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## Course and Curricular Updates to the 2007-09 Catalog

### Effective Summer 2007 through Spring 2009:

Listed below are updates to the 2007-09 catalog. This includes new courses, course changes, experimental courses, corrections, and curriculum substitutions.

- New courses and course changes are the result of the Pilot Continuous Course Review Process.
- [Experimental Courses](#) (link to file of course descriptions) provide academic credit but are not included in the Catalog.
- Corrections have been identified since the printing of the 2007-09 catalog.
- Curriculum substitutions are the result of approved blanket curriculum substitutions.
- To see courses or programs as printed in the Catalog prior to the updates listed below, go to the [printed Catalog, section by section](#).
- For updates to other information in the Catalog, please see the appropriate web sites (e.g., Admissions, Academic Records, Financial Aid, Housing, etc.).

### Last Update: 4/16/09

Item	New Courses, Course Changes, Experimental Courses, Corrections, and Curriculum Substitutions	Effective beginning
<a href="#">AGB 409</a>	Change: units from (3) 3 lectures <i>to</i> (4) 4 lectures. Change description.	Winter 2009
<a href="#">AGB 563</a>	Change: title and description.	Winter 2009
<a href="#">AGED 102</a>	Change: course prefix, number and title <i>to</i> : AG 100 Orientation to the College of Agriculture, Food and Environmental Sciences.	Fall 2008
<a href="#">AGED 202</a>	Change: course number <i>to</i> : AGED 102.	Fall 2008
<a href="#">AGED 537</a>	New course: "Enhancing Instruction in Agricultural Biology (3)"	Spring 2008
<a href="#">Agricultural Business, BS</a>	Correction: For the Agribusiness Management Concentration: Correction to sixth requirement entry: Change AGB 456/404/450 <i>to</i> AGB 456/404/452.	Summer 2007
<a href="#">Agricultural Business, BS</a>	Curriculum Substitution: For Agricultural science electives (12/13) in Support Courses, change the "No AG prefixes except..." statement to include AG 339: "No AG prefixes except AG 315, AG 339, AG 360 and AG 450."	Summer 2007
<a href="#">ANT 345</a>	Correction: ANT 345 is a GE D5 course, not a D4 course.	Summer 2007
<a href="#">ARCH 453</a>	Change: Add "Total credit limited to 10 units."	Winter 2009
<a href="#">Architectural Engineering, BS</a>	Curriculum Substitution: Change Approved professional electives <i>to</i> STAT 321.	Summer 2007
<a href="#">ASCI 260</a>	Change: mode and units from 2 laboratories <i>to</i> 3 activities. Delete "Total credit limited to 4 units."	Spring 2008
<a href="#">ASCI 290</a>	Change: units from (1-4) <i>to</i> (1-5).	Winter 2009
<a href="#">ASCI 304</a>	Change: title and course description <i>to</i> : "ASCI 304 Animal Genomics (3) Application of genetic principles for domestic animal improvement. Improving animal performance and	Spring 2008

