = Required in Support; also satisfies GE

Note: No major, support or concentration courses  
may be taken as credit/no credit.

**MAJOR COURSES**

RPTA 101 Intro. to Recreation, Parks and Tourism	4
RPTA 110 Career Planning/Rec, Parks & Tourism	1
RPTA 205 Leadership and Facilitation <i>or</i> RPTA 257 ..	4
RPTA 210 Introduction to Program Design <i>or</i> RPTA 260 Recreational Sport Programming.....	4
<sup>†</sup> RPTA 252 Therapeutic Rec. & Special Populations <i>or</i> RPTA 221 .....	4
RPTA 342 Legal Aspects of Rec, Parks/Tourism ....	4
<sup>3†</sup> RPTA 350 Recreation Areas and Facilities Mgt .....	4
RPTA 360 Assessment/Eval of Rec Parks/Tourism	4
RPTA 405 Recreation, Parks, and Tourism Mgt ....	4
<sup>†</sup> RPTA 413 or EHS 337 or LA 363 <i>or</i> RPTA 302 or 313 <i>or</i> 314 <i>or</i> 321 <i>or</i> 325 <i>or</i> 370 <i>or</i> 412 .....	4
RPTA 424 Financing Rec., Parks, & Tourism Svcs	4
RPTA 460 Research in Recreation, Parks/Tourism	4
<sup>4</sup> RPTA 461 Senior Project.....	3
RPTA 463 Pre-Internship Seminar.....	1
RPTA 465 Internship.....	6
Concentration courses (see below) .....	28
<b>(10/22/13)</b>	<b>83</b>

**SUPPORT COURSES**

BUS 212 Financial Actg for Nonbusiness Majors....	4
BUS 346 Principles of Marketing .....	4
ENGL 310 Corporate Communications .....	4
JOUR 312 Introduction to Public Relations .....	4
MATH 118 Pre-Calculus Algebra (B1)* .....	4
(MATH 116 & 117 substitute)	
STAT 217 Intro to Stat Concepts/Methods (B1)*....	4
	<b>24</b>

**GENERAL EDUCATION (GE)**

72 units required, 8 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing.....	4

**Area B Science and Mathematics (8 units)**

B1 Mathematics/Statistics * 8 units in Support ....	0
B2 Life Science .....	4
B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
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C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division)**

(4 units) .....	4
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<b>FREE ELECTIVES.....</b>	<b>64</b>
	<b>9</b>
	<b>180</b>

**CONCENTRATIONS (Select one)****Event Planning and Management Concentration**

RPTA 214 Introduction to Travel and Tourism.....	4
RPTA 317 Convention and Meeting Management ..	4
RPTA 320 Special Event Planning .....	4
<del>RPTA 414 Commercial Recreation Enterprise .....</del>	<del>4</del>

<sup>1</sup> Select one course from:..... 4

RPTA 314, 321, 330, 400, 412, 414, 450 (3/9/10)

RPTA 420 Festival and Event Management .....

<sup>2</sup> Approved electives..... 8

Select 8 units from the following, with a minimum  
of 6 units upper division:

AGB 314, 455;  
BUS 207, 215, 347, 387, 418;  
COMS 212, 301, 419;  
EHS 225;  
FSN 250 (D4/USCP); **FSN 275 (4/29/13)**  
GRC 377 (Area F);  
JOUR 331, 342;  
KINE 280;  
PSY 319;  
RPTA 313, 321, 330, 400, 412, 414, 450;  
TH 230/330

28

**Outdoor, Adventure, and Resource Recreation  
Concentration**

RPTA/NR 112 Parks and Outdoor Recreation.....	4
RPTA 302 Environmental/Wilderness Education	4
RPTA 325 Outdoor and Adventure Leadership .....	4

<sup>1</sup> If additional units are needed, the units will come from free electives  
available.

<sup>2</sup> Consultation with advisor is recommended prior to selecting approved  
electives; bear in mind your selections may impact pursuit of post-  
baccalaureate studies and/or goals.

<sup>3</sup> Any upper-division RPTA courses or RPTA 221 may substitute.

<sup>4</sup> Students who satisfy the senior project requirement with RPTA 460,  
may substitute upper-division course work for RPTA 461.

<sup>†</sup> A course used to meet this requirement may not be double-counted to  
satisfy another requirement in the degree.

<sup>2</sup> Approved electives. ....

*Select 16 units from the following, with a minimum  
of 6 units upper division:*

BIO 227, 263, 306, 307, 325, 401, 427;  
 BUS 207, 310, 382, 387, 418, 446;  
 COMS 322;  
 EHS 337<sup>†</sup>;  
 ES/NR 360 (C4/USCP);  
 GEOG 308 (D5);  
 JOUR 331, 342;  
 KINE 280;  
 LA 363<sup>†</sup>;  
 MSL 111;  
 NR 140, 141, 142, 204, 208, 306, 318, 350,  
 360 (C4/USCP), 416;  
 PSY 311 (D5);  
 RPTA 203, 214, 275, 311, 314, 321, 330, 400,  
 410, 412, 414, 450

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 28
**Tourism Planning and Management Concentration**

RPTA 214 Introduction to Travel and Tourism ..... 4  
 RPTA 314 Sustainable Travel and Tourism  
     Planning ..... 4  
 RPTA 317 Convention and Meeting Management 4  
 RPTA 414 Commercial Recreation Enterprise ..... 4

<sup>1</sup> Approved electives. .... 12

*Select 12 units from the following, with a minimum  
of 6 units upper division:*

BUS 207, 302, 310, 387, 418, 446, 451;  
 COMS 201, 331;  
 CRP 310, 427;  
 ECON 221, 222;  
**FSN 250 (D4);**  
 GEOG 308 (D5);  
 JOUR 331, 342;  
 PSY 319, 351;  
 RPTA 320, 321, 330, 400, 412, 415, 420, 450

**(5/9/11)** 

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 28

**Individualized Course of Study** ..... 28

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<sup>†</sup> Can be utilized as a major or concentration course, but not both. **Note:**  
**EHS 337 changed to EHS 437 with 2011-13 catalog.**

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved  
 electives; bear in mind your selections may impact pursuit of post-  
 baccalaureate studies and/or goals.

## Grading

A grade may be changed for the purpose of correcting clerical or administrative error, or to correct an error in the calculation or recording of a grade. A change of grade shall not occur as a result of additional work performed or re-examination beyond the established course requirements.

**Earned Hours** are all hours for which credit was earned (excludes grades of F, WU, and NC).

**Quality Hours** carry grade point value (excludes CR and NC).

**Quality Points** are awarded for each course unit and are determined by multiplying course unit by the quality point value of the grade.

**Grade Point Average (GPA)** is determined by dividing Quality Points by Quality Hours.

**Higher Education GPA** is the grade point average of all college level work.

**Transcripts** are the official record of academic history. Once a degree has been posted, subsequent revision and alteration of any transcript entry is permitted only for correction of proven error as certified by the appropriate academic dean and the Registrar. No changes are made to the academic record after 60 days following the posting of the degree.

## GRADING SYMBOLS

Academic Grading Symbols Earned		Quality Points Earned
A	Superior Attainment of Course Objectives	4.0
A –	Superior Attainment of Course Objectives	3.7
B +	Good Attainment of Course Objectives	3.3
B	Good Attainment of Course Objectives	3.0
B –	Good Attainment of Course Objectives	2.7
C +	Acceptable Attainment of Course Objectives	2.3
C	Acceptable Attainment of Course Objectives	2.0
*C –	Acceptable Attainment of Course Objectives	1.7
**D +	Poor Attainment of Course Objectives	1.3
D	Poor Attainment of Course Objectives	1.0
D –	Poor Attainment of Course Objectives	0.7
F	Non-Attainment of Course Objectives	0.0
CR	Credit	–
NC	No Credit	–

\* Certain sequenced courses may have a C– prerequisite for advancement.

\*\* If a grade of D+ or less is received in a course that is a prerequisite for another course, the student is encouraged to repeat the prerequisite course before attempting the next course in sequence.

## Administrative Grading Symbols

AU	Audit	–
I	Incomplete (authorized)	–
RD	Report Delayed	–
RP	Report in Progress	–
W	Withdrawn	–
WU	Withdrawal Unauthorized	0

## Credit/No Credit Grading

Some courses, *as indicated in their catalog descriptions*, are offered on a Credit/No Credit grading basis only. The following conditions apply when a student *elects* to take for Credit/No Credit grading those courses that are *not* designated by the University as being graded on an exclusive Credit/No Credit basis.

- Students desiring to elect a course on a Credit/No Credit grading basis must be currently enrolled in the course and must elect the Credit/No Credit grading option through the registration system. This request can be made through the 8<sup>th</sup> day of the quarter. Students may **not** change from one grading system to the other after the end of the 8<sup>th</sup> day of the term.
- Undergraduate students are given a grade of CR for accomplishment equivalent to a grade of C– or better. No credit (NC) is given for D+ or lower grades. Graduate students receive a grade of CR that is based on an evaluated grade of B– or higher and NC for assigned grades of C+ or lower. Instructors submit conventional letter grades to the Registrar's Office where they are converted to Credit/No Credit grades. **NOTE: Some post-baccalaureate programs penalize students for a grade of CR.**
- The applicant for a Credit/No Credit grade must have at least a 2.0 grade point average in cumulative Cal Poly work. This requirement is waived for first-time students.
- No more than two courses may be selected for Credit/No Credit grading in any term.
- Units earned in courses for which the grade was CR count toward satisfaction of all degree requirements.
- Undergraduate students may elect a maximum of 16 units of Credit/No Credit grading. Up to 4 units of Credit/No Credit grading is allowed in major or support courses (subject to the approval of the student's major department) and up to 4 units of Credit/No Credit grading is allowed in General Education courses.
- Credit/No Credit grading is removed for courses not meeting the above guidelines.
- Non-matriculated students, including those in the Extension Program, Summer Session, and Workshops must meet the same requirements as matriculated students to elect courses on a Credit/No Credit grading basis. (The 2.0 GPA requirement is waived in the case of

non-matriculated students having no previous coursework recorded at Cal Poly.)

## Administrative Grading Symbols

### Audit

An auditor is a student who attends a course and receives no credit for the course. Enrollment as an auditor is subject to permission of the instructor. Enrollment in a course as an auditor shall be permitted only after students otherwise eligible to enroll on a credit basis have had an opportunity to do so.

Auditors are subject to the same fee structure as credit students, and regular class attendance is expected. Once enrolled as an auditor, a student may not change to credit status unless such a change is requested prior to the last day to add classes. Courses enrolled in with audit grades are not considered when determining enrollment status (for financial aid and other purposes).

An instructor is authorized to submit a change-of-grade form to change an AU to NC for students who audit a class but do not attend or do not meet agreed-upon criteria.

The student services fee and nonresident tuition fee are determined on the basis of the total units for which the student is enrolled including courses audited.

### Incomplete (Authorized)

An incomplete signifies that a portion of required coursework has not been completed and evaluated in the prescribed time period due to unforeseen but fully justified reasons and that there is still a possibility of earning credit. It is the student's responsibility to bring pertinent information to the instructor who determines the means by which the remaining course requirements are satisfied. A final grade is assigned when the work agreed upon has been completed and evaluated. The student is not permitted to re-enroll in the course to complete course requirements. If the student does re-enroll, the original grade of I is counted as an F (or NC) and the re-enrollment is processed as a repeated course.

The instructor designates terms of the contract and length of time allowed to complete work, not to exceed one year. Failure to complete the assigned work results in the I being counted as equivalent to an F (or NC) for grade point average computation. All remaining grades of I are changed to F (or NC) at the time the student's degree is awarded.

### Withdrawal Unauthorized

The symbol "WU" indicates that an enrolled student did not withdraw from the course and also failed to complete course requirements. It is used when, in the opinion of the instructor, completed assignments or course activities or both were insufficient to make normal evaluation of academic performance possible. For purposes of grade point average and progress point computation, this symbol is equivalent to an "F".

## Report In Progress

The "RP" symbol is used in connection with courses that extend beyond one academic term. It indicates that work is in progress but that assignment of a final grade must await completion of additional work. Work is to be completed within one year except for graduate degree theses, which have a three-year time limit.

Cumulative enrollment in units attempted may not exceed the total number applicable to the student's educational objective. Reenrollment is permitted prior to the assignment of the final grade provided that the total permissible number of units for the course or courses is not exceeded. Work is to be completed within a stipulated time period.

The RP symbol shall be replaced with the appropriate final grade within one year or the grade is converted to an F, except that grades of RP for graduate degree theses convert to a grade of No Credit (NC) if a final grade has not been assigned within three years. All remaining RP grade symbols are changed to F or NC at the time the student's degree is awarded.

## Repeating a Course (*Changes effective Fall 2009*)

Undergraduate students cannot repeat courses in which they have earned a C or better grade. If a course that was originally taken for a letter grade is re-taken with *credit/no credit grading*, the original grade is not excluded from the GPA. With the exception of the reasons listed below, the repeat adjustment is made automatically at the end of the term in which the course is repeated. A repeat petition is required for the following reasons only:

- the course was originally taken at Cal Poly before Fall 1987
- the course was originally taken at another institution
- the course has changed prefix or number
- the course was taken through Cal Poly Continuing Education

Repeat petitions for the situations listed above must be turned in to the Office of the Registrar by the end of the seventh week of the quarter in which the course is repeated.

## Course Repeats with Grade Forgiveness

Undergraduate students may repeat a maximum of 16 units at Cal Poly for purposes of improving their GPA. If the second grade is equal to or higher than the first, then it replaces the first grade. The original grade is "forgiven" from the GPA computation, but both grades appear on the student's transcript. Effective Summer 2007, any course is eligible for grade forgiveness one time only. Consecutive attempts beyond the second attempt are averaged into the GPA along with the second attempt while the grade from the first attempt remains forgiven.

## Course Repeats with Grades Averaged

Students may repeat an additional 18 units in addition to the 16 units for which grade forgiveness is permitted. Once

the 16 unit forgiveness limit is reached, the grade from the repeat attempt shall not replace the original grade; instead both grades shall be calculated into the overall GPA.

Once students accumulate 34 units (16 units with forgiveness + 18 units with averaging) of repeated courses, they will no longer be allowed to repeat any future courses.

## WITHDRAWALS / RENEWAL

### Withdrawals from Courses

The W grading symbol indicates that the student was permitted to withdraw from the course after the regular add/drop period with the approval of the appropriate campus officials. It carries no adverse connotation of quality of student performance and is not used in calculating grade point averages.

Between the end of the regular add/drop period and the end of the seventh week of instruction a student must request permission to withdraw from a course by processing a petition that is available at the Office of the Registrar. The petition is approved and withdrawal authorized only if there are serious and compelling reasons for withdrawal in the judgment of the department head.

The withdrawal petition also requires the signature of the course instructor and the student's academic advisor.

Between the end of the 7th week of instruction and the last day of instruction, withdrawals are permitted only if the withdrawal is based on an emergency situation clearly beyond the control of the student. In such cases a final or incomplete grade may be assigned for courses in which sufficient work has been completed to permit an evaluation to be made. The student must request permission to withdraw as specified above, or request grade assignment, both of which are subject to approval by designated campus officials. Any student who fails to provide notification or who fails to obtain formal approval to withdraw is subject to failing grades (WU, F, or NC).

Undergraduate students may withdraw from no more than 28 quarter units (*new CSU policy effective Summer 2009*).

### Cancellation of Registration or Withdrawal from the Term

Students who find it necessary to cancel their registration or to withdraw from all classes after enrolling for any academic term are required to follow the University's official withdrawal procedures. Failure to follow formal University procedures may result in an obligation to pay fees as well as the assignment of failing grades in all courses and the need to apply for readmission before being permitted to enroll in another academic term.

Students may drop their classes on CPreG all the way through the add/drop period, until the end of the 8<sup>th</sup> day of the term. Grades are not assigned for courses dropped during this period.

With the approval of campus officials, a student is permitted to withdraw from all classes for the quarter for serious and compelling reasons until the end of the 7<sup>th</sup> week of instruction. After the 7<sup>th</sup> week and through the last day of instruction, withdrawals for the term must be based on an emergency situation clearly beyond the control of the student, and approved by campus officials.

The student is required to initiate a request for a term withdrawal with the Registrar and to complete required exit procedures. If the student is unable to appear in person, he/she may write or call the Office of the Registrar, 805-756-2531, to request withdrawal. The request must specify reasons for leaving the institution and include the student's signature. The date of the withdrawal is established according to the guidelines contained in the institutional policies governing term withdrawals or as determined by the Registrar.

The student may be eligible for a full or partial refund of registration fees depending upon the time and circumstances of withdrawal. If eligible for a refund, the refund remains in the student's account on campus, unless the student files a written application for the refund to be sent to the student. Fee refund policy information is available at [www.fees.calpoly.edu](http://www.fees.calpoly.edu).

Students who receive financial aid funds must consult with the Financial Aid and Student Account Offices prior to withdrawing from the University regarding any refunds or repayments of grant or loan assistance received for that academic term. If a Title IV financial aid recipient withdraws from the University during a payment period, the grant or loan assistance received is subject to federal refund and repayment provisions.

### Withdrawal from Previous Terms

A student may petition to have all grades retroactively changed to the administrative grade of "W" if he/she can demonstrate and document that there were serious and compelling reasons or circumstances that resulted in the unofficial withdrawal for the quarter in question. A student may not retroactively withdraw from selected courses during a particular quarter, but must petition to withdraw from the entire quarter. **The petition must be submitted within one year following the end of the term.** Refunds of registration fees are not available for withdrawals following the last day of instruction. For more information, contact the Office of the Registrar.

### Academic Renewal

The Trustees of the California State University have established a program of Academic Renewal whereby students who are having difficulty meeting graduation requirements due to a grade point deficiency may petition to have up to two semesters or three quarters of previous college work discounted from all considerations associated with meeting requirements for the baccalaureate degree.

Academic Renewal, as defined by campus policy, is processed at the point of graduation. Academic Renewal is intended only to facilitate graduation from Cal Poly and is not applicable for individuals who already possess a baccalaureate degree or who meet graduation requirements without the approval of a petition for Academic Renewal.

**Conditions:** In order to qualify for Academic Renewal all of the following conditions established by the Trustees must be met:

1. Five years must have elapsed since the term or terms to be disregarded were completed. The terms to be disregarded may have been taken at any institution.
2. Since completion of the term(s) to be disregarded, the student must have completed coursework at Cal Poly of at least one of the following:
  - 22 units with a GPA of 3.00,
  - 45 units with a GPA of 2.50,
  - 67 units with a GPA of 2.00
3. The student must present evidence that the coursework to be disregarded was substandard and not representative of the student's present scholastic ability and level of performance.

Final determination, that one or more terms shall be disregarded, shall be based on careful review of evidence by a committee appointed by the President, which shall include the designee of the chief academic officer and consist of at least three members (E.O. 1037).

For additional information about Academic Renewal contact the Office of the Registrar.



## 2009-11 Cal Poly Catalog

### Recreation, Parks, and Tourism Administration Department

## RPTA–RECREATION, PARKS, and TOURISM ADMINISTRATION

### RPTA 101 Introduction to Recreation, Parks and Tourism (4)

History, philosophy, theory, and organization of recreation and leisure services. Exploration of the recreation, parks, and tourism profession; emphasis upon functions, areas, facilities, clientele, and career opportunities. 4 lectures.

### RPTA 110 Career Planning in Recreation, Parks and Tourism (1) (CR/NC)

Development and application of philosophy, learning strategies, and problem solving for career planning in recreation, parks, and tourism. Credit/No Credit grading only. 1 activity. Prerequisite: Recreation, parks and tourism administration majors only.

### RPTA 112 Parks and Outdoor Recreation (4)

Introduction to park and outdoor recreation systems. History, philosophy, policy and principles of outdoor recreation, wilderness, park management, environmental education, outdoor education, and natural resources recreation at the local, regional, national, and international levels. Field visits. 3 lectures, 1 activity. *Crosslisted as NR/RPTA 112.*

### RPTA 127 Leisure Behavior (4)

Sociological, psychological, and cultural aspects of leisure behavior. Needs, motivations, constraints, values and benefits explored. 4 lectures. Prerequisite: Majors only.

### RPTA 160 Introduction to Sport Management (4)

Introduction to the philosophy, organization, issues and career paths of sport management. Emphasis on ethical decision-making and career opportunities in youth, interscholastic, intercollegiate, professional, and international sport. 4 lectures.

### RPTA 203 Resource Law Enforcement (3)

Law enforcement applied to natural resource conservation on public and private lands. Examination of state and federal laws related to fish and wildlife management. Problems associated with implementation of resource laws examined. 3 lectures. *Crosslisted as NR/RPTA 203.*

### RPTA 205 Leadership and Facilitation (4)

Recreation, parks, and tourism leadership with small and large groups. Skills, knowledge, and abilities required of effective leaders in leisure organizations and settings. 3 lectures, 1 activity. Prerequisite: Recreation, Parks, and Tourism Administration majors only, RPTA 101, sophomore standing or consent of instructor.