	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."	
<a href="#">ASCI 346</a>	Change: from (3) 3 lectures <i>to</i> (4) 3 lectures and 1 laboratory.	Spring 2008
<a href="#">ASCI 461</a>	Correction: mode of instruction <i>to</i> 1 seminar.	Fall 2007
<a href="#">ASCI 490</a>	Change: units from (1-4) <i>to</i> (1-5).	Winter 2009
<a href="#">BIO 330</a>	New course: "Extended Field Biology Activity (1)"	Winter 2009
<a href="#">BIO 343</a>	Change: course number <i>to</i> BIO 443. Change title and description.	Winter 2009
<a href="#">BIO 375</a>	Change: from (2) 2 laboratories <i>to</i> (3) 1 lecture, 2 laboratories.	Fall 2008
<a href="#">BIO 476</a>	Change: prerequisite (delete "MCRO 433.")	Fall 2008
<a href="#">Biomedical Engineering, BS</a>	Curriculum substitution: <i>from</i> CHEM 124 and CHEM 125 <i>to</i> CHEM 124 and CHEM 125 <i>or</i> CHEM 127 and CHEM 128.	Summer 2007
<a href="#">BMED 455, 456</a>	Change: title, description, prerequisite.	Winter 2009
<a href="#">BOT 121</a>	Change: from (4) 2 lectures, 2 laboratories <i>to</i> (4) 3 lectures, 1 laboratory. Change course description to: "The anatomy, physiology, reproduction, and importance of plants."	Spring 2008
<a href="#">BRAE 337</a>	Change: from (3) 2 lectures, 1 laboratory <i>to</i> (4) 3 lectures, 1 laboratory. Change course description and prerequisite.	Fall 2008
<a href="#">BUS 310</a>	Correction: to course units in last line of course description: "... 2-4 lectures...."	Summer 2007
<a href="#">BUS 322</a>	Change: prerequisite.	Fall 2008
<a href="#">BUS 346</a>	Change: prerequisite.	Winter 2009
<a href="#">BUS 382</a>	Change: prerequisite.	Fall 2008
<a href="#">BUS 393</a>	Change: prerequisite.	Fall 2008
<a href="#">BUS 419</a>	Change: prerequisite.	Fall 2008
<a href="#">BUS 431</a>	Change: prerequisite.	Fall 2008
<a href="#">BUS 439</a>	Change: prerequisite.	Fall 2008
<a href="#">BUS 488</a>	Change: prerequisite.	Fall 2008
<a href="#">Business Administration, BS</a>	Curriculum substitution: For Entrepreneurship Concentration, change requirements of BUS 436 and BUS 451 to: "Select two courses from: BUS 311, 418, 436, 451, 470, IT 326, 428, 470"	Summer 2007
<a href="#">Business Administration, BS</a>	Curriculum substitution: For Entrepreneurship Concentration, change last requirement of 12 units of electives to: "Electives selected from: BUS 308, 311, 384, 402, 405, 418, 419, 430, 436, 451, 470, 475, 477, 478, 494, IT 326, 402, 407, 428, 470"	Summer 2007
<a href="#">CHEM 101</a>	New course: "Introduction to the Chemical Sciences (1)"	Fall 2008
<a href="#">CHEM 222</a>	New course: "Introduction to Computational Chemistry (2)"	Winter 2009
<a href="#">CHEM 372</a>	Change: from (3) 3 lectures <i>to</i> (4) 4 lectures. Change course description.	Fall 2008
<a href="#">CHEM 375</a>	Change: from (2) 2 laboratories <i>to</i> (3) 1 lecture, 2 laboratories.	Fall 2008
<a href="#">CHEM 401</a>	Change: Crosslist as SCM 401.	Summer 2008
<a href="#">CHEM 476</a>	Change: prerequisite (delete "MCRO 433.")	Fall 2008
<a href="#">City and Regional Planning, BS</a>	Curriculum substitution: in Support Courses, from LA 213 or LA 220 <i>to</i> LA 213 or LA 220 or CRP 211.	Summer 2007