### RPTA 210 Introduction to Program Design (4)

Methods of program planning, organization, implementation and evaluation in public and private settings. Interrelationship of needs and interests of people, physical settings, and activity content. Emphasis on program construction and scheduling in recreation, parks, and tourism services. 3 lectures, 1 activity. Prerequisite: Recreation, Parks, and Tourism Administration majors only, RPTA 101, sophomore standing or consent of instructor.

### RPTA 214 Introduction to Travel and Tourism (4)

History and development of travel and tourism. Examination of different sectors of the tourism industry. Supply and demand for tourism products and services. Effects of tourism on individual cultures and the natural environment. Travel motivations. Field visits required. 4 lectures. Prerequisite: RPTA 101 with C- or better, or consent of instructor.

### RPTA 252 Therapeutic Recreation and Special Populations (4)

Introduction to special populations and therapeutic recreation. Specialized leadership and communication techniques. Modification requirements for programs, areas, facilities, equipment, and supplies. Exploration of disability rights issues, including legislation which impacts the delivery of recreation and leisure services. 3 lectures, 1 activity. Prerequisite: Recreation, Parks, and Tourism Administration majors only, sophomore standing or consent of instructor.

### RPTA 260 Recreational Sport Programming (4)

Philosophy, foundations, policy and techniques underlying recreational sport programs in public, private and commercial settings. Methods of program planning, organization, implementation and evaluation with emphasis on program construction and scheduling. 3 lectures, 1 activity. Prerequisite: RPTA 101, sophomore standing or consent of instructor.

### RPTA 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### RPTA 275 Challenge Course Facilitation (2)

Techniques and models used in challenge course leadership and facilitation. Emphasis on facilitation styles, challenge course terminology, facilitation models, safety guidelines, and industry best practices. 2 seminars. Prerequisite: RPTA 205 or consent of instructor.

### RPTA 300 Computer Applications in Resource Management (2)

Resource management applications of microcomputers. Software programs include forest and natural resource management planning, forecasting, analysis of systems, and resource data base management for multiple use objectives. Use of forestry and natural resource examples. 1 lecture, 1 laboratory. Prerequisite: Consent of instructor. *Crosslisted as NR/RPTA 300.*

### RPTA 302 Environmental and Wilderness Education (4)

Education and teaching techniques that apply to learning experiences in an outdoor environment. Impact of natural resource usage that affects sociological, biological and physical resources. Educational strategies for presenting environmental learning to grades K-12 in selected environments. 3 lectures, 1 activity. Prerequisite: RPTA 210 or RPTA 260 with C- or better, junior standing or consent of instructor.

### RPTA 311 Environmental Interpretation (4)

Interpretation of the biological, physical and aesthetic values of the natural elements of our environment; organization and presentation of interpretive materials by oral, written, and display methods of communication. 3 lectures, 1 laboratory. Prerequisite: COMS 101 or COMS 102. *Crosslisted as NR/RPTA 311.*

### RPTA 313 Sustainable Tourism (4)

Investigation of tourism industry from a sustainable tourism perspective. Ecotourism, agri-tourism, rural tourism, sustainable tourism development, and adventure travel. Emphasis on tourism that sustains social, cultural, heritage, and natural environments while generating economic development. 3 lectures, 1 laboratory. Prerequisite: RPTA 210 or RPTA 260 with C- or better, junior standing or consent of instructor.

### RPTA 314 Sustainable Travel and Tourism Planning (4)

The planning and development of tourism destinations, agencies, and services from a sustainable development perspective. Emphasis on the economic, social and environmental impacts of tourism. Examination of alternative forms of tourism. Emphasis on sustainable tourism. Travel research and planning models. Field visits required. 3 lectures, 1 laboratory. Prerequisite: RPTA 210 or RPTA 260, RPTA 214 with C- or better, junior standing or consent of instructor.

### RPTA 317 Conventions and Meeting Management (4)

Role of conventions and meeting management in the area of tourism. Factors involved in meeting planning for small and large groups to include committees, amenities, logistics of operations and evaluation. Field visits required. 3 lectures, 1 activity. Prerequisite: RPTA 210 or RPTA 260 with C- or better, junior standing or consent of instructor.

### RPTA 320 Special Event Planning (4)

Major trends and successful practices in festival and event planning. Emphasis on conceptualization, analysis, and planning considerations of small to large-scale community events. Exploration of event management field as a profession. 3 lectures, 1 activity. Prerequisite: RPTA 210 or RPTA 260, junior standing or consent of instructor.

### RPTA 321 Visitor Services in Recreation, Parks, and Tourism (1-4)

Management issues in meeting the needs of recreation, parks, and tourism organizations. Topics to include customer satisfaction, service quality, visitor management, customer service skills and procedures, and creating a customer focused organization. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 1-4 seminars. Prerequisite: RPTA 210 or RPTA 260, junior standing or consent of instructor. *Change effective Winter 2011.*

**RPTA 325 Outdoor and Adventure Leadership (4)**

Theoretical principles and experience in leadership, judgment, and decision-making in outdoor and adventure settings. Total credit limited to 8 units. The Schedule of Classes will list topic selected. 3 lectures, 1 activity. Prerequisite: RPTA 205, junior standing or consent of instructor.

**RPTA 330 Directed Field Experience (3) (CR/NC)**

Practical work experience in related phases of recreation administration in organization or agency under qualified supervision. Minimum of nine hours per week. Credit/No Credit grading only. Total credit limited to 9 units. Prerequisite: RPTA 210 or RPTA 260 with C– or better and consent of instructor.

**RPTA 342 Legal Aspects of Recreation, Parks and Tourism (4)**

Legislative and legal aspects of public, private, commercial, and non-profit recreation, parks, and tourism agencies. Emphasis on risk management, liability, insurance, and negligence. Understanding of legal foundations and the legislative process. 4 lectures. Prerequisite: RPTA 210 or RPTA 260 with C– or better, junior standing or consent of instructor.

**RPTA 350 Recreation Areas and Facilities Management (4)**

Management of recreation areas and facilities: clientele considerations, facility and outdoor area site planning; day-to-day operations of common recreation areas and facilities. Agency visitation required. 3 lectures, 1 laboratory. Prerequisite: RPTA 210 or RPTA 260 with C– or better, junior standing or consent of instructor.

**RPTA 360 Assessment and Evaluation of Recreation, Parks and Tourism (4)**

Evaluation of recreation, parks, and tourism programs using a variety of research methodologies. Needs assessment, program evaluation, research design, and decision making based on data analysis. 3 lectures, 1 laboratory. Prerequisite: RPTA 210 with C– or better, STAT 217, junior standing. Recommended: CSC 110 or CSC 113.

**RPTA 375 Leisure and Community Resources (4)**

Investigation of community development principles, costs and benefits related to leisure, recreation, parks, and tourism. Emphasis on leisure, recreation, park and tourism resources, cultural and social dynamics, economic viability, quality of life, and environmental issues. 4 lectures. Prerequisite: Completion of GE Areas A1, A2, A3.

**RPTA 400 Special Problems For Advanced Undergraduates (1–4)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of academic advisor.

**RPTA 405 Recreation, Parks and Tourism Management (4)**

The study, analysis, and practice of management processes as they are applied to recreation organizations: planning, organizing, motivating, and controlling. Emphasis upon application of theories, practices and case studies in specific recreation settings. 4 lectures. Prerequisite: RPTA 205, RPTA 210 or RPTA 260, senior standing or consent of instructor.

**RPTA 410 Resource Recreation Management (4)**

Practices of management of resource recreation on private and public lands. Consideration of the following management systems: biophysical, user/visitor, facilities, equipment, fiscal, personnel will be made in the provision of resource recreation services. Case studies in mass recreation and wilderness areas will be examined. 3 lectures, 1 laboratory. Some weekend labs necessary. Prerequisite: NR 112 or consent of instructor.

**RPTA 412 Tourism and Outdoor Applications Seminar (2-4)**

Selected topics on aspects of the tourism field. The Schedule of Classes will list topic selected. Field visits may be required. Total credit limited to 12 units, **repeatable in same term**. 2-4 seminars. Prerequisite: RPTA 210 or RPTA 260, RPTA 314 or RPTA 325, or consent of instructor. *Change effective Fall 2009.*

**RPTA 413 Tourism and Protected Area Management (4)**

Practices of tourism and recreation management in protected areas. History and principles of protected areas. Social, cultural, economic, and environmental benefits of and risks to protected areas and communities. Environmental stewardship in tourism and recreation management worldwide. 3 lectures, 1 laboratory. Prerequisite: RPTA 314 or consent of instructor.

**RPTA 414 Commercial Recreation Enterprise (4)**

Development of the domains of commercial recreation and related services. Role of entrepreneurial activity. Procedures for creating and managing a

socially responsible commercial leisure service. 4 lectures. Prerequisite: BUS 212, BUS 346, RPTA 210 or RPTA 260 with C– or better and senior standing.

**RPTA 415 Adventure Programming and Planning (4)**

Exploration of the history, benefits, characteristics, goals, models, and applications of adventure programs. Emphasis on wilderness and outdoor programs, adventure tourism, inclusive programs, adventure education, planning, management, and implementation. 3 lectures, 1 activity. Prerequisite: RPTA 210 or RPTA 260, or consent of instructor.

**RPTA 417 Resource Recreation Planning (3)**

Development and analysis of resource recreation plans. Planning theory, types of plans, scheduling techniques, projecting supply and demand, application of models, and economic evaluations. Basic recreation planning skills examined. Examples emphasize planning for parks and recreation. 2 lectures, 1 laboratory. Prerequisite: NR 112 or consent of instructor.

**RPTA 420 Festival and Event Management (4)**

Management strategies and practices for small to large scale community festivals and events. Emphasis on sponsorship, marketing, staffing, production, and budgeting. 4 lectures. Prerequisite: RPTA 210 or RPTA 260, BUS 346, junior standing, or consent of instructor.

**RPTA 424 Financing Recreation, Parks and Tourism Services (4)**

Financing leisure products and services in public, private, commercial and voluntary settings. Emphasis on sources and methods of financing; operational/financial cost analysis; forecasting, budgeting, pricing and fiscal master planning through use of computer technology. 4 lectures. Prerequisite: BUS 212, RPTA 360 with C– or better, ENGL 310, senior standing.

**RPTA 430 Sports Field Construction and Management (4)**

Construction and maintenance of sports fields. Basic agronomics including sports field construction, sports turf establishment and maintenance, environmental issues, and personnel management. 3 lectures, 1 laboratory. Prerequisite: EHS 343, and junior standing. *Crosslisted as EHS/RPTA 430.*

**RPTA 450 Resource and Grant Development (4)**

Principles of all aspects of grantsmanship; researching grant funding resources from both the private and public sector, preparing the grant proposal, and grant administration. Field visits required. 4 lectures. Prerequisite: Junior standing.

**RPTA 460 Research in Recreation, Parks and Tourism (4)**

Research design, literature review, questionnaire and interview schedule construction, sampling methods, data array and analysis, and computer applications. Selection of senior project topic and proposal development. 3 lectures, 1 laboratory. Prerequisite: STAT 217, RPTA 360 with C– or better, ENGL 310, senior standing.

**RPTA 461 Senior Project (3)**

Completion, under faculty supervision, of an investigative project typical of problems which graduates must solve in their fields of employment. Required minimum of 90 hours. Analytical, formal report is required. Prerequisite: Senior standing and completion of RPTA 460 with C– or better or consent of instructor.

**RPTA 463 Pre-Internship Seminar (1) (CR/NC)**

Exploration of internship opportunities and practices. Internship selection process and procedures introduced. Recommended enrollment two quarters prior to RPTA 465. Credit/No Credit grading only. 1 seminar. Prerequisite: Senior standing.

**RPTA 465 Internship (6) (CR/NC)**

400 hours of full-time concentration-specific practical work experience over a ten-week period in an approved agency. Comprehensive involvement in agency program. Credit/No Credit grading only. Prerequisite: Minimum GPA of 2.0; 1,000 verified hours of advisor-approved paid and/or volunteer experience subsequent to high school; completion of all university coursework other than Internship; approval of Internship Coordinator.

**RPTA 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

**RPTA 471 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to graduate and undergraduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Consent of instructor.

**RPTA 472 Leadership Practice (1)**

Leadership styles used in the natural resources management and recreation administration professions. Study and practice in setting goals and objectives; developing, evaluating and implementing an entrepreneurial project plan; decision making and problem-solving. Total credit limited to 4 units. 1 laboratory. Prerequisite: Junior standing or consent of instructor. *Crosslisted as NR/RPTA 472.*

**RPTA 500 Individual Study (1-6)**

Advanced independent study planned and completed under the direction of a member of the department faculty. Total credit limited to 6 units. Prerequisite: Graduate standing and consent of department head.

**RPTA 502 Current Issues in Recreation, Parks, and Tourism (4)**

Societal issues that influence the management and delivery of recreation, parks, and tourism services. Critical investigation of current research and trends. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**RPTA 527 Leisure Behavior and Theory (4)**

Theories of recreation and leisure; conceptual and theoretical foundations of leisure; the role of leisure behavior in modern day society. The Schedule of Classes will list topic selected. Constructs that contribute to contemporary understanding of leisure behavior. Connection of theories to individual research. Total credit limited to 8 units. 4 lectures. Prerequisite: Graduate standing.

**RPTA 539 Graduate Internship in Recreation, Parks and Tourism (1-9)**

Application of theory to the solution of problems of recreation, parks and tourism or related businesses in the field. Analyze specific management problems and perform general management assignments detailed in a contract between the student, the firm or organization, and the faculty advisor before the internship commences. Degree credit limited to 6 units. Prerequisite: Consent of internship instructor.

**RPTA 570 Selected Topics in Recreation, Parks and Tourism (1-4)**

Directed group study of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1-4 seminars. Prerequisite: Graduate standing or consent of instructor.

**RPTA 571 Selected Advanced Laboratory in Recreation, Parks and Tourism (1-4)**

Directed group laboratory of selected topics for advanced students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1-4 laboratories. Prerequisite: Graduate standing and consent of instructor.

**RPTA 581 Graduate Seminar in Recreation, Parks and Tourism (1)**

Group study of selected developments, trends and problems in the field of recreation, parks and tourism. Total credit limited to 4 units. 1 seminar. Prerequisite: Graduate standing.

**RPTA 599 Thesis in Recreation, Parks and Tourism (1-9)**

Individual research in recreation, parks and tourism management under the general supervision of faculty, leading to a graduate thesis. Degree credit limited to 9 units. Students must enroll each quarter advisement is received. Prerequisite: Graduate standing and consent of instructor.

## 2009-11 Cal Poly Catalog

### College of Science and Mathematics

## SCM—COLLEGE OF SCIENCE AND MATHEMATICS

### SCM 100 Orientation to the College of Science and Mathematics (2) (CR/NC)

Application of learning strategies, problem-solving methodologies, academic planning and career selection for students in the science and mathematics disciplines. Concurrent enrollment in specific orientation or content course is desirable. Credit/No Credit grading only. 1 lecture, 1 activity.

### SCM 101 Introduction to the Health Professions (1) (CR/NC)

Preparation for a health professions career and examination of various health professions. Emphasis on planning and developing an individual pre-health plan, including academic course selection, obtaining appropriate experiences/activities, and review of the elements of a strong application. Intended for freshmen and sophomores. Credit/No Credit grading only. 1 lecture.

### SCM 150 Supplemental Instruction Discussion (1) (CR/NC)

Facilitated study and discussion of theory, concepts, and applications of content material from selected courses. Credit/No Credit grading only. Total credit limited to ~~4~~ 8 units. 1 laboratory. Prerequisite: Concurrent enrollment in the designated section of the associated course. *Change effective Winter 2010.*

### SCM 201 Orientation to Biotechnology (1) (CR/NC)

Introduction to the diversity of fields in biotechnology. Applications in agriculture, nutrition, medicine and environmental problems. Credit/No Credit grading only. 1 activity. Prerequisite: Completion of a course with a BIO, BOT or MCRO prefix and a course with a CHEM prefix.

### SCM 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### SCM 300 Early Field Experience, Science/Mathematics (4) (CR/NC)

Historical, philosophical, and social foundations of public science and mathematics education. Public school curriculum and professional education dispositions. Structured observation and participation in K-12 public schools with attention to instructional practices for diverse learners. Credit/No Credit grading only. 2 lectures, 2 activities. Prerequisite: Sophomore standing or consent of instructor.

### SCM 302 The Learn By Doing Lab Teaching Practicum (2) (CR/NC)

Early teaching experience in an informal science/technology/engineering/mathematics (STEM) teaching and learning environment. Principles of inquiry-driven science STEM education, lesson design, implementation and assessment. Intended for undergraduates exploring science or mathematics STEM teaching as a career. Total credit limited to 4 units. Credit/No Credit grading only. 1 seminar, 1 laboratory. Prerequisite: Completion of GE Area B and consent of instructor. *Crosslisted as ENGR 322/SCM 302. New course, effective Winter 2010. Change effective Spring 2011.*

### SCM 320 Technology in London (4)

GE Area F

Impact of one or two technologies in modern London. How they developed from the scientific/industrial revolution, as seen through London museums and industries. How solutions to modern problems are dependent on available technology. Specific technology chosen by instructor. 2 lectures, 2 activities. Prerequisite: Junior standing and completion of GE Area B. Concurrent enrollment in London Study Program. Fulfills GE Area F.

### SCM 325 Genetic Engineering Technology (4)

GE Area F

Introduction to the methodology and techniques used in genetic engineering. Applications in agriculture, nutrition, medicine and environmental problems. Potential benefits and problems, including the underlying ethical questions. Not open to students with credit in CHEM 373. 4 lectures. Prerequisite: Junior standing and Completion of GE Area B, including a chemistry course. Fulfills GE Area F.

### SCM 330 Ocean Discovery through Technology (4)

GE Area F

Introduction to marine science and current issues in marine science. Investigation of emerging technologies that provide new understanding of the

ocean, including sensors and sensor platforms such as ships, satellites, and underwater vehicles. 3 lectures, 1 activity. Prerequisite: Junior standing and completion of GE Area B. Fulfills GE Area F.

### SCM 335 Nuclear Science and Society (4)

GE Area F

Impact of nuclear phenomena on energy production, warfare, health and medicine, and the environment. Scientific and public policy aspects of reactor design, nuclear accidents, disposal of radioactive waste, nuclear medicine, food irradiation, nuclear weapons, and fusion as potential energy source. 4 lectures. Prerequisite: Junior standing and completion of GE Area B. Fulfills GE Area F.

### SCM 350 The Global Environment (4)

GE Area F

Interdisciplinary investigation of how human activities impact the Earth's environment on a global scale. Examination of population, resource use, climate change, and biodiversity from scientific/technical and social/economic/historical/political perspectives. Use of remote sensing maps. Sustainable solutions. 3 lectures, 1 activity. Prerequisite: Junior standing and completion of GE Areas A and B. *Crosslisted as AG/BUS/EDES/ENGR/HUM/SCM/UNIV 350.* Fulfills GE Area F.

### SCM 363 Health Professions Internships (2) (CR/NC)

Structured experiences for pre-health students, such as County Health Agency internships designed to promote understanding of social and public purpose of chosen professions, or internships designed to provide observational experiences in a modern clinical setting. The Schedule of Classes will list topic selected. Limited space availability. Application process for enrollment. Total credit limited to 12 units; a maximum of 6 units may be applied toward degree requirement. Credit/No Credit grading only. Prerequisite: Sophomore standing; must have been enrolled at Cal Poly for at least two quarters; consent of instructor.

### SCM 401 Advanced Undergraduate Research (1-3) (CR/NC)

Laboratory research under faculty supervision. Credit/No Credit grading only. Total credit limited to 6 units. 1-3 laboratories. Prerequisite: Consent of instructor. 4 units may be applied to approved chemistry electives. *Crosslisted as SCM/CHEM 401.*

### SCM 451 Ethics in the Sciences (3)

The practice, performance and application of science from the standpoint of ethics. Includes issues involving plagiarism, data handling, fraud, safety and selected applications in specific science careers. Models for the analysis and resolution of ethical dilemmas are presented. 3 seminars. Prerequisite: Junior standing.

### SCM 470 Selected Advanced Topics (1–4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

### SCM 471 Selected Advanced Laboratory (1–4)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

### SCM 491 Science Student Teaching Seminar-Workshop (1) (CR/NC)

Facilitated discussions of successful pedagogical tools used in secondary science education, laboratory activities geared towards teaching California science standards, and issues facing students pursuing the public school teaching profession. Open to students in a secondary science credential program. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity seminar. Corequisite: EDUC 469 or EDUC 479. *Change effective Spring 2010.*

### SCM 593 Advanced Science Topics for Teachers (1-4) (CR/NC)

Science topics for credentialed and pre-service teachers. Content, hands-on activities geared towards California science standards. Development of inquiry-based lessons and skills for integration of language, literacy and technology into the science curriculum. The Schedule of Classes will list topic selected. Total credit limited to 12 units; repeatable same term. 1-4 seminars. Prerequisite: Multiple Subject or Single Subject teaching credential or consent of instructor.



## 2009-11 Cal Poly Catalog

### Social Sciences Department

## SOC–SOCIOLOGY

### SOC 110 Comparative Societies (4) GE D3

Introduction to sociological theory and methods, emphasizing a comparative analysis of social institutions of contemporary societies in major world regions, including the family, religion, politics, and the economy. Direct comparisons made between American social institutions and those of other societies, their histories, social problems and social change. 4 lectures. Fulfills GE D3.

### SOC 111 Social Problems (4)

An introduction to sociology with an emphasis on problems inherent in selected social institutions. Instruction in social analysis, including theories of social problems, how those problems are studied, and a survey of possible solutions. 4 lectures.

### SOC 200 Special Problems for Undergraduates (1–4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

### SOC 218 International Political Economy (4) GE D2

Principles of international political economy in their social and cultural context. Sociological perspectives on the historical development of the world system and the current patterns of global inequality. Comparison of the political economy of major nations and their relation to the overall world system. 4 lectures. Fulfills GE D2.

### SOC 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### SOC 301 Social Work and Social Welfare Institutions (4)

Introduction to the field of social welfare. Development of social work and social welfare services; major issues in social service policy. Scope and diversity of specific programs in the social services. Analysis of current programs and the recipients of welfare services. 4 lectures. Prerequisite: Junior standing or consent of instructor.

### SOC 306 Sociology of the Family (4)

Description and analysis of family relationships; role of family in society, effects of society on family economy, structure and change. Other topics include courtship, marriage, parenting, divorce and alternative family forms. 4 lectures. Prerequisite: Junior standing or consent of instructor.

### SOC 309 The World System and Its Problems (4)

Analysis of the historical background, structure, and dynamics of the world system; examines such issues as the origins of Third World poverty, colonialism, the changes in the world's dominant economic powers, the fall of communism, the growing economic competition between Europe, North America, and Asia; and possible strategies for the economic development of the Third World. 4 lectures. Prerequisite: Junior standing.

### SOC 310 Self, Organizations and Society (4)

Analysis of the interactions relating to the development of self. Examination of the reciprocal interactions between biology, personal environment, and society. 4 lectures. Prerequisite: Junior standing or consent of instructor.

### SOC 311 Sociology of Gender (4)

Description and analysis of the impact of gender definitions on men and women in society. Special attention is given to the learning process; the creation and perpetuation of gender stereotypes and the way these affect individual life chances and social structure, explored in the areas of work, education, family and abusive relationships. Focus on media presentation of gender and effects of ethnicity and class. 4 lectures. Prerequisite: Junior standing. *Crosslisted as SOC/WGS 311.*

### SOC 313 Urban Sociology (4)

Description of the context of urban development; analysis of various forces generating urbanization. Investigation of urban models and spatial relationships; urban processes; and problems. 4 lectures. Prerequisite: Junior standing or consent of instructor.

### SOC 315 Global Race and Ethnic Relations (4) GE D5

Diverse structures of unequal relationships among racial and ethnic groups in several countries including the United States. Theories about sources of economic and social discrimination and colonialism. Focus on the concept of ethnicity. Evaluation methods to restructure race and ethnic relations. International case histories. 4 lectures. Prerequisite: Junior standing; completion of GE Area A, one course from D1 and one course from D3. Fulfills GE D5 except for Social Sciences majors.

### SOC 316 American Ethnic Minorities (4) USCP

Exploration of the issues and problems facing the four major ethnic minorities in American society: Native Americans, Afro-Americans, Hispanics and Asian Americans. Dynamics of intergroup relations focusing on the concepts of ethnocentrism, stereotyping, pluralism and assimilation. Sources and manifestations of economic and social discrimination patterns and how they affect the individual's life course. 4 lectures. Prerequisite: Junior standing. Fulfills USCP.

### SOC 323 Social Stratification (4)

Social class and the distribution of income, wealth, status and power in society, with emphasis on contemporary United States; social mobility; race, gender, and ethnic inequalities; political power and the nature of welfare; the nature, causes and solutions to poverty. A comparative perspective also taken with a focus on Japan and Europe. 4 lectures. Prerequisite: Junior standing or consent of instructor.

### SOC 326 Sociology of the Life Cycle (4) GE D5

Change and continuity of the self through the life course. Impact of aging on the physical, emotional, intellectual and social aspects of well being, and how this knowledge can be applied to enhance the quality of life. 4 lectures. Prerequisite: Junior standing; completion of GE Area A, one course from D1 and one course from D3. Fulfills GE D5 except for Social Sciences majors.

### SOC 350 Social Organization of Modern Japan (4)

Social and cultural features of modern Japan. Japanese group processes. Investigation of contemporary Japanese institutions: family, education, mass media, industry, politics, including an overview of popular culture. 4 lectures. Prerequisite: Junior standing or consent of instructor.

### SOC 354 Sociological Data Collection (4)

Data collection for social research. The relationship among theory research and hypothesis testing. Data collection techniques, including content analysis and the fundamentals of sampling and data collections techniques for qualitative as well as quantitative research. 3 lectures, 1 activity. Prerequisite: STAT 217, STAT 221 or equivalent with a C- or better, and two sociology courses.

### SOC 355 Social Data Collection and Analysis (4)

The basics of how to do social research. Includes topics on data collection techniques such as surveys, experiments, participant observation, content analysis and the use of existing data. Also includes topics on univariate, bivariate, and multivariate analysis and the use of SPSS for data analysis. 3 lectures, 1 activity. Prerequisite: STAT 221 or STAT 217 or equivalent with a C- or better, and two sociology courses. *Correction to title, and former description; effective Spring 2010.*

### SOC 356 Sociological Data Analysis (4)

The basics of how to do social research and analyze sociology data. Includes topics on univariate, bivariate, and multivariate analysis and the use of SPSS for data analysis. 3 lectures, 1 activity. Prerequisite: STAT 221 or STAT 217 or equivalent with a C- or better, SOC 354, and two sociology courses. *Correction: New course number, effective Spring 2010.*

### SOC 377 Sociology of Religion (4) GE D5

Religion from a sociological perspective. Topics may include the nature of religious experience, the role of religion in politics, economics, and social change, and the role that social forces have in influencing religious beliefs and practices. 4 lectures. Prerequisite: Junior standing; completion of GE Area A, and two courses from two categories in Area D. Fulfills GE D5 except for Social Sciences majors.

### SOC 395 Sociology of Complex Organizations (4)

Bureaucracies and informal organizations from a sociological perspective. Organizational networks within and between organizations, relationship between organizations and their environment, and organizational socialization and career patterns, and gender and race or ethnic differences in organizational patterns. 4 lectures. Prerequisite: Junior standing or consent of instructor.

**SOC 400 Special Problems for Advanced Undergraduates (1–4)**

Individual investigation, research, studies, or surveys of selected problems.

Total credit limited to 8 units, with a maximum of 4 units per quarter.

Prerequisite: Consent of department head.

**SOC 402 Crime and Violence (4)**

Criminal behavior of individuals and groups; special categories include drug use, sex offenders, property crime, syndicated crime, interpersonal violence, and white-collar criminality. Legal definitions of crime and their implications, theories of causation, the sources of criminological data, and possible responses to the problems posed by criminal behavior. 4 lectures. Prerequisite: Junior standing or consent of instructor.

**SOC 406 Juvenile Delinquency (4)**

Sociological examination of juvenile delinquency as a social and legal concept, covering the nature, volume and social distribution of juvenile crime; the formal structure of juvenile justice; and how justice for juveniles is applied in practice. 4 lectures. Prerequisite: One course in sociology.

**SOC 412 Criminal Justice (4)**

Approaches to the control and rehabilitation of adult and juvenile offenders; philosophy of treatment strategies; history and analysis of probation, imprisonment, parole and preventive programs. 4 lectures. Prerequisite: SOC 402.

**SOC 413 Methods of Social Work (4)**

Skills, values and knowledge emphasized in social work. The generic perspective. Methods in social case work, group work, community organization, and social action. Alternative models. Settings of social work practice. Discussion of case material and professional literature. Case work management. Traditional and innovative therapy techniques. 4 seminars. Prerequisite: SOC 301 and junior standing.

**SOC 421 Social Theory (4)**

Concepts and theories in sociology. Development and history of social theory in the classical period. Development of the predominant perspectives in sociology: positivist/functionalist, conflict, symbolic interactionist. Importance of theories for understanding of present social arrangements and problems. 4 lectures. Prerequisite: SOC 111 or consent of instructor.

**SOC 422 Contemporary Social Theory (4)**

Concepts and theories in sociology. Paradigms and sociology of knowledge. Modern perspectives. Importance of theories for understanding of present social arrangements and problems. 4 lectures. Prerequisite: SOC 421 or consent of instructor.

**SOC 431 Population, Migration and the Environment (4)**

Description and analysis of basic population processes including fertility, mortality, and migration and the environment. Emphasis on understanding the significance of today's growth rates for the future, especially in relationship to resources and standards of living. 4 lectures. Prerequisite: SOC 111 or consent of instructor.

**SOC 440 Internship (4–8) (CR/NC)**

Supervised training, research, and work in public and private organizations. Credit/No Credit grading only. Total credit limited to 18 units. Prerequisite: Senior standing and/or consent of instructor.

**SOC 461, 462 Senior Project I, II (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing or consent of instructor.

**SOC 470 Selected Advanced Topics in Sociology (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.



**2009-11 Cal Poly Catalog****Social Sciences Department**

**Note: Effective Fall 2010, students will no longer be admitted to BS Social Sciences. Instead, they should apply to either BS Anthropology and Geography or BA Sociology.**

**BS SOCIAL SCIENCES**

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                      ☐ USCP

\* = Required in Major; also satisfies GE

Note: No major, support or concentration courses may be taken as credit/no credit.

**MAJOR COURSES**

ANT 201 Cultural Anthropology (D3)* .....	4
ANT 202 World Prehistory .....	4
ANT 250 Biological Anthropology (B2)* .....	4
Anthropology electives (300–400 level) .....	4
GEOG 150 Intro. to Cultural Geography .....	4
GEOG 250 Physical Geography .....	4
GEOG 318 Applications in GIS .....	4
GEOG 333 Human Impact on the Earth .....	4
Geography electives (300–400 level) .....	4
SOC 110 Comparative Societies .....	4
SOC 111 Social Problems .....	4
SOC 323 Social Stratification .....	4
SOC 355 Sociological Data Analysis .....	4
SOC 421 Social Theory .....	4
SOCS 461 Senior Project I .....	2
SOCS 462 Senior Project II .....	2
Sociology electives (300–400 level) .....	4
STAT 217/221 Intro. Statistics (B1)* .....	4/5
Concentration <i>or</i> individualized course of study ....	28
	<b>96/97</b>

**GENERAL EDUCATION (GE)**

72 units required, 12 of which are specified in Major.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing .....	4

**Area B Science and Mathematics (12 units)**

B1 Mathematics/Statistics * 4 units in Major plus	4
B2 Life Science * 4 units in Major .....	0
B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	
B5 elective	
Area B elective (select one course from B1-B5) ...	4

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective (not in ANT, GEOG or SOC) .....	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions * 4 in Major ..	0
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective (Not ANT, GEOG, or SOC) .....	4

**Area F Technology Elective (upper division) (4 units)**

<b>FREE ELECTIVES</b> .....	<b>24/25</b>
	<b>180</b>

**CONCENTRATION OR INDIVIDUALIZED COURSE OF STUDY (select one)****Criminal Justice Concentration**

SOC 402 Crime and Violence .....	4
SOC 406 Juvenile Delinquency .....	4
SOC 412 Criminal Justice .....	4
SOC 440 Internship .....	8
<i>Applications and Issues courses to be selected from: SOC 316, SOC 413; SOCS 440 or other approved electives (internship units not to exceed 12 in concentration) .....</i>	<i>8</i>
	<b>28</b>

**Cross-Cultural Studies and International Development Concentration**

ANT 360 Human Cultural Adaptation .....	4
GEOG 308 Global Geography .....	4
GEOG 370 Geography of Latin America .....	4
SOC 309 The World System and Its Problems [ <i>or</i> SOC 218 <i>or</i> SOC 315] .....	4
<i>Problems and Issues courses to be selected from: ...</i>	<i>8</i>
ANT 309, 312, 320, 325, 330, 344, 345, 401, 415; GEOG 301, 325, 328, 414; SOC 315, 350	
Advisor approved elective .....	4
	<b>28</b>

**Environmental Studies and Sustainability Concentration**

GEOG 301 Geography of Resource Utilization .....	4
GEOG 325 Climate and Humanity .....	4
GEOG 328 Applications in Remote Sensing .....	4
Advisor approved electives .....	16
	<b>28</b>

**Human Ecology Concentration**

ANT 345 Human Behavioral Ecology .....	4
ANT 360 Human Cultural Adaptation .....	4
GEOG 308 Global Geography .....	4
GEOG 325 Climate and Humanity .....	4
<i>Applications and Issues courses to be selected from: ANT 309, 310, 311, 312, 320, 325, 330, 344, 415 (USCP); BIO 263; CRP 211, 334; GEOG 301, 317 (F), 340, 370, 414, 415, 440 .....</i>	<i>12</i>
	<b>28</b>

**Organizations Concentration**

<i>Select 20 units from the following courses:</i> .....	20
SOC 310 Self, Organizations and Society (4)	
SOC 350 Social Organization of Modern Japan (4)	
SOC 395 Sociology of Complex Organizations (4)	
SOCS 440 Internship ( <b>maximum 8 units -4</b> )	
BUS 382 Organizations, People and Technology (4)	
BUS 384 Human Resource Management (4)	
BUS 387 Organizational Behavior (4) <i>or</i>	
PSY 302 Behavior in Organizations (4)	
<sup>1</sup> Approved electives. ....	8
<i>Select 8 units from the following:</i>	
BUS 207, 382, 404, 407, 472, 473, 478;	
POLS 351;	
SOC 412	
<b>SOCS 440 (internship units not to exceed 8 in concentration)</b>	
<b>(9/2/13)</b>	<b>28</b>

**Social Services Concentration**

SOC 301 Social Work and Social Welfare Inst.....	4
SOC 316 American Ethnic Minorities (USCP).....	4
SOC 413 Methods of Social Work.....	4
SOCS 440 Internship.....	8
<sup>1</sup> Approved electives. ....	8
<i>Select 8 units from the following:</i>	
ES 340, ES/WGS 350;	
POLS 310, 343, 419, 459, 471;	
POLS/UNIV 333;	
PSY 310, 318, 330;	
PSY/CD 306;	
RELS/WGS 370;	
SOC 306, 309, 310, 402, 406, 412;	
WGS 301, 401	
	<b>28</b>

**Teaching Concentration**

GEOG 308 Global Geography .....	4
GEOG 340 Geography of California.....	4
PSY 306 Adolescence .....	4
POLS 343 Civil Rights in America (USCP) .....	4
SOC 316 American Ethnic Minorities (USCP).....	4
SOCS 400 Special Problems for Adv. Undergrads ..	1
EDUC 300 Intro. To the Teaching Profession .....	3
Select one course from the following:.....	4
ECON 304, HIST 320, 321, 322	
	<b>28</b>

**Individualized Course of Study** ..... 28

300-400 level courses selected in consultation with advising faculty. A written justification for the courses selected and the way they constitute a cohesive, integrated study is required. One-half of courses selected are to be from major (major prefix) and one-half related approved courses.

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

**2009-11 Cal Poly Catalog****Social Sciences Department****BA SOCIOLOGY**

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA      ☐ USCP

\* = Satisfies General Education requirement

Note: No major, support or concentration courses may be taken as credit/no credit.

**MAJOR COURSES**

SOC 110 Comparative Societies (D3)* .....	4
SOC 111 Social Problems .....	4
SOC 218 International Political Economy (D2)* ....	4
SOC/WGS 311 Sociology of Gender .....	4
SOC 315 Global Race and Ethnic Relations.....	4
SOC 316 American Ethnic Minorities (USCP) .....	4
SOC 323 Social Stratification.....	4
SOC 354 Sociological Data Collection .....	4
SOC 355 Sociological Data Analysis .....	4
SOC 421 Social Theory .....	4
SOC 461 Senior Project.....	2
SOC 462 Senior Project.....	2
Sociology electives (300-400 level) .....	12
STAT 217 Intro. to Stat. Concepts/Methods (B1)* .	4
GEOG 150 Intro. To Cultural Geography .....	4
ANT 201 Cultural Anthropology.....	4
Concentration <i>or</i> individualized course of study ....	28
	<b>96</b>

**GENERAL EDUCATION (GE)**

72 units required; 12 units are in Major.

→See page 56 for complete GE course listing.

→Minimum of 12 units required at the 300-400 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing.....	4

**Area B Science and Mathematics (16 units)**

B1 Mathematics/Statistics * 4 units in Major .....	4
B2 Life Science.....	4
B3 Physical Science .....	4
B4 One lab taken with either a B2 or B3 course	
B5 elective .....	4

**Area C Arts and Humanities (16 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

**Area D/E Society and the Individual (12 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy * 4 units in Major.....	0
D3 Comparative Social Institutions * 4 units in Major.....	0
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective (Not SOC courses) .....	4

**Area F Technology Elective (upper division) (4 units)****60**

<b>FREE ELECTIVES</b> .....	<b>24</b>
	<b>180</b>

**CONCENTRATION OR INDIVIDUALIZED COURSE OF STUDY (select one)****Criminal Justice Concentration**

SOC 402 Crime and Violence .....	4
SOC 406 Juvenile Delinquency.....	4
SOC 412 Criminal Justice .....	4
SOC 440 Internship .....	8

*Applications and Issues courses to be selected from:*

POLS 245, 344, 351; PSY 352, 375, 460; SOC 301, 395, 413, 440 or other approved electives ( <i>internship units not to exceed 12 in concentration</i> ) .....	8
	<b>28</b>

**Organizations Concentration**

*Select 20 units from the following courses:* .....

SOC 310 Self, Organizations and Society (4)	
SOC 350 Social Organization of Modern Japan (4)	
SOC 395 Sociology of Complex Organizations (4)	
SOC 440 Internship ( <b>maximum 8 units -4</b> )	
BUS 382 Organizations, People and Technology (4)	
BUS 384 Human Resource Management (4)	
BUS 387 Organizational Behavior (4) <i>or</i> PSY 302 Behavior in Organizations (4)	

<sup>1</sup> Approved electives. .... 8

*Select 8 units from the following:*

BUS 207, 382, 404, 407, 472, 473, 478; POLS 351; SOC 412, 440 ( <b>internship units not to exceed 8 in concentration</b> )	
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(9/2/13) **28**

**Social Services Concentration**

SOC 301 Social Work and Social Welfare Inst.....	4
SOC 413 Methods of Social Work .....	4
SOC 440 Internship .....	8

<sup>1</sup> Approved electives. .... 12

*Select 12 units from the following:*

ES 340, ES/WGS 350; POLS 310, 343, 419, 459, 471; POLS/UNIV 333; PSY 310, 318, 330; PSY/CD 306; SOC 306, 309, 310, 402, 406, 412; WGS 301, 401; WGS/RELS 370	
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**28**

**Individualized Course of Study**..... **28**

300-400 level courses selected in consultation with advising faculty. A written justification for the courses selected and the way they constitute a cohesive, integrated study is required. One-half of the units must be courses from the major.