<a href="#">CM 342</a>	Correction: to prerequisite: CM 212 and ARCE 211.	Summer 2007
<a href="#">CM 400</a>	Change: Delete "...with a maximum of 2 units per quarter."	Spring 2009
<a href="#">Computer Science, BS</a>	Curriculum substitution: from CSC/CPE 102 <i>to</i> CSC/CPE 102 <i>or</i> CSC/CPE 108.	Summer 2007
<a href="#">CPE 437</a>	New course: "Dynamic Web Development (4)"	Spring 2009
<a href="#">CPE 466</a>	New course: "Knowledge Discovery from Data (4)"	Spring 2009
<a href="#">CPE 522</a>	Change: add crosslisted as EE 522, which has changes: title, description, prerequisite.	Spring 2009
<a href="#">CPE 556</a>	New course: "Computer Security (4)"	Spring 2009
<a href="#">CRP 202</a>	Change: prerequisite.	Winter 2009
<a href="#">CRP 213</a>	Change: from (4) 4 lectures <i>to</i> (4) 3 lectures, 1 laboratory. Change prerequisite.	Fall 2008
<a href="#">CRP 404</a>	Change: prerequisite.	Fall 2008
<a href="#">CRP 408</a>	Change: prerequisite.	Fall 2008
<a href="#">CRP 410</a>	Change: prerequisite.	Fall 2008
<a href="#">CRP 435</a>	Change: prerequisite.	Fall 2008
<a href="#">CRP 438</a>	Change: prerequisite.	Spring 2009
<a href="#">CRP 442</a>	Change: prerequisite.	Winter 2009
<a href="#">CRP 446</a>	Change: prerequisite.	Winter 2009
<a href="#">CRP 452</a>	New course: "Community Design Methods (4)"	Winter 2009
<a href="#">CRP 461, 462</a>	Change: prerequisite.	Fall 2008
<a href="#">CRP 553</a>	Change: from (4) 2 lectures 2 laboratories <i>to</i> (4) 4 laboratories	Spring 2009
<a href="#">CSC 310</a>	Change: crosslist as HNRS 311.	Winter 2008
<a href="#">CSC 341</a>	Change: prerequisite.	Spring 2009
<a href="#">CSC 437</a>	New course: "Dynamic Web Development (4)"	Spring 2009
<a href="#">CSC 466</a>	New course: "Knowledge Discovery from Data (4)"	Spring 2009
<a href="#">CSC 556</a>	New course: "Computer Security (4)"	Spring 2009
<a href="#">Earth Sciences, BS</a>	Curriculum substitution: from FNR/LA 318 <i>to</i> FNR/LA 318 <i>or</i> GEOG 318.	Summer 2007
<a href="#">Economics, MS</a>	New master's degree program.	Fall 2008
<a href="#">EDUC 412</a>	Change: title, description, prerequisite.	Fall 2008
<a href="#">EDUC 414</a>	Change: title, description, prerequisite.	Fall 2008
<a href="#">EDUC 416</a>	Change: title, description, prerequisite.	Fall 2008
<a href="#">EDUC 418</a>	Change: title, description, prerequisite.	Fall 2008
<a href="#">EDUC 471</a>	New course: "Selected Advanced Laboratory (1-4)".	Spring 2009
<a href="#">EDUC 573</a>	Correction: to fifth sentence: "Maximum of 12 units may be applied toward MA Education."	Summer 2007
<a href="#">EE 321</a>	Change: prerequisite to "EE 201 or BRAE 216 for BRAE majors."	Winter 2008
<a href="#">EE 361</a>	Change: prerequisite to "EE 251 or BRAE 216 for BRAE majors."	Winter 2008
<a href="#">EE 420</a>	Correction to description.	Fall 2008
<a href="#">EE 422</a>	Change: crosslist as PHYS 422.	Fall 2008
<a href="#">EE 522</a>	Change: crosslist as CPE 522. Change title, description and prerequisite.	Spring 2009
<a href="#">ENGL 149</a>	Correction to prerequisite.	Winter 2009
<a href="#">ENGL 231</a>	Change: Crosslist as HNRS 232.	Spring 2009