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

## 2009-11 Cal Poly Catalog

### Computer Science Department

#### BS SOFTWARE ENGINEERING [Flowchart](#)

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                      ☐ USCP

\* = Required in Major/Support; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

#### MAJOR COURSES

CSC 101 Fundamentals of Computer Science I.....	4
CSC 102 Fundamentals of Computer Science II or CSC 108 Accelerated Intro Computer Science	4
CSC 103 Fundamentals of Computer Science III.....	4
CSC 141 Discrete Structures I.....	4
CSC 225 Intro to Computer Organization.....	4
CSC 300 Professional Responsibilities .....	4
CSC 305 Individual Software Design & Dev .....	4
CSC 308 Software Engineering I .....	4
CSC 309 Software Engineering II .....	4
CSC 349 Design and Analysis of Algorithms.....	4
CSC 357 Systems Programming.....	4
CSC 402 Software Requirements Engineering.....	4
CSC 405 Software Construction.....	4
CSC 406 Software Deployment.....	4
CSC 430 Programming Languages I .....	4
CSC 453 Intro to Operating Systems .....	4
CSC 484 User-Centered Interface Design & Dev.	4
CSC 491, 492 Senior Project Design Lab I, II .....	2,3
<sup>1</sup> Technical electives. ....	20
Select from Category 1 and 2 in technical electives guidelines, below.	
<sup>1, 2</sup> Approved cooperative education experience via CSC 400 or technical elective equivalent .....	4
See technical electives guidelines, below, and, in particular, Category 3.	
<b>97</b>	

#### SUPPORT COURSES

BIO 213 and ENGR/BRAE 213 (B2)* .....	2,2
BIO 111 (4) or BIO 115 (4) or BIO 161 (4) or BOT 121 (4) or MCRO 221 (4) or MCRO 224 (5) (B2)* (4/3/12)	
ENGL 149 Technical Writing for Engineers (A3)*	4
IME 314 Engineering Economics.....	3
MATH 141, 142 Calculus I, II (B1)* .....	4,4
MATH 143 Calculus III (Add'l Area B)* .....	4
MATH 241 Calculus IV .....	4
MATH 244 Linear Analysis I .....	4
Select one from: MATH 248, 304, 335, 336, 451 ....	4
PSY 201/202 General Psychology (D4)* .....	4
PSY 350 Teamwork or PSY 351 Group Dynamics	4
Science electives (B3/4)* (Add'l 4 units Area B)*	12
Select either	
CHEM 124, 125, 129 or	
PHYS 141, 132, 133	

STAT 312 Statistical Methods for Engineers (B6)\* **4**  
**59**

#### GENERAL EDUCATION (GE)

72 units required, 36 of which are specified in Major/Support.

→See page 50 for complete GE course listing.

→Minimum of 8 units required at the 300 level.

#### Area A Communication (8 units)

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation and Writing * 4 units in Support .....	0

#### Area B Science and Mathematics (no add'l units req'd)

B1 Mathematics/Statistics * 8 units in Support.....	0
B2 Life Science * 4 units in Support .....	0
B3 Physical Science * 4 units in Support .....	0
B4 One lab taken with a B3 course	
B5 (requirement for Liberal Arts students only)	
B6 Upper-division Area B * 4 units in Support .....	0
Additional Area B units * 8 units in Support .....	0

#### Area C Arts and Humanities (16 units)

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4

#### Area D/E Society and the Individual (12 units)

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Dev (CSU Area E) * 4 units in Support ....	0

**36**

**FREE ELECTIVES..... 0**  
**192**

#### Technical Electives Guidelines

##### BS Software Engineering

Courses used to satisfy any other major, support, or general education requirement are not allowed to count toward Technical Elective requirement. Credit/No Credit grading is not allowed.

Contact the CSC Department for further information.

#### Category 1

##### Category 1a: Prerequisites and Individual Courses 8

Select 8 units from the following:

CSC/CPE 341/342, 365, 369, 448, 464, 471, 477,  
480, 484, 488, 587

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>2</sup> CSC/CPE 123 replaces this requirement for freshmen and transfer students admitted Fall 2010. (4/29/10) Alternately, an additional 4 units of CSC/CPE technical electives in Category 1 or 2 may be substituted. (2/27/12)

**Category 1b: Specialization Areas..... 8***Select 4 units from each of two separate areas:*Graphics: CSC/CPE 473, 474, 475, 476, 478, or  
CSC 572

Databases: CSC/CPE 366, 466, 468, or CSC 560

Networks: CSC/CPE 465 or 564

Software Engineering: CSC/CPE 409, 437; CSC 508,  
or 509

Distributed Computing: CSC/CPE 469 or 569

OS: CSC/CPE 454, 456, 458, or CSC 550

Architecture: CSC/CPE 315, 316, 416, 459, 520, or  
CPE 482 "Robotics"Languages/Compilers: CSC/CPE 431, 434, or  
CSC 530

GUI/HCI: CSC/CPE 435, 483, 487, 581, or CSC 486

Artificial Intelligence: CSC/CPE 416, 481, 485, 489,  
580, 581, or CPE 482 "Autonomous Mobile  
Robots" or Multi-Robot Systems",Computational Sciences/Theory: CSC/CPE 449,  
CSC 343, 445, 540, or 541**Category 2 ..... 4***Select 4 units from the following:***+ Additional CSC/CPE Electives**Select **CSC 570** or any unused course from  
Categories 1a or 1b or from upper division  
courses approved as technical electives by CSC  
Department; (5/14/13)**+ Auxiliary CSC/CPE Electives***Select from:*CSC 358, 400 (requires form/approval; cannot  
double count for Category 3 technical elective),  
479 (maximum 2 units), 490**+ External Electives***Select from:*

AERO 450;

ART 384;

BUS 310, 320;

CHEM **216, 217, 218**, 312, 316, 317, 318; (7/5/12)

ECON 339;

EE 201/251, 314, 336, 424;

ENVE 542;

GRC 316, 331, 338 ;

IME 301, 314, 356;

MATH 206, 242, 248, 304, 341, 350, 412;

ME 211, 212, 405;

PHIL 412, 422;

PSY 329, 333, 366, 457;

STAT 323, 324, 330

**Category 3 Cooperative Education Experience ..... 4**CSC 400 (requires form/approval) or technical  
elective equivalent. CSC 400 credit is limited to  
4 units and it cannot be used in Category 2 and  
Category 3. Contact the CSC Department for  
further information.



## 2009-11 Cal Poly Catalog

### Earth and Soil Sciences Department

#### BS SOIL SCIENCE

#### Flowchart

☐ 60 units upper division

☐ GWR

☐ 2.0 GPA

☐ USCP

\* = Required in Support; also satisfies GE

Note: No major, support or concentration courses may be taken as credit/no credit.

#### MAJOR COURSES

SS 110 Orientation in Earth and Soil Sciences <i>or</i> NR 140 Careers in Forestry & Env Mgmt (7/2/13)...	1
SS 121 Introductory Soil Science.....	4
ERSC 202 Soil Erosion and Water Conservation.....	4
SS 221 Fertilizers and Plant Nutrition.....	4
ERSC 223 Rocks and Minerals .....	4
SS 321 Soil Morphology .....	4
SS 322 Soil Plant Relationships .....	4
ERSC 323 Geomorphology <del>SS 345 Soil Interpretations and Management</del> (effective Summer 2009)	4
SS 422 Soil Microbiology and Biochemistry .....	4
SS 423 Soil and Water Chemistry .....	5
SS 431 Soil Resource Inventory .....	4
SS 432 Soil Physics .....	5
SS <i>or</i> ERSC 461 Senior Project I.....	1
SS <i>or</i> ERSC 462 Senior Project II.....	3
SS <i>or</i> ERSC 463 Undergraduate Seminar .....	2
Concentration courses (see below) .....	27-28
	<b>80-81</b>

#### SUPPORT COURSES

BOT 121 General Botany (B2 & B4)* .....	4
BRAE 340 Irrigation Water Management (Area F)* .....	4
CHEM 127 General Chemistry (B3&B4)* .....	4
CHEM 128 General Chemistry .....	4
CHEM 129 General Chemistry .....	4
CHEM 313 Survey of Biochemistry.....	5
GEOL 201 Physical Geology .....	3
NR/LA 318 Applications of GIS .....	3
<sup>1</sup> MATH 118 Pre-Calculus Algebra <i>or</i> MATH 141 Calculus I (B1)* .....	4
<sup>1</sup> MATH 119 Pre-Calculus Trigonometry <i>or</i> MATH 142 Calculus II (B1)* .....	4
<sup>2</sup> PHYS 121/PHYS 141 .....	4
STAT 218 Appl Statistics-Life Sciences .....	4
	<b>47</b>

#### GENERAL EDUCATION (GE)

72 units required, 20 of which are specified in Support.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

#### Area A Communication (12 units)

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing.....	4

#### Area B Science and Mathematics (no add'l units req'd)

B1 Mathematics/Statistics * 8 units in Support ....	0
B2 Life Science * 4 units in Support.....	0
B3 Physical Science * 4 units in Support .....	0

B4 One lab taken with either a B2 or B3 course

#### Area C Arts and Humanities (20 units)

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one course from C1-C4)	4

#### Area D/E Society and the Individual (20 units)

D1 The American Experience (40404) .....	4
D2 Political Economy .....	4
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

#### Area F Technology Elective (upper division)

* 4 units in Support .....	0
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	<b>52</b>
<b>FREE ELECTIVES</b> .....	<b>0-1</b>
(7/27/12)	<b>180</b>

#### CONCENTRATIONS (select one):

##### Environmental Management Concentration

CHEM 312 Survey of Organic Chemistry ( <i>transfer equivalent CHEM 212</i> ).....	5
CRSC 411 Experimental Techniques & Analysis <i>or</i> STAT 313 Applied Experimental Design & Regression Models .....	4
<del>ERSC 323 Geomorphology</del> .....	<del>4</del>
GEOG 440 Geo-Social Applications in GIS .....	4
SS 433 Land Use Planning.....	3
<sup>3</sup> Approved electives.....	<b>12 8</b>
<i>Select 12 8 units from the following:</i>	
BRAE 415;	
CHEM 341, 342;	
CRP 212, 336;	
CRP/NR 404, 408;	
<del>GEOG 440;</del>	
NR 142, 306, 320, 335, 416, 418, 425;	
NR/ES 406 (6/30/13)	
NR/RPTA 311;	
PHIL 340;	
RPTA 302;	
SS 339 <sup>†</sup> , 440, 444, 453	
<i>Corrections effective Summer 2009</i>	<b>28</b>

<sup>1</sup> Students in the Environmental Science and Technology concentration take MATH 141 and MATH 142.

<sup>2</sup> Students in the Environmental Science and Technology concentration take PHYS 141.

<sup>3</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>†</sup> No more than 4 units of SS 339 may be used.



**Environmental Science and Technology Concentration**

CHEM 216 or 316, CHEM 217 or 317 ( <del>transfer equivalent CHEM 216</del> ); ( <del>transfer equivalent CHEM 217</del> ) Organic Chemistry I, II...	5, 4/5
Select from: CHEM 218/318, 231/331, 319, 341, 342, 385, 481 .....	8
Select from: ENVE 325, 330, 434, 439; SS 442 .....	6
STAT 313 Applied Experimental Design & Regression Models or CRSC 411 Experimental Techniques & Analysis .....	4
(7/27/12)	27-28

**Land Resources Concentration**

CHEM 312 Survey of Organic Chemistry ( <del>transfer equivalent CHEM 212</del> ).....	5
CRSC 411 Experimental Techniques & Analysis ....	4
<sup>1</sup> Approved electives. ....	19
Select 19 units from any one minor, or select 19 units from the following courses.	
Note: The prerequisite courses are not listed - check the catalog.	
AG 450;	
AGB 321, 370;	
AGED 404;	
ANT 310;	
ARCH 202;	
ASCI 220, 221, 222, 223, 231, 329, 420;	
BIO 112, 114, 161, 162, 325, 415, 427, 435;	
BOT 238, 323, 324, 433;	
BRAE 340, 348, 405, 415, 435, 440, 448;	
CHEM 216, 217, 218, 316, 317, 318, 319, 341, 342, 385, 481;	
COMS 212;	
CRP 212, 214;	
CRSC 132, 203, 333, 421, 422, 445;	
DSCI 101, 121, 230;	
EHS 343;	
ENVE 325, 330, 434, 436, 439;	
ERSC/GEOG 250, 325, 333;	
FRSC 132, 133, 230, 231, 342, 422;	
FSN 121, 125, 341;	
GEOG 150, 300, 301, 308, 340;	
GEOL 204;	
HUM 302;	
JOUR 205;	
LA 551;	
MCRO 221;	
NR 141, 142, 208, 306, 420; NR/ES 406 (6/30/13)	
NR/GEOG/LA 318;	
NR/RPTA 311;	
PHIL 321, 331, 337, 340;	
PPSC 311, 321, 327, 431, 441;	
PSY 301, 302;	
RPTA 302;	
SOC 309;	
SS 301, 310, 339 <sup>†</sup> , 433, 440, 442, 444, 453;	
VGSC 230, 260	
(7/27/12)	28

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>†</sup> No more than 4 units of SS 339 may be used.

**2009-11 Cal Poly Catalog**  
**[Earth and Soil Sciences Department](#)**

**SOIL SCIENCE MINOR**

Students from major fields other than Soil Science may broaden their education, and enhance their career opportunities, by selecting the minor in Soil Science.

**Required courses**

SS 121 Introductory Soil Science (B5) .....	4
ERSC 202 Soil Erosion and Water Conservation ....	4
SS 221 Fertilizers and Plant Nutrition <i>or</i>	
ERSC 223 Rocks and Minerals .....	4
SS 321 Soil Morphology .....	4

**Restricted Electives**..... 11/14

ERSC 323; BIO/NR/SS 421; SS 322, ~~345~~, 422,  
 423, 431, 432, 433, 440, 442, 453 (4/29/09)

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27/30

**2009-11 Cal Poly Catalog****Modern Languages & Literatures Department****SPANISH MINOR**

<b>Required courses</b>	<i>Units</i>
SPAN 122 Fundamentals of Spanish <i>or</i>	
SPAN 123 Spanish for Heritage Speakers .....	4
SPAN 124 Composition in Spanish <i>or</i> SPAN 203	4
Intermediate Spanish III (9/11/13).....	
SPAN 233 Intro. to Hispanic Readings (C1).....	4
<b>Electives to be chosen from the following:.....</b>	<b>12</b>
SPAN 301 Advanced Composition in Spanish (4)	
SPAN 302 Advanced Conversation and	
Composition in Spanish (4)	
SPAN 305 Significant Writers in Spanish (4) (C4)	
(repeatable to 8 units)	
<b>SPAN 307 Spanish and Latin American</b>	
<b>Film (4) (C4) (5/22/12)</b>	
SPAN 340 Chicano/a Authors (4) (C4) (USCP)	
SPAN 350 Hispanic Literature in English	
Translation (4) (C4)	
SPAN 351 Latino(a) Literature in the U.S. (4) (C4)	
(USCP)	
SPAN 402 Advanced Linguistics in Spanish (4)	
SPAN 410 Advanced Literature in Spanish (4)	
SPAN 416 Don Quixote (4)	
SPAN 470 Selected Advanced Topics (4)	
HUM 310 Humanities in World Cultures (Spain,	
Mexico or Latin America) (4) (C4)	
HUM 312 Chicano/a Culture (4)	

## 2009-11 Cal Poly Catalog

### Earth and Soil Sciences Department

## SS–SOIL SCIENCE

### SS 110 Orientation in Earth and Soil Sciences (1) (CR/NC)

Understanding the depth and breadth of earth and soil sciences. Examine potential career opportunities. Introduction to both student and professional organizations. Credit/No Credit grading only. 1 activity. *Crosslisted as ERS/SS 110.*

### SS 121 Introductory Soil Science (4)

GE B5

Biological, chemical, physical and genetic properties of soils. Application of scientific principles to solving land use, water management, and soil conservation problems. Interpretation of soils data for making environmental decisions, applying management practices, and sustainable food production. 3 lectures, 1 laboratory. Prerequisite: College chemistry and passing score on ELM examination, or an ELM exemption, or credit in MATH 104. Fulfills GE B5.

### SS 131 Soils in Environmental and Agricultural Systems (4)

Soils' ecological functions; soil and the water cycle; soil in production of food, fiber, and forest materials; techniques and reports of soil analyses with agricultural and environmental applications; soil quality; introductory overview of soils and civilizations. Not open to students with credit in SS 121. 3 lectures, 1 activity. *New course, effective Fall 2010.*

### SS 200 Special Problems for Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

### SS 221 Fertilizers and Plant Nutrition (4)

Plant nutrient requirements. Composition, value, and use of fertilizer materials, conditioners and agricultural minerals. Methods of manufacturing, distributing, and applying fertilizers. 3 lectures, 1 laboratory. Prerequisite: SS 121.

### SS 270 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

### SS 301 Soils Practicum (2) (CR/NC)

Supervised practice in technical, educational, professional, and operational applications related to soil science. Students participate in faculty-supervised group or individual activities that support educational and professional goals. Credit/No Credit grading only. 2 activities. Prerequisite: SS 110 or SS 121.

### SS 310 Urban Soils (4)

Management and manipulation of soils in urban environments. Measurement and interpretation of morphological, physical and chemical properties. Selection and treatment of soil materials for interior and exterior plantings. 3 lectures, 1 laboratory. Prerequisite: SS 121.

### SS 321 Soil Morphology (4)

Identification of soil morphological and site properties. Correlation of soil physical and chemical properties with soil taxonomy and land use. Techniques of interpretations for agriculture, forest lands, wetlands, range lands and urban development. 3 lectures, 1 laboratory. Prerequisite: SS 121.

### SS 322 Soil Plant Relationships (4)

Investigation and evaluation of the nutrient supplying ability of soils. Conditions and transformations involved in the transfer of mineral nutrients from soils to plants. Effects of cultural treatments on soil fertility. Diagnostic techniques and data interpretation in soil and plant analysis. 3 lectures, 1 laboratory. Prerequisite: SS 221, CHEM 111 or CHEM 128.

### SS 339 Soil Science Internship (1–12) (CR/NC)

Selected students will spend up to 12 weeks with an approved firm or agency engaged in work and study related to their major. A detailed written proposal and written interim and final reports required. One unit of credit may be allowed for each full week of internship. Credit/No Credit grading. Prerequisite: Consent of internship instructor.

### SS 345 Soil Interpretations and Management (4)

Calculate, graph, and interpret physical, chemical, and microbiological data from soils and reports. Apply laboratory results to field conditions. Debate

efficacy of soil management and environmental practices considering social, economic and political implications of soil science. 2 lectures, 2 activities. Prerequisite: SS 121, CHEM 129, MATH 119 or MATH 141, PHYS 121 or PHYS 131, or consent of instructor.

### SS 400 Special Problems for Advanced Undergraduates (2–4)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

### SS 421 Wetlands (4)

The formation, characteristics, and functions of wetlands. Genesis of hydric soils. Plant adaptations to saturated soils. Wetlands as wildlife habitat. Policies and social issues associated with wetlands. The procedures of wetland delineations. 3 lectures, 1 laboratory. Prerequisite: CHEM 128, BOT 313 223, SS 321. *Crosslisted as BIO/NR/SS 421. Corrected 7/19/10.*

### SS 422 Soil Microbiology and Biochemistry (4)

Biochemical activities, ecology and environmental implications of soil organisms. Effects on the formation, characteristics, and productivity of soils. Methods of studying soil organisms. 3 lectures, 1 laboratory. Prerequisite: SS 221 and SS 345, CHEM 313, or consent of instructor.

### SS 423 Soil and Water Chemistry (5)

Chemical processes governing weathering, soil mineral formation and stability, common solubility equilibria. Use of chemical principles to explain surface chemical properties of soils and environmental problems in water and soil chemical systems. Preparation of professional quality reports based on laboratory data and library research. 3 lectures, 1 laboratory, 1 activity. Prerequisite: SS 223, SS 345, CHEM 129, CHEM 212/312, or CHEM 216/316, MATH 118 or MATH 141.

### SS 431 Soil Resource Inventory (4)

Development and production of soil surveys for interpretive purposes. Use of soil taxonomy and land classification systems to evaluate land for best management practices. 2 lectures, 2 laboratories. Prerequisite: SS 223; SS 321.

### SS 432 Soil Physics (5)

Matter and energy in soils, with emphasis on properties and behavior of solids, water, air, and heat. Applications to agriculture, forestry, range management, engineering, and environmental sciences. Preparation of professional reports based on laboratory data and library research. 3 lectures, 1 laboratory, 1 activity. Prerequisite: SS 121, SS 345, PHYS 121 or PHYS 131, CHEM 129, MATH 118 or MATH 141, or consent of instructor.

### SS 433 Land Use Planning (3)

Development of plans and practices for management of agricultural, recreational and urban land use by evaluating the soil capabilities through the use of Soil Survey Reports. 2 lectures, 1 laboratory. Prerequisite: SS 121.

### SS 440 Forest and Range Soils (4)

Ecosystem approach to chemical, biological, physical and mechanical properties of forest and range soils. Site quality, nutrient cycling, erosion and mass movement, fire effects. Preparation of soil management reports similar to those required by various land management organizations. Overnight field trips. 3 lectures, 1 laboratory. Prerequisite: SS 121, SS 321 or consent of instructor.

### SS 442 Soil Vadose Zone Remediation (4)

Redox transformations and removal or immobilization of inorganic pollutants. Microbial degradation and elimination of organic contaminants. Monitoring and predicting management strategies for vadose zone enhancement. Reclamation of disturbed lands. 3 lectures, 1 activity. Prerequisite: CHEM 212/312 or CHEM 216/316, GEOL 201, SS 121 or consent of instructor.

### SS 444 Soil Judging (2)

Morphological description of soils in the field. Taxonomic determination of classifications and interpretive properties from soil descriptions. Participation in collegiate soil judging contests. Total credit limited to 12 units. 1 lecture, 1 laboratory. Prerequisite: SS 321 or consent of instructor.

### SS 453 Tropical Soils (4)

Nature and properties of soils occurring in the tropics, their origin, morphology, classification, fertility, management and conservation. Examination of social implications in international agriculture. 3 lectures, 1 laboratory. Prerequisite: SS 121, CHEM 111 or CHEM 128.

**SS 461 Senior Project I (1)**

Senior project topic selection and contract development with project advisor. Statement of problems, subproblems, assumptions, objectives, hypothesis, methods of analysis and statistical design. Development of literature review and budget of time and finances. Proper format and presentation of tabular and graphic information. 1 activity. Prerequisite: MATH 118 or MATH ~~141~~ ~~434~~, STAT 211 or STAT 321 or CRSC 411. *Corrected 8/9/10.*

**SS 462 Senior Project II (3)**

Implementation of materials and methods. Collection, analysis and interpretation of data. Completion of formal written report under advisor supervision. Minimum 90 hours. Prerequisite: SS 461.

**SS 463 Undergraduate Seminar (2)**

Review of current research, experiments, and problems related to the student's major field of interest. Preparation and presentation of reports on problems or research activities. 2 seminars.

**SS 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**SS 471 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

**SS 500 Individual Study in Soil Science (1–6)**

Advanced independent study planned and completed under the direction of a member of the Earth and Soil Sciences faculty. Total credit limited to 6 units. Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

**SS 501 Research Planning (4)**

Problem solving and research planning for agriculture, natural resources and related sciences. Preparation of study plans that identify problems, review appropriate literature, formulate objectives, develop methods and provide for presentation and interpretation of results. Oral reports. 4 lectures. Prerequisite: Graduate standing or consent of instructor.

**SS 508 Environmental Assessment for Erosion Control (3)**

Assessment techniques for the development of soil erosion control and the dispersal of surface runoff water on urban, agriculture, riparian, and rangelands. Development of a water quality management plan for a specific land use. 3 lectures. Prerequisite: Introductory soils course and graduate standing, or consent of instructor.

**SS 522 Advanced Soil Fertility (3)**

Current research frontiers in soil fertility. Evaluating soil testing philosophy, theories and interpretation. Optimizing soil conditions for maximizing crop production. Consequences of environmental pollution, trace elements and organic amendments. Chemical reactions including solubility and chelate equilibria, adsorption phenomena, nutrient mobility, soil mineralogy and weathering. Use of foliar fertilization. Radioisotopes in soil fertility. 3 lectures. Prerequisite: SS 322, graduate standing or consent of instructor.

**SS 570 Selected Topics in Soil Science (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1 to 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**SS 571 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Graduate standing or consent of instructor.

**SS 581 Graduate Seminar in Soils (3)**

Current research, experiments and problems related to soil science. Total credit limited to 3 units. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**SS 582 GIS in Advanced Land Management (3)**

Development of plans and practices for the management of crop, range, urban and wood land. 2 seminars, 1 laboratory. Prerequisite: Graduate standing, NR/LA 318, GEOG 318, or equivalent; SS 433.

**SS 599 Thesis (1–6)**

Individual research in soil science under faculty supervision, leading to a scholarly written presentation exhibiting originality, clarity, critical and independent thinking, proper analysis of data, appropriate organization and format, and accurate and thorough documentation. Six units required for the M.S. degree. Prerequisite: Graduate standing and consent of instructor.

## 2009-11 Cal Poly Catalog

### Statistics Department

#### STAT–STATISTICS

**STAT 130 Introduction to Statistical Reasoning (4)** **GE B1**  
Survey of statistical ideas and philosophy. Emphasis on concepts rather than in-depth coverage of statistical methods. Topics include sampling, experimentation, data exploration, chance phenomena, and methods of statistical inference. Credit not allowed for students with a previous statistics course. 4 lectures. Prerequisite: Passing score on the ELM examination, or an ELM exemption, or credit in MATH 104. Fulfills GE B1.

**STAT 150 Introduction to Statistical Investigations (4)**  
Orientation to the statistics program. Introduction to the discipline of statistics and the nature of statistical reasoning. Design of surveys and experiments, graphical and numerical summaries, statistical models, and interpretation of results. Development of discussion, writing, presentation, and evaluation skills. 4 lectures. Prerequisite: Freshman statistics major, or permission of instructor.

**STAT 200 Special Problems for Undergraduates (1–2)**  
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

**STAT 217 Introduction to Statistical Concepts and Methods (4)** **GE B1**  
Sampling and experimentation, descriptive statistics, confidence intervals, two-sample hypothesis tests for means and proportions, Chi-square tests, linear and multiple regression, analysis of variance. Substantial use of statistical software. Not open to students with credit in STAT 218 or STAT 221 or STAT 251. 4 lectures. Prerequisite: Passing score on the ELM examination, or an ELM exemption, or credit in MATH 104. Fulfills GE B1.

**STAT 218 Applied Statistics for the Life Sciences (4)** **GE B1**  
Data collection and experimental design, descriptive statistics, confidence intervals, parametric and non parametric one and two-sample hypothesis tests, analysis of variance, correlation, simple linear regression, chi-square tests, relative risk and odds. Applications of statistics to the life sciences. Substantial use of statistical software. Not open to students with credit in STAT 217 or STAT 221 or STAT 251. 4 lectures. Prerequisite: Passing score on the ELM examination, or an ELM exemption, or credit in MATH 104. Fulfills GE B1.

**STAT 221 Introduction to Probability and Statistics (5)** **GE B1**  
Data classification, descriptive statistics, elementary probability. Binomial and normal distributions. Random sampling, confidence intervals and hypothesis testing on common parameters. Introduction to regression and correlation, analysis of variance, contingency table analysis. Substantial use of statistical software. Not open to students with credit in STAT 217, STAT 218, STAT 252, **STAT 302**, or **STAT 312**. 5 lectures. Prerequisite: Passing score on the ELM examination, or an ELM exemption, or credit in MATH 104. Fulfills GE B1. *Changed effective Winter 2010.*

**STAT 251 Statistical Inference for Management I (4)** **GE B1**  
Descriptive statistics. Probability and counting rules. Random variables and probability distributions. Sampling distributions and point estimation. Confidence intervals and tests of hypotheses for a single mean and proportion. 4 lectures. Prerequisite: Completion of the ELM requirement and a passing score on appropriate Mathematics Placement Examination for MATH 221 eligibility, or MATH 118 or equivalent. Fulfills GE B1.

**STAT 252 Statistical Inference for Management II (5)** **GE B1**  
Confidence intervals and tests of hypotheses for two means and two proportions. Introduction to ANOVA, regression, correlation, multiple regression, time series, and forecasting. Statistical quality control. Enumerative data analysis. Substantial use of statistical software. 5 lectures. Prerequisite: STAT 221 or STAT 251 with a minimum grade of C-. Fulfills GE B1.

**STAT 270 Selected Topics (1–4)**  
Directed group study of selected topics. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

**STAT 301 Statistics I (4)**  
Introduction to statistics for mathematically inclined students, focused on process of statistical investigations. Observational studies, controlled

experiments, randomization, confounding, randomization tests, hypergeometric distribution, descriptive statistics, sampling, bias, binomial distribution, significance tests, confidence intervals, normal model, *t*-procedures, two-sample procedures. Substantial use of statistical software. 4 lectures. Prerequisite or concurrent: MATH 142.

**STAT 302 Statistics II (4)**  
Continued study of the process, concepts, and methods of statistical investigations. Association, chi-square procedures, one-way ANOVA, multiple comparisons, two-way ANOVA **with** interaction, simple linear regression, correlation, prediction, **logistic regression**, multiple regression, **time series**, **forecasting**, **quality control**. Substantial use of statistical software. Not open to students with credit in STAT 322. 4 lectures. Prerequisite: STAT 301. *Change effective Fall 2010.*

**STAT 312 Statistical Methods for Engineers (4)** **GE B6**  
Descriptive and graphical methods. Discrete and continuous probability distributions. One and two sample confidence intervals and hypothesis testing. Single factor analysis of variance. Quality control. Introduction to regression and to experimental design. Substantial use of statistical software. 4 lectures. Prerequisite: MATH 142. Fulfills GE B6.

**STAT 313 Applied Experimental Design and Regression Models (4)** **GE B1**  
Analysis of variance and regression analysis for students not majoring in statistics or mathematics. Includes one-way classification, randomized blocks, Latin squares, factorial designs, multiple regression, diagnostics, and model comparison. 4 lectures. Prerequisite: STAT 217 or STAT 218 or STAT 221 or STAT 312. Fulfills GE B1.

**STAT 321 Probability and Statistics for Engineers and Scientists (4)** **GE B6**  
Tabular and graphical methods for data summary, numerical summary measures, probability concepts and properties, discrete and continuous probability distributions, expected values, statistics and their sampling distributions, point estimation, confidence intervals for a mean and proportion. Use of statistical software. 4 lectures. Prerequisite: MATH 142. Fulfills GE B6.

**STAT 323 Design and Analysis of Experiments I (4)**  
Principles, construction and analysis of experimental designs. Completely randomized, randomized complete block, Latin squares, Graeco Latin squares, factorial, and nested designs. Fixed and random effects, expected mean squares, multiple comparisons, and analysis of covariance. 4 lectures. Prerequisite: STAT 302 or STAT 312.

**STAT 324 Applied Regression Analysis (4)**  
Simple linear regression and associated special topics, multiple linear regression, indicator variables, influence diagnostics, assumption analysis, selection of "best subset", nonstandard regression models, logistic regression, nonlinear regression models. 4 lectures. Prerequisite: STAT 252 or STAT 302 or STAT 312 or STAT 313.

**STAT 325 Introduction to Probability Models (4)**  
Introduction to probability and applied probability models. Topics include basic probability rules, counting rules, conditional probability, discrete and continuous random variables, and expectation. Applied models include Poisson processes, Markov chains, and reliability models. Not open to students with credit in STAT 321 or **STAT 425**. *Changed effective Winter 2010.* 4 lectures. Prerequisite: MATH 206 and CSC/CPE 101 or CSC 232 or CSC/CPE 235.

**STAT 330 Statistical Computing I: SAS (4)**  
Techniques available to the statistician for efficient use of computers to perform statistical computations and to analyze large amounts of data. Use of SAS throughout the course. Includes data preparation, report writing, and basic statistical methods. 4 lectures. Prerequisite: STAT 252 or STAT 302 or STAT 312 or STAT 313 or STAT 322.

**STAT 350 Probability and Random Processes for Engineers (4)** **GE B6**  
Random events, random variables, and random processes, with emphasis on probabilistic treatment of signals and noise. Specific topics include: sample spaces, probability, distributions, independence, moments, covariance, time/ensemble averages, stationarity, common processes, correlation and spectral functions, physical noise sources. 4 lectures. Prerequisite: MATH 241, EE 228. Fulfills GE B6.



**STAT 400 Special Problems for Advanced Undergraduates (1–2)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

**STAT 416 Statistical Analysis of Time Series (4)**

Time series components, descriptive smoothing methods, regression models for time series data, forecasting via exponential smoothing, evaluation of forecasts, autocorrelation, ARIMA models and Box-Jenkins methods, combining forecasts, frequency domain analysis, filtering. 4 lectures. Prerequisite: **STAT 252 or STAT 302 or STAT 312; STAT 324 or STAT 524 (Change effective Winter 2010)** or consent of instructor.

**STAT 417 Survival Analysis Methods (4)**

Parametric and nonparametric methods for analyzing survival data. Topics include Kaplan-Meier and Nelson-Aalen estimates, Cox regression models, accelerated failure time models. Use of statistical software to implement methods throughout course. 4 lectures. Prerequisite: STAT 302 or consent of instructor.

**STAT 418 Analysis of Cross-Classified Data (4)**

Discrete multivariate statistics, including analysis of cross-classified data, log-linear models for multidimensional contingency tables, goodness of fit statistics, measures of association, model selection, and hypothesis testing. 4 lectures. Prerequisite: STAT 324 or STAT 524 (Change effective Winter 2010) or consent of instructor.

**STAT 419 Applied Multivariate Statistics (4)**

Continuous multivariate statistics. Multivariate linear model, principal components and factor analysis, discriminant analysis, clustering, and canonical correlation. Use of Minitab and SAS throughout the course. 4 lectures. Prerequisite: Two courses in statistics, or consent of instructor. Recommended: MATH 206.

**STAT 421 Survey Sampling and Methodology (4)**

Survey planning, execution, and analysis. Principles of survey research, including non-sampling and sampling error topics. Survey sample designs, including simple random, systematic, stratified, cluster, and multi-stage. Estimation procedures and sample size calculations. 4 lectures. Prerequisite: One of the following: STAT 217, STAT 218, STAT 221, STAT 252, STAT 302, STAT 312, or STAT 512.

**STAT 423 Design and Analysis of Experiments II (4)**

Continuation of STAT 323.  $2^k$  factorial designs,  $3^k$  factorial designs, balanced and partially balanced incomplete block designs, nested designs, split-plot designs, response surface methodology, confounding, repeated measures, and other design approaches. 4 lectures. Prerequisite: STAT 323.

**STAT 425 Probability Theory (4)**

Basic probability theory, combinatorial methods, independence, conditional and marginal probability, probability models for random phenomena, random variables, probability distributions, distributions of functions of random variables, mathematical expectation, covariance and correlation, conditional expectation. 4 lectures. Prerequisite: STAT 301 or STAT 321, MATH 241, and MATH 248. Recommended: STAT 325.

**STAT 426 Estimation and Sampling Theory (4)**

Continuation of STAT 425. Properties of statistics obtained from samples. Sample mean properties, convergence in probability, law of large numbers, and central limit theorem. Selected probability distributions. Theory of estimation. Sampling distribution of estimators. 4 lectures. Prerequisite: STAT 425.

**STAT 427 Mathematical Statistics (4)**

Continuation of STAT 426. The theory of hypothesis testing and its applications. Power and uniformly most powerful tests. Categorical data and nonparametric methods. Other selected topics. 4 lectures. Prerequisite: STAT 426.

**STAT 430 Statistical Computing II: S-Plus (4)**

Design and use of statistical software in programming statistical applications; object oriented statistical languages; random number generation; Monte Carlo methods including resampling (bootstrap and jack-knife), randomization tests, and simulation; exploratory data analysis using linked, Trellis, and dynamic graphics; smoothing algorithms; and regression trees. 4 lectures. Prerequisite: STAT 302, STAT 330, and STAT 323 or STAT 324.

**STAT 440 SAS Certification Preparation (2)**

Preparation and discussion of programming, data management, and data analysis topics related to the Certified Base Programmer Exam offered by the Statistical Analysis Systems (SAS) Institute. 2 lectures. Prerequisite: STAT 330 or equivalent.

**STAT 461, 462 Senior Project I, II (1) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 90 hours total time.

**STAT 465 Statistical Communication and Consulting (4)**

Blending of the theoretical and practical aspects of statistical consulting. Development of tools necessary to conduct effective consulting sessions, present oral arguments and written reports, work collaboratively to solve problems, and utilize professional publications in statistics. 4 lectures. Prerequisite: **Successful completion of at least one STAT-400-level course and senior standing. Open only to statistics majors with senior standing. Changed effective Winter 2010.**

**STAT 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

**STAT 485 Cooperative Education Experience (6) (CR/NC)**

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 6 units; total credit limited to 12 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**STAT 495 Cooperative Education Experience (12) (CR/NC)**

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Major credit limited to 12 units; total credit limited to 24 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**STAT 512 Statistical Methods (4)**

Statistical methods in research for graduate students not majoring in mathematical sciences. Probability distributions, confidence intervals, hypothesis testing, contingency tables, linear regression and correlation, multiple regression, analysis of variance. Substantial use of statistical software. 4 seminars. Prerequisite: Graduate standing and intermediate algebra or equivalent.

**STAT 513 Applied Experimental Design and Regression Models (4)**

Applications of statistics for graduate students not majoring in mathematics. Analysis of variance including the one-way classification, randomized blocks, Latin squares, and factorial designs. Introduction to multiple regression and to analysis of covariance. Substantial use of statistical software. 4 lectures. Not open to students with credit in STAT 313. Prerequisite: **Graduate standing and one of the following: STAT 512, STAT 542, STAT 217, STAT 218, STAT 221, STAT 252, STAT 312, or equivalent. Change effective Fall 2010.**

**STAT 523 Design and Analysis of Experiments I (4)**

Principles, construction and analysis of experimental designs. Completely randomized, randomized complete block, Latin squares, Graeco-Latin squares, factorial, and nested designs. Fixed and random effects, expected mean squares, multiple comparisons, and analysis of covariance. Not open to students with credit in STAT 323. 4 lectures. Prerequisite: STAT 513 or STAT 542 or consent of instructor.

**STAT 524 Applied Regression Analysis (4)**

Simple linear regression and associated special topics, multiple linear regression, indicator variables, influence diagnostics, assumption analysis, selection of best subset, nonstandard regression models, logistic regression, nonlinear regression models. Not open to students with credit in STAT 324. 4 lectures. Prerequisite: STAT 513 or STAT 542 or consent of instructor.

**STAT 530 Statistical Computing I: SAS (4)**

Techniques available to the statistician for efficient use of computers to perform statistical computations and to analyze large amounts of data. Use of the SAS software system. Includes data preparation, report writing, basic statistical

methods, and a research project. Not open to students with credit in STAT 330.  
4 lectures. Prerequisite: STAT 512 or STAT 513 or STAT 542 or equivalent.

**STAT 542 Statistical Methods for Engineers (4)**

Descriptive and graphical methods. Discrete and continuous probability distributions. One and two sample confidence intervals and hypothesis testing. Single factor analysis of variance. Quality control. Introduction to regression and to experimental design. Substantial use of statistical software. 4 lectures. Not open to students with credit in STAT 312. Prerequisite: MATH 142 and graduate standing.

**STAT 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Graduate standing or consent of instructor. *New course, effective Spring 2010.*

**2009-11 Cal Poly Catalog****Statistics Department****BS STATISTICS****Flowchart**

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                      ☐ USCP

\* = Required in Major; also satisfies GE

Course sequencing: See flowcharts at

[www.csmadvising.calpoly.edu](http://www.csmadvising.calpoly.edu)

Note: No ~~major or support courses~~ course with a STAT prefix may be taken as credit/no credit. *Effective Summer 2009.*

**MAJOR COURSES**

STAT 150 Introduction to Statistical Investigations	4
MATH 141 Calculus I (B1)*	4
MATH 142 Calculus II (B1)*	4
MATH 143 Calculus III	4
MATH 206 Linear Algebra I	4
MATH 241 Calculus IV	4
STAT 301 Statistics I or STAT 321 (10/22/09)	4
STAT 302 Statistics II or STAT 322 (10/22/09)	4
STAT 323 Design and Analysis of Experiments I	4
STAT 324 Applied Regression Analysis	4
STAT 325 Introduction to Probability Models	4
STAT 330 Statistical Computing I: SAS	4
STAT 425 Probability Theory	4
STAT 426 Estimation and Sampling Theory	4
STAT 427 Mathematical Statistics	4
STAT 461 Senior Project I	1
STAT 462 Senior Project I	2
STAT 465 Statistical Communication and Consulting	4
<sup>1</sup> CSC, MATH, STAT electives	11-12
Statistics electives (STAT 331; any 400 level STAT course) (7/28/11)	12
<hr/>	
<b>90-91</b>	

**SUPPORT COURSES**

CSC/CPE 235 Fundamentals of Computer Science for Scientists and Engineers or CSC/CPE 101 Fundamentals of Computer Science I	4
MATH 248 Methods of Proof in Mathematics	4
Advisor approved technical electives	8
<hr/>	
<b>16</b>	

**GENERAL EDUCATION (GE)**

72 units required, 8 of which are specified in Major.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing	4
A2 Oral Communication	4
A3 Reasoning, Argumentation, and Writing	4

**Area B Science and Mathematics (8 units)**

B1 Mathematics/Statistics * 8 units in Major	0
B2 Life Science	4

B3 Physical Science	4
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature	4
C2 Philosophy	4
C3 Fine/Performing Arts	4
C4 Upper-division elective	4
Area C elective (Choose one course from C1-C4)	4

**Area D/E Society and the Individual (20 units)**

D1 The American Experience (40404)	4
D2 Political Economy	4
D3 Comparative Social Institutions	4
D4 Self Development (CSU Area E)	4
D5 Upper-division elective	4

**Area F Technology Elective (upper division)**

(4 units)	4
<hr/>	
<b>64</b>	

<b>FREE ELECTIVES</b>	<b>9-10</b>
<hr/>	
<b>180</b>	

<sup>1</sup> Select from the following: CSC/CPE 102, 103, 236; CSC 342; MATH 242, 306, 335, 336, 406, 412, 437, 451, 452; STAT 400 level courses.