<a href="#">ENGL 260</a>	Change: crosslist as LS 260.	Spring 2009
<a href="#">ENGR 450</a>	Change: course number <i>to</i> ENGR 451.	Winter 2009
<a href="#">ENGR 470</a>	New course: "Selected Advanced Topics (1-4)"	Fall 2008
<a href="#">ENGR 483</a>	New course: "Senior Project Design Laboratory III (2)"	Spring 2009
<a href="#">ENGR 550</a>	Change: course number <i>to</i> ENGR 551. Change prerequisite.	Winter 2009
<a href="#">ENVE 324</a>	Change: description.	Winter 2009
<a href="#">Environmental Horticultural Science, BS</a>	Correction: For Support Courses, BUS 201 is no longer offered. BUS 207 is a 4-unit course; total Support units increases to 50. Total units for program increases to 189.	Summer 2007
<a href="#">Experimental Courses - Winter 2009</a>	HNRS X492 (modified), UNIV X492 (modified)	Winter 2009
<a href="#">Experimental Courses - Fall 2008</a>	LS X475, LS X476	Fall 2008
<a href="#">Experimental Courses - Summer 2008</a>	ASTR X324 (GE Area F), DMHS X351, DMHS X352	Summer 2008
<a href="#">Experimental Courses - Spring 2008</a>	ASCI X366, CHEM X240, CPE X105, CRP X445, ECON X409, EDUC X410, EHS X430, ENGL X201, ES X340 (GE C4), HIST X510, LS X477, PHYS X115 (GE B3), SCM X302, UNIV X492	Spring 2008
<a href="#">Experimental Courses - Winter 2008</a>	ARCE X449, FRSC X211, HNRS X491 (GE D5), MATH X316, PHYS X118, UNIV X491 (GE D5), WVIT X211	Winter 2008
<a href="#">Experimental Courses - Fall 2007</a>	ARCE X410, ARCH X410, CM X410, HNRS X424, UNIV X424	Fall 2007
<a href="#">Experimental Courses - Summer 2007</a>	AERO X517, AGED X538, CPE X133, CPE X171, CPE X350, CRP X424, CSC X171, EDUC X433, ENGL X382, HCS X415, HNRS X324, HNRS X347, HNRS X380, IT X545, LS X475, MATE X424, MATE X555, MATH X504, ME X555, PE X150, POLS X295, POLS X380, PSY X375, RELS X205, RELS X380, SCM X335, STAT X523	Summer 2007
<a href="#">FNR 404</a>	Change: prerequisite.	Fall 2008
<a href="#">FNR 408</a>	Change: prerequisite.	Fall 2008
<a href="#">FRSC 211</a>	New course: "Survey of Viticulture (4)"	Winter 2009
<a href="#">FSN 101</a>	Change: title and description.	Fall 2008
<a href="#">FSN 125</a>	Change: units from (5) 4 lectures, 1 laboratory <i>to</i> (4) 3 lectures, 1 laboratory.	Fall 2008
<a href="#">FSN 200</a>	Change: units from (1-3) <i>to</i> (1-4). Change grading method <i>to</i> regular grading.	Fall 2008
<a href="#">FSN 244</a>	Change: description and prerequisite.	Fall 2008
<a href="#">FSN 285</a>	Change: units from (2) 2 lectures <i>to</i> (4) 4 lectures; description change.	Fall 2008
<a href="#">FSN 310</a>	Change: description and prerequisite.	Fall 2008
<a href="#">FSN 328, 329</a>	Change: title.	Fall 2008
<a href="#">FSN 335</a>	Change: description change.	Fall 2008
<a href="#">FSN 400</a>	Change: from "Credit/No Credit" <i>to</i> regular grading.	Fall 2008
<a href="#">FSN 415</a>	Change: description.	Fall 2008
<a href="#">FSN 416</a>	Change: prerequisite.	Fall 2008
<a href="#">FSN 417</a>	Change: prerequisite.	Fall 2008
<a href="#">FSN 461, 462</a>	Change: description and prerequisite.	Fall 2008