**2009-11 Cal Poly Catalog****Biological Sciences Department****MASTER OF SCIENCE DEGREE IN BIOLOGICAL SCIENCES****General Characteristics**

This degree offers a broad background in the biological sciences. The program is designed to offer sufficient breadth and depth to strengthen the student's academic understanding and improve competence for: (a) many types of biological work that require advanced training beyond the bachelor's degree; (b) careers in industry and/or civil service; (c) teaching biological sciences at the elementary, secondary, and community college levels; (d) independent research in the field of specialization; or (e) continued graduate work at other institutions.

**Prerequisites**

Admission as a conditionally classified or classified student in this program requires a minimum grade point average of 3.0 in the last 90 quarter units attempted, submission of Graduate Record Examination (GRE) scores, and submission of Biology Subject GRE score, and letters of recommendation from persons knowing your academic potential.

Information pertaining to specific departmental requirements for admission to graduate standing—classified or graduate standing—conditionally classified may be obtained from the Director of the Graduate and Research Committee (Graduate Coordinator) of the Biological Sciences Department.

**Program of Study**

The formal program of study for the degree must include 45 units of committee-approved graduate work, at least 30 units of which must be at the 500 level. Coursework must include 32 units taken within the Biological Sciences Department at Cal Poly. A grade point average of 3.0 or better is required in all courses included in the Formal Study Plan. A maximum of 6 units of BIO 590 Seminar in Biology can be used. To complete the degree the GRE Advanced Biology exam must be passed with a score of 650 or better.

**CURRICULUM FOR MS BIOLOGICAL SCIENCES**

	<i>Units</i>
<b>Required courses</b> .....	27
BIO 501 Molecular and Cellular Biology (4)	
BIO 502 Biology of Organisms (4)	
BIO 503 Population Biology (4)	
BIO 561 Proposal Writing for Bio Research (3)	
BIO 590 Seminar in Biology (3)	
BIO 599 Thesis, including oral defense of thesis (3) (3) (3)	
<b>Electives</b> .....	18
Additional units at the 400 or 500 level. At least 3 units must be 500 level to meet the 30 unit requirement.	
	45

All 45 units must be acceptable for graduate credit and in accordance with Graduate Guidelines of the Biological Sciences Department. For further information, students should communicate with the Chair of the Biological Sciences Department or with the Director of the Graduate and Research Committee.

**MS Biological Sciences, Specialization in STEM CELL RESEARCH*****New, Winter 2011***

**Characteristics.** Prepares students for research careers working with stem cells. Graduates of the program are well-prepared to matriculate into stem-cell focused doctoral programs. Following completion of a PhD in a stem-cell focused program (and likely post-doctoral training), students would have job opportunities as principal investigators at universities/non-profit research institutes or as lead scientists at for profit institutions. Graduates are also well prepared for immediate employment as research specialists/laboratory managers at universities, research institutes, or private companies in the field of stem cells/regenerative medicine.

**Culminating Experience.** Students who obtain a degree in the Master of Science in Biological Sciences with a specialization in Stem Cell Research are not required to complete BIO 599. In place of the thesis as a culminating experience, students are required to complete a non-traditional Comprehensive Exam. This non-traditional Comprehensive Exam includes a 9-month internship in a stem cell research laboratory<sup>1</sup> (BMED/ASCI/BIO 593), a quarter-long project course at Cal Poly (BMED/ASCI/BIO 594), a written report of their internship research, a written report of their quarter-long project course, and an oral presentation of their internship research. Through the completion of these components, students demonstrate their “ability to integrate the knowledge of the area, show critical

and independent thinking, and demonstrate mastery of the subject matter.”

<b>Required Courses .....</b>	<b>38</b>
BIO 501 Molecular and Cellular Biology (4)	
BIO 502 Biology of Organisms (4)	
BIO 534 Principles of Stem Cell Biology (2)	
BIO 590 Seminar in Biology (1)	
BIO/BMED/ASCI 593 Stem Cell Research Internship (10)	
BIO/BMED/ASCI 594 Applications in Stem Cell Research (2)	
BMED 510 Principles of Tissue Engineering (4)	
BMED 515 Introduction to Biomedical Imaging (4)	
BMED 545 Cell Transplantation and Biotherapeutics (4)	
BMED 563 (2) and ASCI 581 (1) Stem Cell Research Seminars	
<b>Approved engineering, science and mathematics electives .....</b>	<b><math>\frac{7}{45}</math></b>

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<sup>1</sup> Students will complete their internship in stem cell research laboratories at UCSD, the Salk Institute, the Scripps Research Institute, Stanford University, or Novocell Inc.

## 2009-11 Cal Poly Catalog

### Biomedical and General Engineering Department

#### MS BIOMEDICAL ENGINEERING

##### General Characteristics

The Master of Science degree program in Biomedical Engineering is well-suited for those individuals who desire depth in engineering application to living systems, with a strong pragmatic and rigorous, hands-on educational experience. Graduates will be well-equipped to make significant contributions to the biomedical field. The MS in Biomedical Engineering program objectives are to:

- Provide graduates with a rigorous, broad-based advanced education in engineering coupled with applied biology that will prepare graduates for the many diverse career opportunities of biomedical engineering.
- Provide an empowering professional degree for students who intend to become practicing engineers
- Provide job-entry education for the more complex and evolving interdisciplinary area of biomedical engineering.
- Provide a base that enables graduates to maintain currency in their fields.
- Provide preparation for further study in engineering and/or medicine, leading to the Doctor of Engineering, MD, Ph.D, or MD/Ph.D. degrees.

##### Prerequisites

For admission as a classified graduate student, an applicant must possess a bachelor's degree in engineering or a closely related physical science with a minimum grade point average of 3.0 in the last 90 quarter units (60 semester units) attempted. Applicants for graduate engineering programs are required to submit scores for the General Test of the Graduate Record Examination. Applicants are also required to submit 3 letters of reference in support of their application. A college level biology course, with laboratory, for biology majors is highly recommended. Applicants who meet these standards but lack prerequisite coursework may be admitted as conditionally classified students and must make up any deficiencies before advancement to candidacy. Applicants from other academic disciplines, such as biology or chemistry are encouraged to apply and may be admitted to the program conditionally in order to make up deficiencies in prerequisite coursework. Information regarding specific admission requirements and classification as a graduate student may be obtained from the Graduate Coordinator, Biomedical Engineering.

##### Program of Study

Graduate students must file formal study plans with their advisor, department, college, and university graduate studies office as well as fulfill the Graduation Writing Requirement no later than the end of the quarter in which the 12th unit of approved graduate course work is completed. The formal program of study must include a minimum of 45 units with:

- a) At least 23 units of the 45 unit program at the 500 level.
- b) A thesis or project as the mandatory culminating experience.

##### Curriculum for MS Biomedical Engineering

	<i>Units</i>
<b>Required Courses</b> .....	27
BMED 460 Engineering Physiology (4)	
BMED 512 Biomedical Engineering Horizons (4)	
BMED 530 Biomaterials (4)	
BMED 550 Current and Evolving Topics in Biomedical Engineering (4)	
BMED 563 Biomedical Engineering Graduate Seminar (2)	
BMED 599 Design Project (Thesis) (9)	
<b>Approved Engineering, Science and Mathematics Electives</b> .....	18
a) A minimum of 8 units from an advisor approved list of mathematics, statistics, biology, or analytic engineering courses, with at least 4 units at the 500 level;	
b) Remaining elective units are advisor approved.	
	45

#### MS Biomedical Engineering, Specialization in STEM CELL RESEARCH

##### *New, Winter 2011*

**Characteristics.** Prepares students for research careers working with stem cells. Graduates of the program are well-prepared to matriculate into stem-cell focused doctoral programs. Following completion of a PhD in a stem-cell focused program (and likely post-doctoral training), students would have job opportunities as principal investigators at universities/non-profit research institutes or as lead scientists at for profit institutions. Graduates are also well prepared for immediate employment as research specialists/laboratory managers at universities, research institutes, or private companies in the field of stem cells/regenerative medicine.

**Culminating Experience.** Students who obtain a degree in the Master of Science in Biomedical Engineering with a specialization in Stem Cell Research are not required to complete BMED 599. In place of the thesis as a



culminating experience, students are required to complete a non-traditional Comprehensive Exam. This non-traditional Comprehensive Exam includes a 9-month internship in a stem cell research laboratory<sup>1</sup> (BMED/ASCI/BIO 593), a quarter-long project course at Cal Poly (BMED/ASCI/BIO 594), a written report of their internship research, a written report of their quarter-long project course, and an oral presentation of their internship research. Through the completion of these components, students demonstrate their “ability to integrate the knowledge of the area, show critical and independent thinking, and demonstrate mastery of the subject matter.”

<b>Required Courses</b> .....	38
BMED 460 Engineering Physiology (4)	
BMED 510 Principles of Tissue Engineering (4)	
BMED 512 Biomedical Engineering Horizons (4)	
BMED 515 Introduction to Biomedical Imaging (4)	
BMED 545 Cell Transplantation and Biotherapeutics (4)	
BMED 563 Biomedical Engineering Graduate Seminar (2)	
BMED/ASCI/BIO 593 Stem Cell Research Internship (10)	
BMED/ASCI/BIO 594 Applications in Stem Cell Research (2)	
BIO 534 Principles of Stem Cell Biology (2)	
BIO 590 (1)and ASCI 581 (1) Stem Cell Research Seminars	
<b>Approved engineering, science and mathematics electives</b> .....	<u>7</u>
	45

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<sup>1</sup> Students will complete their internship in stem cell research laboratories at UCSD, the Salk Institute, the Scripps Research Institute, Stanford University, or Novocell Inc.

# Graduate Programs

Mark Shelton, Associate Dean of Graduate Programs  
and Research

Agricultural Sciences Bldg., Room 211  
805 756-2161

[mshelton@calpoly.edu](mailto:mshelton@calpoly.edu)

[http://cafes.calpoly.edu/departmentsandmajors/  
graduatePrograms](http://cafes.calpoly.edu/departmentsandmajors/graduatePrograms)

## Programs of Study/Specializations Available

[Agribusiness – MS](#), see page 89

[Forestry Sciences – MS](#), see page 124

[Agricultural Education – Master of](#) **New Fall 2010**

Agriculture – MS with Specializations in:

Agricultural Engineering Technology

Animal Science

Crop Science

Dairy Products Technology

Environmental Horticultural Science

Food Science and Nutrition

Irrigation

Plant Protection Science

Recreation, Parks, and Tourism Management

Soil Science

## General Characteristics

Graduate studies in the College of Agriculture, Food and Environmental Sciences (CAFES) allow the student to pursue either a professional program designed to enhance the competencies of agricultural educators, or an academic program of graduate-level scholarly activities and research in one of several specializations. Graduates are prepared for:

- \* professional-level positions with business and industry, government, and foreign service in agriculture and related fields;
- \* continued graduate work at other institutions.

## Admission/Acceptance Requirements – MS only

- File an application for Graduate Admission via [www.csumentor.edu](http://www.csumentor.edu) by the deadlines specified at [www.ess.calpoly.edu/admiss/grad/regular.html](http://www.ess.calpoly.edu/admiss/grad/regular.html)
- Submit Graduate Record Exam (GRE) General Test scores **electronically to Institution Code: R4038**
- Three Letters of Recommendation

## Prerequisites

For consideration as a graduate student, an applicant will have completed a bachelor's degree from an accredited college/university with a minimum grade point average of 2.75 in the last 90-quarter units. An applicant who meets these standards but lacks prerequisite coursework may be admitted as a conditionally classified student and must make

up any deficiencies before advancement to classified graduate standing.

All applicants who do not speak and write English as their primary language are required to complete the Test of English as a Foreign Language (TOEFL), taken within the last 2 years with a minimum score of 550 (paper version), 213 (computerized version), or 80 (internet based). Submit scores electronically to Institution Code: 4038. This requirement does not apply if your country of citizenship is listed on Cal Poly Admissions website:

[www.ess.calpoly.edu/admiss/international/toefl.html](http://www.ess.calpoly.edu/admiss/international/toefl.html)

Each specialization below may list additional prerequisites/requirements for the specific program.

## Programs of Study

There are four graduate degree programs in the college: MS Agribusiness, MS Forestry Sciences, Master of Agricultural Education (non-thesis), and MS Agriculture with the following specializations: Agricultural Engineering Technology, Animal Science, Crop Science, Dairy Products Technology, Environmental Horticultural Science, Food Science and Nutrition, Irrigation, Plant Protection Science, Recreation, Parks, and Tourism Management, and Soil Science.

**Thesis.** The thesis is based on independent, supervised research. Students should contact individual departments to determine the availability of funding support for their research. The final copy of the thesis must meet the standards explained in the "Manual of Instructions for the Preparation and Submission of the Master's Thesis or Master's Project" available from the Cal Poly Research and Graduate Programs Office. At least one course in statistical methods and/or experimental design is required of students in a thesis based curriculum.

**Formal Study Plan.** Graduate students must file the formal study plan for the degree with the CAFES Graduate Coordinator no later than the end of the quarter in which the 12th unit of approved courses is completed. The formal program of study must include at least 45 units of committee-approved graduate coursework; at least half of the units required by the committee as reflected on the formal study plan must be at the 500 level. Students should refer to the course descriptions in this catalog for credit limitations of individual courses; for example, total credit for AG 500, Individual Study, is limited to six units. All candidates must meet the current Graduation Writing Requirement; see page 71. All students are required to pass an oral comprehensive examination which is normally given during the final quarter of the program of study. A written comprehensive exam may also be required by the master's degree committee, but this is optional. For students in a thesis program the final oral comprehensive examination includes, but is not necessarily limited to, a defense of the thesis.

## Master of Science in Agriculture

### MS Agriculture, Specialization in AGRICULTURAL ENGINEERING TECHNOLOGY

Students have the opportunity to focus their program on the application of engineering technologies and management to solve agriculturally related problems.

	<i>Units</i>
<b>Required Courses</b> .....	23
BRAE 599 Thesis (6)	
AG 581/BRAE 581 Graduate Seminar (1)	
SS 501 Research Planning (4)	
STAT 512 Statistical Methods (4)	
STAT 513 Applied Experimental Design and Regression Models (4)	
BRAE 521 Systems Analysis of Ag Systems (4)	
<b>Restricted electives</b> .....	22
Any 400 and 500 level courses approved by the student's graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	
	45

### MS Agriculture, Specialization in ANIMAL SCIENCE

*Additional prerequisites:* Prospective students are required to: (1) submit a cover letter identifying interests, goals and experience relevant to the MS program, and (2) submit a résumé.

The program provides students with an interdisciplinary, science-based program, where students develop basic scientific knowledge, apply that knowledge to a research project, then write and defend a thesis. An individual's coursework and research project is focused based upon his or her interests and goals in Animal Science, and under the guidance of the advisor and thesis committee.

	<i>Units</i>
<b>Required Courses</b> .....	18
ASCI 581 Graduate Seminar (3)	
AG 581 Graduate Seminar (1)	
STAT 512 Statistical Methods (4)	
STAT 513 Applied Experimental Design and Regression Models (4)	
AG 599 Thesis (6)	
<b>Select 16 units from the following</b> .....	16
AG 500 Individual Study in Agriculture (6)	
ASCI 403 Applied Biotech in Animal Science (5)	
ASCI 405 Domestic Livestock Endocrinology (4)	
ASCI 406 Applied Animal Embryology (5)	
ASCI 415 HACCP for Meat and Poultry Ops (3)	
ASCI 420 Animal Metabolism and Nutrition (3)	
ASCI 450 Computer Apps in Animal Science: Spreadsheet Analysis (4)	

ASCI 500 Individual Study in Animal Science (6)  
 ASCI 503 Adv Molecular Tech in Animal Sci (4)  
**ASCI 593 Stem Cell Research Internship (5)**  
**ASCI 594 Applications in Stem Cell Research (2)**  
*(Winter 2011)*

VS/ASCI 438 Systemic Animal Physiology (4)  
 VS/ASCI 440 Immunology and Diseases of Animals (4) *or* VS/ASCI 540 Advanced Immunology and Diseases of Animals (4)  
 AGED 438 Instructional Processes in Agric Ed (4)  
 BIO 501 Molecular and Cellular Biology (4)  
 BIO 524 Developmental Biology (2)  
 CHEM 528 Nutritional Biochemistry (3)  
 NR 532 Apps in Biometrics and Econometrics (4)

**Restricted electives** ..... 11  
 Any 400 and 500 level courses approved by the student's graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.

45

### MS Agriculture, Specialization in CROP SCIENCE

For students with undergraduate preparation in plant agriculture. Research currently is focused primarily in postharvest technology, viticulture, and integrated pest management, with additional work being done in other areas, including agronomy, horticulture, and precision farming.

	<i>Units</i>
<b>Required Courses</b> .....	21
CRSC 445 Cropping Systems (4)	
CRSC 581 Graduate Seminar (3)	
CRSC 599 Thesis (6)	
HCS 511 Ecological Biometrics (4)	
SS 501 Research Planning (4)	
<b>Restricted electives</b> .....	24
Any 400 and 500 level courses, approved by the student's graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	
	45

### MS Agriculture, Specialization in DAIRY PRODUCTS TECHNOLOGY

*Additional prerequisites:* Prospective students are required to: (1) submit a cover letter identifying interests, goals and experience relevant to the MS program, and (2) submit a résumé.

An applied program for students who desire to use their academic preparation in food science and nutrition, dairy science, microbiology, chemistry, engineering, biochemistry and related fields to address applied research questions of impact to the field of dairy science and technology. The program requires the demonstration of strong analytical

thinking, effective oral and written communication, and project management. Coursework and thesis experience are designed with flexibility to enhance and increase proficiency in scientific methods while enriching students' overall preparation to enter the workforce. Graduates enter research and development positions with major food companies, leadership positions in dairy food processing and other allied areas, or further graduate study for the Ph.D. Students have opportunity to work on funded research projects of the Dairy Products Technology Center and interact with multidisciplinary teams of scientists from throughout the world. International students are encouraged to apply.

	<i>Units</i>
<b>Required Courses</b> .....	27
DSCI 401 Physical and Chemical Properties of Dairy Products (4)	
DSCI 444 Dairy Microbiology (4)	
DSCI 570 Selected Topics in Dairy Science (3)	
DSCI 571 Selected Adv. Lab in Dairy Science (3)	
DSCI 581 Graduate Seminar in Dairy Science (3)	
DSCI 599 Thesis (6)	
STAT 523 Design and Analysis of Experiments (4)	
<b>Restricted electives</b> .....	18
Any 400 and 500 level courses, approved by the student's graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	
	45

### MS Agriculture, Specialization in ENVIRONMENTAL HORTICULTURAL SCIENCE

For students interested in careers in teaching, applied research positions in industry, or to students planning on continuing on for a Ph.D. It would also appeal to foreign students interested in an American graduate degree, particularly since California is internationally famous for its horticulture industry.

	<i>Units</i>
<b>Required Courses</b> .....	23
CRSC/ EHS 581 Graduate Seminar (3)	
HCS 500 Individual Study (3)	
HCS 511 Ecological Biometrics (4)	
HCS 570/571 Selected Topics/Lab (3)	
SS 501 Research Planning (4)	
EHS 599 Thesis (6)	
<b>Restricted electives</b> .....	22
Any 400 and 500 level courses approved by the student's graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	
	45

### MS Agriculture, Specialization in FOOD SCIENCE AND NUTRITION

For students with undergraduate preparation in food science, nutrition, or other science-based curricula. A thesis is required. Research areas vary with faculty expertise and interest; refer to Food Science and Nutrition Department and College of Agriculture, Food and Environmental Sciences web pages for more information on faculty research. Graduates are prepared for further study in doctoral programs or for responsible positions in nutrition and food industries.

	<i>Units</i>
<b>Required Courses</b> .....	15-17
FSN 581 Graduate Seminar (3)	
FSN 599 Thesis (6)	
SS 501 Research Planning <i>or</i> other 400-500 level research methods course (2-4)	
STAT 512 Statistical Methods (4)	
<b>Restricted electives</b> .....	28-30
Any 400 and 500 level courses, approved by the student's graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	
	45

### MS Agriculture, Specialization in IRRIGATION

*Additional prerequisites:* B.S. or B.A. with proficiency in basic chemistry and math. Students must have successfully completed at least one undergraduate class in general irrigation, soil science, crop science, calculus, and hydraulics, plus be familiar with spreadsheets. Students may complete prerequisite courses at Cal Poly if necessary.

	<i>Units</i>
<b>Required Courses</b> .....	37
BRAE 405 Chemigation (1)	
BRAE 414 Irrigation Engineering (4)	
BRAE 435 Drainage (4)	
BRAE 440 Agricultural Irrigation Systems (4)	
BRAE 438 Drip/Micro Irrigation <i>or</i> BRAE 439 Vineyard Water Management (4)	
BRAE 500 Individual Study (3)	
BRAE 532 Water Wells and Pumps (4)	
BRAE 533 Irrigation Project Design (4)	
BRAE 599 Thesis (6)	
400-500 level research methods or statistics course (3)	
<b>Restricted electives</b> .....	8
Any 400 and 500 level courses approved by the student's graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	
	45

**MS Agriculture, Specialization in PLANT PROTECTION SCIENCE**

Provides research experience at the graduate level; provides the opportunity to conduct field and/or laboratory research programs with corporate stakeholders for career enhancement; allows students to develop more diverse or specialized skill sets for post-graduation employment; provides opportunity to obtain required coursework for state licensing.

	<i>Units</i>
<b>Required Courses</b> .....	22-24
AG 581 Graduate Seminar (1-3)	
CRSC/EHS 581 Graduate Seminar (3)	
HCS 511 Ecological Biometrics (4)	
PPSC 521 Plant-Pest Interactions (4)	
PPSC 599 Thesis (6)	
SS 501 Research Planning (4)	
<b>Select 8 units from the following</b> .....	8
PPSC 405 Advanced Weed Management (4)	
PPSC 414 Grape Pest Management (4)	
PPSC 427 Disease and Pest Control Systems for Ornamental Plants (4)	
PPSC 431 Insect Pest Management (4)	
PPSC 441 Biological Control of Insects (4)	
<b>Restricted electives</b> .....	13-15
Any 400 and 500 level courses approved by the graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	
	<hr/> 45

**MS Agriculture, Specialization in RECREATION, PARKS, AND TOURISM MANAGEMENT**

Prerequisite: In order to develop an academic background in this discipline, students who have not completed a BS/BA degree in Recreation, Parks and Tourism Administration may be required to take the following undergraduate courses: RPTA 101, RPTA 210, RPTA 360, and STAT 217/218.

	<i>Units</i>
<b>Required Courses</b> .....	23
RPTA 450 Resource and Grant Development (4)	
RPTA 527 Leisure Behavior and Theory (4)	
RPTA 581 Graduate Seminar (2)	
RPTA 599 Thesis (9)	
STAT 513 Applied Experimental Design and Regression Models (4)	
<b>Restricted electives</b> .....	22
Any 400 and 500 level courses approved by the graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	
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**MS Agriculture, Specialization in SOIL SCIENCE**

Provides graduate level knowledge and skills for soils interpretation and management, for teaching, or for continuation into a PhD program. Department facilities include modern instrumentation, laboratories, and a glasshouse. Students have access to several thousand acres of agricultural, forest, and range lands. Graduates meet educational requirements for professional certification by the American Registry of Certified Professionals in Agronomy, Crops, and Soils, and as Certified Professional Erosion and Sediment Control Specialists.

	<i>Units</i>
<b>Required Courses</b> .....	40
SS 422 Soil Microbiology and Biochemistry (4)	
SS 423 Soil and Water Chemistry (5)	
SS 431 Soil Resource Inventory (4)	
SS 432 Soil Physics (5)	
SS 501 Research Planning (4)	
SS 508 Environmental Assessment for Erosion Control (3)	
SS 522 Advanced Soil Fertility (3)	
SS 581 Graduate Seminar in Soil Science (3)	
SS 582 GIS in Advanced Land Management (3)	
SS 599 Thesis (6)	
<b>Restricted electives</b> .....	5
Any 400 and 500 level courses approved by the graduate committee. At least half of all units required by the committee as reflected on the formal study plan must be at the 500 level.	
	<hr/> 45

Students with a BS degree in Soil Science may apply only 9 units of SS 422, SS 423, SS 431, SS 432 to fulfill the MS requirements.

**MBA, Specialization in AGRIBUSINESS**

The Orfalea College of Business and the Agribusiness Department jointly offer an Agribusiness Specialization in the Master of Business Administration program. The program is part of the two-year MBA curriculum and requires the completion of six graduate classes taught by the Agribusiness Department (see page 158, the Orfalea College of Business). Information and application materials may be obtained by writing to the MBA Coordinator, Orfalea College of Business.

**MS Engineering, Specialization in WATER ENGINEERING**

The College of Engineering and the BioResource and Agricultural Engineering Department jointly offer the Water Engineering Specialization under the M.S. Engineering. Please see College of Engineering section of this catalog for more information.

**2009-11 Cal Poly Catalog****Art and Design Department****STUDIO ART MINOR**

Courses consist of a required core and advisor approved electives. The electives include courses in 2D, 3D studio, and art history. Students, working with an advisor, select their area(s) of interest. Advisors are: Daniel Dove, Tera Galanti, or Michael Barton Miller.

<b>Required Core</b>	<i>Units</i>
ART 101 The Fundamentals of Drawing (C3) .....	4
ART 148 Beginning Sculpture (C3) .....	4
ART 312 Art History–Modern Art, 1900-1945 <i>or</i> ART 315 Art History–Art Since 1945 .....	4
<b>ART advisor approved electives</b>	
<i>Select a minimum of 4 units from:</i> .....	4
ART 112 (C3), 121- <del>(C3)</del> , 182, 183, 184, 201, 203, 209, 211, 212, 222, 224, 241, 245, 260 <i>Corrected 4/15/09</i>	
<i>Select a minimum of 12 units from:</i> .....	12
(see course descriptions for repeatable units)	
ART 301, 302, 309, 310, 311 (C4), 313, 314 (C4), 316, 317, 318 (C4), 334, 336, 341, 345, 348, 353, 400, 402, 406, 409, 440, 448, <del>455</del> <i>Corrected 4/15/09</i>	
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## 2009-11 Cal Poly Catalog

### College of Architecture and Environmental Design

#### SUSTAINABLE ENVIRONMENTS MINOR

Margot McDonald, Minor Advisor  
<mailto:mmcdonal@calpoly.edu>, (805) 756-1298  
 Architecture Department (05), Room 212

This minor educates students within the University in the principles and various aspects of sustainable environmental design with global, regional and local perspectives and concepts. It provides students with the knowledge and abilities needed to integrate concerns for ecology, social equity and economics within the context of human and natural resource systems and the built environment.

#### Required courses Units

EDES 406 Sustainable Environments .....	4
EDES 408 Implementing Sustainable Principles ..	4

#### Approved Electives ..... 16

Select 16 units ~~not required as major or support courses by the student's major~~ from the following courses: (9/28/10)

AG 450;  
 ANT 201<sup>1</sup>, 360<sup>2</sup>;  
 ARCH 413, 445, 472;  
 BIO 112, 227, 325<sup>3</sup>;  
 BOT 238;  
 BRAE 348;  
 CM 470 (LEED)  
 CRP 211<sup>4</sup>, 212<sup>4</sup>, 214<sup>4</sup>, 334, 336<sup>4</sup>, 342<sup>4</sup>, 436<sup>4</sup>, 438;  
 CRP/ES 215; (2/29/12)  
 ECON/HNRS 303;  
 EDES 410, 420;  
 ENGL 380 (Eco-Lit or Nature);  
 ES/ARCH 326;  
 ES 360;  
 GEOG 150<sup>1</sup>,  
 GEOG/ERSC 325, 333;  
 HUM 303/HNRS 304;  
 LA 482;  
 NR 306<sup>3</sup>,  
 NR/LA 318<sup>3</sup>;  
 PHIL 340;  
 PHYS 310;  
 PSY 311;  
 SOC 313;  
 UNIV/AG/HUM 330;  
 UNIV 333, 339, 350, 391, 392, 492

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<sup>1</sup> ANT 201 and GEOG 150 do not count for Sociology, Social Sciences, and Anthropology and Geography majors. (9/28/10)

<sup>2</sup> ANT 360 does not count for Anthropology and Geography majors. (9/28/10)

<sup>3</sup> BIO 325, LA/NR 318, and NR 306 do not count for Environmental Management and Protection majors. (9/28/10)

<sup>4</sup> CRP 211, ~~and~~ CRP 212, CRP 214, CRP 336, CRP 342, and CRP 436 do not count for City and Regional Planning majors. (9/28/10) (2/29/12)

## 2009-11 Cal Poly Catalog

### Theatre & Dance Department

#### TH-THEATRE

##### TH 210 Introduction to Theatre (4) GE C3

Principles of theatre and production process, including theatrical terminology, methods, dramatic literature, aesthetics, and technology. 4 lectures. Fulfills GE C3.

##### TH 220 Acting Methods (4)

Contemporary acting techniques focused on character building, objectives and tactics, with a focus on the development and implementation of various interactive methods of vocal work, images and actor resources. 3 lectures, 1 activity. Prerequisite: TH 210.

##### TH 227 Theatre History: Classical (4) GE C3

Highlights of European theatrical history – Greeks, Romans, Medieval English and French theatre through the 17<sup>th</sup> century. Production methods, acting styles, playwriting theories and representative plays. 4 lectures. Fulfills GE C3.

##### TH 228 Theatre History: 18<sup>th</sup> Century to Contemporary (4) GE C3

Highlights of European and American theatrical history from the 18<sup>th</sup> to 20<sup>th</sup> century. Production methods, acting styles, playwriting theories and representative plays. 4 lectures. Fulfills GE C3.

##### TH 230 Stagecraft I (4)

Basic stagecraft technique used in the entertainment industry. Construction and painting of scenery, building and gathering properties, hanging and focusing lighting instruments, assisting with costumes and acting as running crew for department production each term. 4 laboratories.

##### TH 240 Improvisational Theatre (4)

Objectives and techniques of improvisational theatre. Participation in a series of exercises designed to develop skills in dramatic structure formatting, interactive problem solving, spontaneous scripting, dynamic communications, and applied performance styles. 2 lectures, 2 activities.

##### TH 250 Costume and Craft Construction (4)

Basic costume and craft construction techniques used in the entertainment industry. Building of all costumes and special craft projects for main stage theatre productions. Total credit limited to 12 units. Major credit limited to 4 units; repeated units are free electives. 4 laboratories.

##### TH 260 Voice and Diction for the Stage (4)

Theory and practice in developing command of oral techniques for the stage including breath support, resonance and articulation. 4 lectures.

##### TH 270 Make-Up for Theatre and Film (4)

Introduction to the art of theatrical and film make-up design and application. Techniques for producing character, old age, fantasy and special effects make-up. Demonstration and discussion of various design and application styles. 3 lectures, 1 activity.

##### TH 275 Selected Topics (1–4)

Directed group study of selected topics. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Open to undergraduate students and consent of instructor.

##### TH 280 Movement for the Actor (4)

Directed group study of movement techniques and exercises to facilitate expressive physical performance for the actor. Body effectiveness, alignment and conditioning practice integrated with creative exploration and movement analysis of effort, spatial awareness and detailed body usage. 4 lectures.

##### TH 290 Script Analysis (4)

Script analysis taught as an essential applied skill for actors, designers and directors. Students read a variety of plays and learn how to examine their structure, theme and context. 4 seminars. Prerequisite: TH 210, TH 227 or TH 228.

##### TH 295 Foundations in Theatrical Design (4)

Exploration of the fundamental principles and practices of designing for the stage. Emphasis placed upon the creative and collaborative process of theatre; development of the visual world of the play via language, color, drawing,

analysis, and peer evaluation. 3 lectures, 1 activity. Prerequisite: TH 210; TH 230 or TH 250 or consent of instructor. *New course, effective Spring 2010.*

##### TH 310 Women's Theatre (4) GE C4

Examination of a variety of female theatre artists from the Greeks to the present and the socio-political contexts from which they emerged. Analysis of a variety of classic and contemporary playscripts emphasizing evolving visions of women. 4 lectures. Prerequisite: Junior standing; completion of GE Area A; TH 210, TH 227, or TH 228. Fulfills GE C4 except for Theatre Arts majors.

##### TH 320 Black Theatre (4) GE C4 USCP

African-American theatre artists from the 17<sup>th</sup>-20<sup>th</sup> century, and the socio-political contexts from which they emerged. Particular emphasis on 20<sup>th</sup> century African-American plays and playwrights: Hansberry, Baldwin, Shange, Baraka, Gordone, and Wilson. 4 lectures. Prerequisite: Junior standing; completion of GE Area A; TH 210, TH 227, or TH 228. Fulfills GE C4 except for Theatre Arts majors. Fulfills USCP.

##### TH 330 Stagecraft II (4)

Basic stagecraft technique used in the entertainment industry. Students construct and paint scenery, build and gather properties, hang and focus lighting instruments, assist on costumes and act as running crew for department production each term. Total credit limited to 8 units. 4 laboratories. Prerequisite: Junior standing, TH 230, or junior standing, or consent of instructor.

##### TH 341 Advanced Acting Studio (4)

Selected acting techniques with focus on specific advanced modes of training. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 3 lectures, 1 activity. Prerequisite: TH 210; TH 220.

##### TH 345 Rehearsal and Performance (4)

Preparation of a play for public presentation, including acting, stage management, publicity, or serving as a key member of the artistic team. Total credit limited to 12 units. Major credit limited to 4 units; repeated units are free electives. 4 laboratories. Prerequisite: By audition only.

##### TH 350 Seminar in Playwriting (4)

Examines dramatic structure, techniques of dialogue, and means of characterization in variety of plays. Relates dramatic writing to technical, design, directorial and acting demands. Compositions of monologues, scenes and one-act play; works read and critiqued in class. 4 seminars. Prerequisite: TH 210, completion of GE Area A.

##### TH 360 Theatre in the United States (4) GE C4

Examination of American plays, playwrights, organizations and movements, applying them as portraits of the United States' historical, philosophical and cultural make-up. Topical emphasis focuses on the definition and development of an "American" identity via the context of theatre. 4 lectures. Prerequisite: Junior standing; completion of GE Area A; TH 210, TH 227 or TH 228. Fulfills GE C4 except for Theatre majors.

##### TH 370 Costume History (4)

Dress worn in Western society from Ancient Egypt through AD 2000. Silhouette; how, when, and why particular garments were worn; emphasis on social, political, and economic context. 4 lectures. Prerequisite: TH 210 or consent of instructor.

##### TH 380 Children's Drama (4)

Techniques for teaching theatre performance skills to children. Creation of small group seminar performance projects that are performed before an audience of elementary school children. 3 lectures, 1 activity. Prerequisite: TH 210 or upper-division Liberal Studies or Human Development course.

##### TH 390 World Drama (4) GE C4

Investigation of non-western/underrepresented theatre and dramatic performance; emphasis on plays, playwrights, and movements as portraits of philosophical/national make-up. Topical emphasis focuses on the definition and development of a cultural identity via the context of historical and contemporary theatre practices. 4 lectures. Prerequisite: Junior standing; completion of GE Area A; TH 210, TH 227 or TH 228. Fulfills GE C4 except for Theatre majors.

##### TH 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, or project centering around theatre. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

**TH 430 Introduction to Stage Design: Scenery (4)**

Scenic design process used in the entertainment industry, including concept development, research, sketching, drafting, color rendering using a variety of media, 3D model building, and the presentation of design material. 3 lectures, 1 activity. Prerequisite: TH 210, TH 290 or consent of instructor.

**TH 432 Introduction to Stage Design: Costume (4)**

Costume design process used in the entertainment industry, including concept development, research, sketching, color rendering in a variety of media, and the presentation of design material. 3 lectures, 1 activity. Prerequisite: TH 210, TH 290 or consent of instructor.

**TH 434 Introduction to Stage Design: Lighting (4)**

Lighting design process used in the entertainment industry, including concept development, research, the functional aspects of lighting equipment, drafting techniques, the development of production paperwork and the presentation of design material. 3 lectures, 1 activity. Prerequisite: TH 210, TH 290 or consent of instructor.

**TH 450 Directing (4)**

Principles, philosophies, analytical methods, business practices, organizational techniques and interpersonal strategies of directing for the stage. Experiential work includes hands-on, in-class exercises, as well as intensive outside class rehearsals. Culmination in a public production of student-directed one-act plays. 3 lectures, 1 activity. Prerequisite: TH 210, TH 290 and consent of instructor.

**TH 455 Seminar in Professional Practices (2)**

Focus on post-graduate career planning options in theatre arts, including resume and portfolio building, preparation for professional work, graduate school and internships. A structure by which students design and submit their senior project proposals. 2 seminars. Prerequisite: Two 300-level Theatre courses, junior standing and consent of instructor.

**TH 460 Senior Project (4)**

Selection and completion of a project under faculty supervision. Examples include: A formal report, an original play, producing a creative work, conceiving and completing a theatrical design, or a combination of these or similar assignments. Prerequisite: Consent of department head.

**TH 470 Selected Advanced Topics (1–4)**

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**TH 471 Selected Advanced Laboratory (1–4)**

Directed group laboratory study of selected topics for theatre students. The Schedule of Classes will list title selected. Total credit limited to 12 units. 1–4 laboratories. Prerequisite: Consent of instructor.

**TH 480 Internship (4) (CR/NC)**

Part-time work experience in the entertainment industry. Ability to work independently; strong verbal and written skills. Faculty approval of job position required. Evaluations by job supervisor and written reports by student required. 120 hours of work experience. Total credit limited to 8 units. Credit/No Credit grading. Prerequisite: Junior standing with a minimum 3.0 GPA.

## 2009-11 Cal Poly Catalog

Administered by the [Academic Programs](#) Office

### UNIV–UNIVERSITY STUDIES

#### UNIV 125 First Year Seminar (2) (CR/NC)

Issues associated with the successful transition from high school or community college to Cal Poly. Links fostered between student needs and campus resources. Coverage of academic policies and procedures, university study skills, goal setting, career planning, wellness and other topics relevant to student success. Credit/No Credit grading only. 1 lecture, 1 activity. *Crosslisted as EDUC 125. Effective Fall 2009.*

#### UNIV 321 Undergraduate Research Methods and Practice (4)

Research methods and tools for sciences and humanities, including formulating a research question, designing a study, using the scientific method to conduct and analyze surveys, and analyzing data. Emphasis on working in interdisciplinary research teams. Total credit limited to 8 units. 2 lectures, 2 activities. Prerequisite: Completion of GE Areas A and B1, and consent of instructor. *Crosslisted as HNRS/UNIV 321.*

#### UNIV 330 Cal Poly Land: Nature, Technology and Society (4) GE Area F

Scientific investigation of the natural features of the Cal Poly landscape and their transformations by land management technology. Analysis of the environmental, economic, social, and political effects of agriculture, resource extraction, and construction technology on that landscape. Emphasis on the educational, land-use, and long term planning issues of technology presented by this case study. 4 lectures. Prerequisite: Junior standing and completion of GE Areas A and B. *Crosslisted as AG/HUM/UNIV 330.* Fulfills GE Area F.

#### UNIV 333 World Food Systems (4)

GE Area F

Integrated, interdisciplinary study of the technologies of global food production, environmental, and social issues related to the application of those technologies, and moral and ethical issues associated with global food production and distribution. Emphasis on the politics of change. 4 lectures. Prerequisite: Junior standing and completion of Area B. *Crosslisted as POLS/UNIV 333.* Fulfills GE Area F.

#### UNIV 339 Disaster-Resistant Sustainable Communities (4) GE Area F

Creation of safer, more resilient cities through systematic application of urban disaster risk reduction methods that utilize the technology of GIS combined with principles from the engineering and geo-sciences. Emphasis on hazard identification and methods to lower disaster risk. 3 lectures, 1 activity. Prerequisite: Junior standing and completion of GE Area B. Fulfills GE Area F.

#### UNIV 350 The Global Environment (4)

GE Area F

Interdisciplinary investigation of how human activities impact the Earth's environment on a global scale. Examination of population, resource use, climate change, and biodiversity from scientific/technical and social/economic/historical/political perspectives. Use of remote sensing maps. Sustainable solutions. 3 lectures, 1 activity. Prerequisite: Junior standing and completion of GE Areas A and B. *Crosslisted as AG/BUS/EDES/ENGR/HUM/SCM/UNIV 350.* Fulfills GE Area F.

#### UNIV 361 Modernism (4)

GE C4

Interdisciplinary survey of the eighteenth, nineteenth and twentieth-century concepts and cultural movements known as modernism throughout Europe, North America, and Latin America. Disciplines may include architecture, art, drama, literature, music, philosophy, and photography. 4 lectures. Prerequisite: Completion of GE Area A and one class from Area C. *Crosslisted as HUM/UNIV 361.* Fulfills GE C4.

#### UNIV 391 Appropriate Technology for the World's People: Development (4)

GE D5

A broad overview of international development and appropriate design for sustainability. Besides traditional classroom work, students work in teams to address problems with technical solutions. Collaboration with mentors from the university, private sector, and nonprofits serves to provide diverse background and project mentorship. 4 lectures. Prerequisite: Junior standing; completion of GE Area A, two courses from GE D1-D4 and consent of instructor. *Crosslisted as HNRS/UNIV 391.* Fulfills GE D5.