<a href="#">FSN 464</a>	Change course number <i>to</i> FSN 365; change title, description and prerequisite.	Fall 2008
<a href="#">General Education Courses</a>	<p>Corrections - Add the following courses to lists on pages 58-60:</p> <p>B5 list - HNRS 319 Natural Resource Ecology, Theories &amp; Applications</p> <p>C2 list - HNRS 230 Philosophical Classics: Metaphysics &amp; Epistemology</p> <p>D3 list -  ES 241 Survey of Indigenous Studies (<i>USCP</i>)  ES 242 Survey of Africana Studies (<i>USCP</i>)  ES 243 Survey of Latino/a Studies (<i>USCP</i>)  ES 244 Survey of Asian American Studies (<i>USCP</i>)</p> <p>D5 list - ES 310 Hip-Hop, Poetics and Politics (<i>USCP</i>), <i>and</i>  ES 381 The Social Construction of Whiteness (<i>USCP</i>)</p>	Summer 2007
<a href="#">General Engineering, BS</a>	Correction: for technical electives for Individualized Course of Study, and also for footnote #2, "A minimum of 35 units at 300-400 level" must be completed. Please note: For the 2001-03, 2003-05 and 2005-07 Catalogs, the correction is "A minimum of 36 units at 300-400 level..."	Summer 2007
<a href="#">General Engineering, BS</a>	Curriculum substitution: from CHEM 124 and CHEM 125 to: CHEM 124 and CHEM 125 <i>or</i> CHEM 127 and CHEM 128.	Summer 2007
<a href="#">GEOG 370</a>	Correction: change prerequisite to: "Completion of GE Area A and two courses from GE Areas D1, D2, D3, D4. Social Sciences majors will not receive GE Area D5 credit."	Fall 2007
<a href="#">GRC 338</a>	Correction to prerequisite: GRC 218. (not GRC 203)	Summer 2007
<a href="#">GRC 402</a>	Correction to prerequisite: GRC 338. (not GRC 201)	Summer 2007
<a href="#">GSA 539</a>	Change: title <i>to</i> "Clinical Tax Education Internship", and grading method <i>to</i> credit/no credit	Winter 2008
<a href="#">HIST 207</a>	Change: crosslist as HNRS 207.	Fall 2008
<a href="#">HIST 208</a>	Offers USCP credit.	Spring 2009
<a href="#">HIST 322</a>	Correction: prerequisite <i>to</i> "Completion of GE Area A, D1 and completion of Area D2, Area D3, or Area D4. History majors will not receive GE Area D5 credit."	Summer 2007
<a href="#">HIST 324</a>	Correction: prerequisite <i>to</i> "Completion of GE Area A, D1 and any other lower-division Area D course. History majors will not receive GE Area D5 credit. "	Summer 2007
<a href="#">HIST 425</a>	Change: Add "Repeatable to 4 units."	Spring 2008
<a href="#">HIST 437</a>	Change: mode from (4) 3 lectures and 1 activity <i>to</i> (4) 3 lectures and research project. Change prerequisite <i>to</i> "HIST 303; junior standing or consent of instructor."	Fall 2008
<a href="#">HIST 460</a>	Change: Remove the following sentence from description: "Schedule of Classes will list topic area selected."	Winter 2009
<a href="#">HIST 461</a>	Change: Remove the following sentence from description: "Schedule of Classes will list topic area selected."	Winter 2009
<a href="#">HIST 468</a>	Change: add "Total credit limited to 6 units."	Summer 2007
<a href="#">HNRS 207</a>	Change: add crosslisted as HIST 207.	Fall 2008
<a href="#">HNRS 232</a>	Change: add crosslisted as ENGL 231.	Spring 2009

<a href="#">HNRS 311</a>	Change: add crosslisted as CSC 310.	Winter 2008
<a href="#">HNRS 321</a>	New course: "Undergraduate Research Methods and Practice (4)". Crosslisted as UNIV 321. Total credit limited to 8 units.	Winter 2009
<a href="#">HNRS 391</a>	New course: "Appropriate Technology for Impoverished Communities: Development (4)". Crosslisted as UNIV 391. GE D5.	Fall 2008
<a href="#">IME 458</a>	Change: crosslist as MATE 458.	Spring 2009
<a href="#">Industrial &amp; Technical Studies, MS</a>	Curriculum substitution: change units for "IT 598 ... or other approved culminating experience" from 5 to 3, 3, 3. Reduce Advisor approved electives, from 16 to 12.	Fall 2007
<a href="#">IS 301</a>	Change: total credit limit from 8 to 12 units.	Fall 2007
<a href="#">IS 302</a>	Change: Delete "The Schedule of Classes will list topic selected." Change prerequisite.	Spring 2009
<a href="#">IS 352</a>	New course: "Organizational Leadership (4)".	Spring 2009
<a href="#">IS 450</a>	Change: Delete "The Schedule of Classes will list topic selected." Change prerequisite.	Spring 2009
<a href="#">IS 453</a>	New course: "Special Topics in Organizational Leadership (4)".	Spring 2009
<a href="#">IT 330</a>	Change: title, prerequisite, and offers GE Area F credit.	Spring 2009
<a href="#">IT 403</a>	Change: prerequisite.	Fall 2008
<a href="#">IT 598</a>	Change: units from (5) to (3), and add "Total credit limited to 9 units." Change prerequisite to: "Graduate standing in the Master of Science in Industrial and Technical Studies program or approval from the Associate Dean of OCOB Graduate Programs."	Fall 2007
<a href="#">IT 599</a>	Change: from (5) to (3) units. Change credit limit and prerequisite.	Fall 2008
<a href="#">JOUR 219</a>	Offers USCP credit.	Spring 2009
<a href="#">Journalism, BS</a>	Curriculum substitution: change Journalism Dept. electives to "...To be selected from: JOUR courses not used elsewhere in the major."	Summer 2007
<a href="#">KINE 408</a>	Change: title and description.	Fall 2008
<a href="#">KINE 434</a>	Change: mode from (4) 3 lectures, 1 activity to (4) 3 lectures, 1 laboratory. Change title and description.	Fall 2008
<a href="#">KINE 511</a>	Change: title	Fall 2008
<a href="#">KINE 518</a>	New course: "Research Prospectus and Proposal Writing (2)"	Spring 2009
<a href="#">KINE 522</a>	Change: from (3) 2 seminars, 1 laboratory to (4) 3 seminars, 1 laboratory. Change description.	Fall 2008
<a href="#">KINE 526</a>	Change: title and description.	Summer 2007
<a href="#">KINE 534</a>	Change: mode from (4) 3 lectures, 1 activity to (4) 3 lectures, 1 laboratory. Change title and description.	Fall 2008
<a href="#">KINE 539</a>	Change: title, description and prerequisite.	Fall 2008
<a href="#">Kinesiology, BS</a>	Curriculum substitution: change requirement of PHYS 121 to: PHYS 121 or PHYS X118.	Summer 2007
<a href="#">Kinesiology, BS</a>	Curriculum substitution: Footnote 1 should read: "Students following the Exercise Science and Health Promotion Concentration <i>should</i> take KINE 212, KINE 220, KINE 227 and KINE 228." KINE 219 is moved to that concentration and the additional unit requirement is eliminated.	Summer 2007
<a href="#">Kinesiology, BS</a>	Curriculum substitution: for the Exercise Science and Health Promotion Concentration, change requirement of KINE 218 to: KINE 218 or KINE 384.	Summer 2007
<a href="#">Kinesiology, BS</a>	Curriculum substitution: Footnote 2 should read, corrected, "Students interested in careers in the health professions should take BIO 161 in lieu of BIO 111/115,	Summer 2007