#### UNIV 392 Appropriate Technology for the World's People: Design (4)

GE Area F

Addresses the needs of international impoverished communities with technological solutions, which are inexpensive, ecologically sustainable, and socially appropriate. Group study of target communities, and design and construction of an appropriate technology prototype. Not open to students with credit in UNIV 492. 3 lectures, 1 laboratory. Prerequisite: Junior standing and completion of GE Area B, or graduate standing. Recommended: UNIV 391, GE Area D2, and GE Area D3. *Crosslisted as HNRS/UNIV 392.* Fulfills GE Area F.

#### UNIV 424 Design of Museum Displays on Science, Engineering, and Technology (4)

The design and creation of educational museum displays that highlight science, engineering, and technology. Projects done by multidisciplinary teams and for clients in the community. Emphasis on design, teamwork, service learning and project management. 3 lectures, 1 laboratory. Prerequisite: GE Area B. *Crosslisted as HNRS 424.*

#### UNIV 470 Selected Advanced Topics (1–4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list title selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

#### UNIV 492 Appropriate Technology for the World's People: Design (4)

Addresses the needs of international impoverished communities with technological solutions, which are inexpensive, ecologically sustainable, and socially appropriate. Group study of target communities, and design and construction of an appropriate technology prototype. Seminar paper required. Not open to students with credit in UNIV/HNRS 392. 3 lectures, 1 laboratory. Prerequisite: Junior standing and completion of GE Area B, or graduate standing. Recommended: UNIV 391, GE Area D2, and GE Area D3.

## 2009-11 Cal Poly Catalog

### Humanities Program

#### VALUES, TECHNOLOGY AND SOCIETY MINOR

The purpose of the minor is to increase understanding of how technology shapes and influences modern life.

Students develop an increased understanding of the social, environmental, economic and political implications of technology in the twenty-first century. They are able to think critically about the intellectual, moral, and historical issues that technological developments pose for the future of humankind.

The courses in the minor provide an overview of technological issues, with an emphasis on the impacts technology has on organizations and society. Technology's impact on society is examined from a values and public policy perspective. Students are able to tailor their minor program to focus on specific issues through the selection of electives in technology, society, and values areas. The minor is available to students throughout the University regardless of students' technical backgrounds.

Required Courses	Units
ENGR 302 Transportation and Manufacturing in the Twenty-First Century (F) .....	4
HUM 303 Values and Technology (C4) .....	4
PHIL 321 Philosophy of Science (C4) .....	4
IME 320 Human Factors and Technology (F).....	4
<b>Elective Courses:</b> .....	12
Select 12 units, at least one from each category	
<i>Technology:</i>	
AERO 310 Air and Space (4) (F)	
BRAE 348 Energy for a Sustainable Society (4) (F)	
CSC 302 Computers and Society (4) (F)	
<b>HIST 350 The Scientific Revolution, c. 1500-1800 (4) (D5) (6/11/12)</b>	
HIST 354 History of Network Technology (4) (F)	
ME 321 Solar Energy (4) (F)	
PSC 307 Nuclear Weapons in the Post-9/11 World (4) (F)	
PSC 320 Energy, Society and the Environment (4) (F)	
<i>Society:</i>	
ANT 360 Human Cultural Adaptations (4)	
CRP 211 Cities: Form, Culture and Evolution (4)	
NR 141 Introduction to Forest Ecosystem Management (3)	
POLS 451 Technology and Public Policy (4)	
PSY 311 Environmental Psychology (4) (D5)	
PSY 494 Psychology of Technological Change (4)	
<i>Philosophy and Values:</i>	
ENVE 330 Environmental Quality Control (4)	
GEOG 333 Human Impact on the Earth (4)	
HIST 358 Cloning (4) (F)	
HIST 359 Living in a Material World (4) (F)	
HUM 302 Human Values in Agriculture (4) (F)	
PHIL 339 Biomedical Ethics (4) (C4)	
PHIL 340 Environmental Ethics (4) (C4)	

**2009-11 Cal Poly Catalog****Horticulture and Crop Science Department****BS WINE and VITICULTURE**

- ☐ 60 units upper division      ☐ GWR  
☐ 2.0 GPA                      ☐ USCP

\* = Required in Major; also satisfies GE

Note: No major or support courses may be taken as credit/no credit.

**MAJOR COURSES**

WVIT 101 Orientation to Wine and Viticulture.....	1
WVIT 102 Global Wine and Viticulture .....	4
WVIT 202 Fundamentals of Enology.....	4
WVIT 339 Internship in Wine and Viticulture.....	4
WVIT/FSN 342 Sensory Evaluation of Wine .....	4
WVIT 463 Issues, Trends and Careers in the Wine Industry.....	2
AGB 401 Managing Cultural Diversity in Agricultural Labor Relations (USCP).....	4
AGB 443 Branded Wine Marketing <i>or</i> WVIT 433 Wine Sales and E-Commerce (2/12/13) .....	4
<sup>2</sup> AGB 460/461/HCS/FSN 461/462 Senior Project	2,2
BRAE 340 Irrigation Water Management (F)* .....	4
BUS 212 Financial Accounting Nonbus Majors <i>or</i> AGB 214 Agribusiness Financial Accounting (2/22/13) .....	4
CHEM 111 Survey of Chemistry (B3)* .....	5
FRSC/WVIT 231 Viticulture (8/15/13).....	4
FRSC/WVIT 331 Viticulture (8/15/13).....	4
SS 121 Introductory Soil Science.....	4
Concentration courses (see below) .....	65 43-59
Advisor approved electives-see concentrations .....	-6-22
	<b>121</b>

**GENERAL EDUCATION (GE)**

72 units required; 24 of which are specified in Major/Concentrations.

→See page 50 for complete GE course listing.

→Minimum of 12 units required at the 300 level.

**Area A Communication (12 units)**

A1 Expository Writing .....	4
A2 Oral Communication .....	4
A3 Reasoning, Argumentation, and Writing.....	4

**Area B Science & Mathematics (no additional units req'd)**

B1 Math/Statistics * 8 units in Concentrations.....	0
B2 Life Science * 4 units in Concentrations.....	0
B3 Physical Science * 4 units in Major .....	0
B4 One lab taken with either a B2 or B3 course	

**Area C Arts and Humanities (20 units)**

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts .....	4
C4 Upper-division elective .....	4
Area C elective (Choose one from C1-C4).....	4

**Area D/E Society and the Individual (16 units)**

D1 The American Experience (40404) .....	4
D2 Political Economy * 4 units in Concentration	0
D3 Comparative Social Institutions .....	4
D4 Self Development (CSU Area E) .....	4
D5 Upper-division elective .....	4

**Area F Technology Elective (upper division)**

4 units in Major .....	0
	<b>48</b>

<b>FREE ELECTIVES</b> .....	<b>11</b>
	<b>180</b>

**CONCENTRATIONS (select one)****Enology Concentration**

<sup>3</sup> WVIT 103 The Anatomy of a Wine.....	2
WVIT 301 Wine Microbiology.....	4
WVIT 404 Winemaking I .....	4
WVIT 405 Winemaking II .....	4
WVIT 406 Winemaking III.....	4
CHEM 312 Survey of Organic Chemistry.....	5
ECON 201 Survey of Economics (D2)* .....	4
FSN 365 Wine Analysis and Amelioration .....	4
MATH 118 Pre-Calculus Algebra <i>or</i> MATH 161 Calculus for Life Sciences I (B1)*....	4
MCRO 221 Microbiology (B2)*.....	4
STAT 218 Appld Stats for the Life Sciences (B1)* .....	4
<sup>1</sup> Approved electives.....	<b>22</b>

Select 22 units from the following:

AGB 212, 301, 310, 312, 318, 322, 323, 444, 450;  
BIO 111, 303, 161;  
BOT 121, 323;  
BRAE 348, 439;  
CHEM 129, 216, 217, 313, 316, 317, 401; (7/13/12)  
ECON 222<sup>†</sup>;  
FRSC 202, 210, 402, 415;  
FSN 230, 270 *or* 370, 285, 354, 374; (6/7/13)  
HCS 421;  
IT 330, 411, 435;  
MCRO 342, 421;  
PPSC 311, 321, 414, 421;  
RPTA 214, 314, 320, 321, 412, 420;  
WVIT 339<sup>††</sup>; 423, 433 (10/17/13)(11/4/14)  
SPAN/ITAL/FR/GER 101, 102, 103, 201 (formerly 121),  
202 (formerly 122) (limited to 8 units) (1/29/14)

**65 43**

**Viticulture Concentration**

BIO 303 Survey of Genetics .....	<b>→ 4</b>
(corrected effective Summer 2009)	
BOT 121 General Botany (B2)* .....	4
BOT 323 Plant Pathology .....	4

<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post-baccalaureate studies and/or goals.

<sup>2</sup> WVIT 460 (4) may be used as a substitute for AGB 460 (2) and AGB 461 (2). (6/12/13)

<sup>3</sup> May substitute an additional 2 units of free electives. (8/5/14)

<sup>†</sup> ECON 201 must be taken first, as it is not open to students with ECON 222 credit.

<sup>††</sup> Limited to 2 units.



BRAE 438 Drip/Micro Irrigation <i>or</i> BRAE 439 Vineyard Water Management.....	4	HCS 421; IT 330, 411, 435;	
CHEM 312 Survey of Organic Chemistry.....	5	JOUR 203, 285, 312, 331, 342;	
ECON 201 Survey of Economics (D2)*.....	4	PPSC 311, 321, 414, 421;	
<sup>2</sup> FRSC 202 Enterprise Project.....	2	RPTA 214, 314, 320, 321, 412, 420;	
FRSC 210 Viticultural Practices.....	2	WVIT 103, 301, 339 <sup>††</sup> , 404, 405, 406, 423, 433;	
<sup>2</sup> FRSC 402 Enterprise Project Management.....	2	(10/17/13) (12/17/13) (11/4/14)	
FRSC 415 Vine Physiology.....	4	SPAN/ITAL/FR/GER 101, 102, 103, 201 (formerly 121), 202 (formerly 122) (limited to 8 units) (1/29/14)	
MATH 118 Pre-Calculus Algebra <i>or</i> MATH 161 Calculus for Life Sciences I (B1)* ....	4		65 49
PPSC 311 Agricultural Entomology.....	4		
PPSC 321 Weed Biology and Management .....	4		
PPSC 414 Grape Pest Management.....	4		
SS 221 Fertilizers and Plant Nutrition.....	4		
STAT 218 Appld Stats for the Life Sciences (B1)*	4		
<sup>1</sup> Approved electives .....	6		
<i>Select 6 units from the following:</i>			
AG 315, 360, 450, 452;			
AGB 212, 301, 310, 321, 409;			
BIO 435;			
BOT 326, 335, 431;			
CRSC 244;			
GEOG 318, 328;			
FRSC 342;			
FSN 365;			
HCS 470;			
MCRO 221;			
PPSC 327, 405, 421, 431, 441;			
SS 321, 322;			
WVIT 103, 301, 339 <sup>††</sup> , 404, 405, 406, 423, 433			
(10/17/13)(12/17/13)(11/4/14)			
	65 -59		
<b>Wine Business Concentration</b>			
AGB 202 Sales, Communication and Leadership in Agribusiness .....	4		
AGB 212 Agricultural Economics.....	4		
AGB 301 Food and Fiber Marketing.....	4		
AGB 310 Agribusiness Credit and Finance.....	4		
AGB 323 Agribusiness Managerial Accounting .....	4		
AGB 422 Logistics in Global Agribusiness.....	4		
AGB 444 Wine Compliance and Market Analysis <i>or</i> WVIT 444 (8/15/13) .....	4		
AGB 450 Agribusiness Strategy Formulation <i>or</i> WVIT 450 (8/15/13).....	4		
BIO 111 General Biology (B2)* .....	4		
ECON 222 Macroeconomics (D2)* .....	4		
MATH 118 Pre-Calculus Algebra <i>or</i> MATH 221 Calculus Business/Economics (B1)*	4		
STAT 221 Intro Probability and Statistics (B1)* .....	5		
<sup>1</sup> Approved electives .....	16		
<i>Select 16 units from the following:</i>			
AGB 312, 315, 318, 322, 324, 326, 360, 404, 405, 406, 410, 452;			
BRAE 348, 439;			
FRSC 202, 210, 402, 415, 421;			
FSN 230, 270 <i>or</i> 370, 285, 354, 365, 374; (6/7/13)			
<sup>1</sup> Consultation with advisor is recommended prior to selecting approved electives; bear in mind your selections may impact pursuit of post- baccalaureate studies and/or goals.			
<sup>2</sup> WVIT 424 (2) <i>or</i> WVIT 425 (2) <i>or</i> WVIT 426 (2) <i>or</i> WVIT 427 (2) may substitute. (8/15/13)			
<sup>††</sup> Limited to 2 units. (12/17/13)			

**2009-11 Cal Poly Catalog**  
**Women's and Gender Studies Department**

**WOMEN'S AND GENDER STUDIES MINOR**

<b>Required Courses (20)</b>	<b>Units</b>	<b>28</b>
WGS 301 Introduction to Women's and Gender Studies (D5) (USCP) .....	4	
WGS 450 Feminist Theory (USCP) .....	4	
<i>Choose three from the following courses .....</i>	<i>12</i>	
WGS/SOC 311, WGS/PSY 314, WGS 320 (D5), WGS 340 (D5), WGS/ES 350 (Area F) (USCP), WGS/RELS 370 (C4) (USCP), WGS 401, WGS/HIST 434, WGS/HIST 435 (USCP)		
<b>Elective Courses .....</b>	<b>8</b>	
Students select 8 units from the approved list of elective courses in consultation with their Women's and Gender Studies faculty advisor.		
COMS 421 Gender and Communication (4)		
ENGL 345 Women Writers of the Twentieth Century (4) (C4) (USCP)		
ENGL 349 Gender in 20 <sup>th</sup> Century Lit.(4)(C4) (USCP)		
ENGL 382 Lesbian, Gay, Bisexual, Transgender Literature and Media (4)		
ENGL 469 Women's Rhetoric: Definitions, Contexts, Issues (4)		
ENGL topics courses. See a Women's and Gender Studies advisor for approval of specific topics. Topics courses include:		
ENGL 439 Significant British Writers (4)		
ENGL 449 Significant American Writers (4)		
ENGL 459 Significant World Writers (4)		
ENGL 495 Topics in Applied Language Study (4)		
ES 300 Chicano/a Non-Fiction Lit. (4) (C4) (USCP)		
ES 325 Sex & Gender in African American Communities (4) (USCP)		
HIST 421 History of Prostitution (4)		
HIST 458 Gender & Sexuality in Modern Europe (4)		
KINE 323 Sport and Gender (4) (D5) (USCP)		
MU 328 Women in Music (4) (C4)		
PHIL 336 Feminist Ethics, Gender and Society (4) (C4) (USCP)		
POLS 310 Politics of Ethnicity & Gender (4) (USCP)		
SOC 351 Women in East Asia (4)		
TH 300 Topics in Diversity on the American Stage (LGBT Theatre subtopic) (4) (USCP) (10/11/12)		
TH 310 Women's Theatre (4) (C4)		
WGS/SOC 311 Sociology of Gender (4)		
WGS/PSY 314 Psychology of Women (4)		
WGS/ART 316 Women as Subj & Object in Art Hist (4)		
WGS 320 Women in Global Perspective (4) (D5)		
WGS 340 Sexuality Studies (4) (D5)		
WGS/ES 350 Gender, Race, Science & Technology (4)(Area F) (USCP)		
WGS/RELS 370 Religion Gender & Soc (4)(C4)(USCP)		

WGS 400 Special Problems for Adv. Undergrads (1-4)  
WGS 401 Sem. in Women's & Gender Studies (4)  
WGS/HIST 434 Amer. Women's Hist to 1870 (4)  
WGS/HIST 435 American Women's History from 1870 (4) (USCP)

## 2009-11 Cal Poly Catalog

### Biological Sciences Department

## ZOO–ZOOLOGY

### **ZOO 231 Essentials of Human Anatomy and Physiology I (5)**

See ZOO 331. ZOO 231 accepted in lieu of ZOO 331, but not for upper division credit. Not open for major credit in the Biological Sciences.

### **ZOO 232 Essentials of Human Anatomy and Physiology II (5)**

See ZOO 332. ZOO 232 accepted in lieu of ZOO 332, but not for upper division credit. Not open for major credit in the Biological Sciences.

### **ZOO 321 Mammalogy (4)**

Ecology, behavior, physiology, functional morphology, and evolution of mammals. Classification and identification of mammals, with emphasis on California species. 2 lectures, 2 laboratories. Prerequisite: BIO 160, BIO 162 and BIO 263 or consent of instructor.

### **ZOO 322 Ichthyology (4)**

Phylogeny, anatomy, functional morphology, physiology, and ecology of marine and freshwater fishes. Special reference to local and economically important species. Laboratory emphasis on taxonomy of California species, especially marine groups. 2 lectures, 2 laboratories. Prerequisite: BIO 162.

### **ZOO 323 Ornithology (4)**

Classification and identification of birds, with emphasis on California species. Functional morphology, physiology, ecology, behavior and census methods. Field trips may require meeting in the morning before scheduled lab time. 2 lectures, 2 laboratories. Prerequisite: BIO 160, BIO 162 and BIO 263 or consent of instructor.

### **ZOO 329 Vertebrate Field Zoology (4)**

Identification and natural history of terrestrial vertebrates, with emphasis on field studies and local species. Field trips may require meeting in the morning before scheduled lab time. 2 lectures, 2 laboratories. Prerequisite: BIO 160, BIO 162 and BIO 263.

### **ZOO 331 Human Anatomy and Physiology I (5)**

Structural and functional organization of the skeletal, muscular, nervous, endocrine, and integumentary systems. Includes discussion of molecular, cellular, and organ system levels of organization. Activities emphasize histology, cadaver anatomy, physiology of muscle contraction, nerve impulse initiation and conduction, sensory and motor functions. 4 lectures, 1 laboratory. Prerequisite: BIO 111, BIO 115, or BIO 161; CHEM 111, CHEM 124, or CHEM 127. Not open for major credit in Biological Sciences. **Not open to students with credit in BIO 432. Change effective Summer 2009.**

### **ZOO 332 Human Anatomy and Physiology II (5)**

Structural and functional organization of the circulatory, respiratory, digestive, excretory, and reproductive systems. Includes discussion of molecular, cellular, and organ system levels of organization. Activities emphasize histology, cadaver anatomy, and physiological experiments. 4 lectures, 1 laboratory. Prerequisite: BIO 111, BIO 115, or BIO 161; CHEM 111, CHEM 124, or CHEM 127. Not open for major credit in Biological Sciences. **Not open to students with credit in BIO 433. Change effective Summer 2009.**

### **ZOO 335 General Entomology (4)**

Introduction to the study of insects. Structure, major orders and families of insects, life histories, medical, and economic importance. Insect collection required. 2 lectures, 2 laboratories. Prerequisite: One course in college biology.

### **ZOO 336 Invertebrate Zoology (4)**

Invertebrate groups of animals with emphasis on taxonomy, morphology, distribution, and economic importance. 2 lectures, 2 laboratories, and fieldwork. Prerequisite: BIO 160 and BIO 162.

### **ZOO 341 Herpetology (4)**

Living and extinct reptiles and amphibians; an adaptive approach to their diversity, biology, and classification. 2 lectures, 2 laboratories. Prerequisite: BIO 160 and BIO 162.

### **ZOO 422 Functional Histology (4)**

Functional microscopic anatomy of principal tissues and organs of vertebrates, including humans. Structural studies to determine mechanisms underlying

physiological processes and their clinical applications in medicine. 2 lectures, 2 laboratories. Prerequisite: BIO 162.

### **ZOO 425 Parasitology (4)**

External and internal parasites of man and animals. Life history. Parasite-host relationships. Control and recognition of species of clinical importance. 2 lectures, 2 laboratories. Prerequisite: BIO 160 and BIO 161, or MCRO 221, or MCRO 224.

### **ZOO 428 Hematology (4)**

Development of blood as a tissue. Composition, function, and mechanisms of formation and destruction of blood components in health and disease. Methods for examination of blood. Suitable for preparing laboratory technologists. 2 lectures, 2 laboratories. Prerequisite: BIO 351 and consent of instructor. Recommended: Biochemistry course.

### **ZOO 437 Animal Behavior (4)**

Behavioral adaptations of animals to their environment and way of life. Analysis of behavior patterns, use of patterns in clarifying evolutionary, and ecological relationships. 3 lectures, 1 laboratory. Prerequisite: BIO 263 or consent of instructor.

### **ZOO 537 Behavioral Ecology (1)**

Function and evolution of behavioral traits as they relate to ecological phenomena. Habitat selection, migration, spacing mechanisms, reproductive strategies, feeding strategies, agonistic, parasitic, altruistic behavior, communication, and comparative social systems. 1 activity. Prerequisite: Graduate standing in Biological Sciences; corequisite: ZOO 437 or consent of instructor. *Formerly ZOO 530.*