	and CHEM 127 in lieu of CHEM 111."	
<u>Kinesiology, BS</u>	Curriculum substitution: for the Individualized Course of Study, change requirement of KINE 218 <i>to</i> KINE 218 <i>or</i> KINE 384.	Summer 2007
<u>LAES 301</u>	Change: mode from (4) 2 lectures, 2 activities <i>to</i> (4) 4 lectures.	Fall 2008
<u>LAES 411</u>	Change: mode from (4) 1 seminar, 3 activities <i>to</i> (4) 4 lectures.	Winter 2009
<u>LAES 462</u>	Change: mode from (4) 2 seminars, 2 activities <i>to</i> (4) supervision.	Fall 2008
<u>Landscape Architecture, Bachelor of</u>	Curriculum substitution: for Major Courses, For upper-division LA electives (8 units) add "May be LA courses, including additional ILCs and Focus Studios, or CAED interdisciplinary studios."	Summer 2007
<u>Latin American Studies Minor</u>	Correction: Delete GEOG 150 as a choice in list of courses from which to select two courses (8 units).	Summer 2007
<u>Liberal Arts and Engineering Studies, BA</u>	New degree program.	Spring 2008
<u>Liberal Studies, BA/BS</u>	Curriculum substitution: change requirement of LS 310 <i>to</i> : LS 310 <i>or</i> LS X477. Change requirement of LS 311 <i>to</i> : LS 311 <i>or</i> LS X475.	Fall 2008
<u>LS 260</u>	New course: "Children's Literature" (4). Crosslisted as existing ENGL 260.	Spring 2009
<u>Master of Public Policy</u>	Correction: add the following to the third paragraph under "General Characteristics", after the fifth sentence: "After the completion of POLS 590, students are required to pass a comprehensive exam."	Summer 2007
<u>MATE 458</u>	Change: add crosslisted as IME 458.	Spring 2009
<u>MATE 470</u>	New course: "Selected Advanced Topics (1-4)"	Spring 2009
<u>MATE 555</u>	New course: "Micro Systems Laboratory (2)" . Crosslisted as ME 555.	Spring 2009
<u>MATE 570</u>	Change course number to: MATE 501 Advanced Engineering Materials	Spring 2009
<u>MATE 570</u>	New course: "Selected Advanced Topics (1-4)"	Spring 2009
<u>MATE 571</u>	New course: "Selected Advanced Laboratory (1-4)"	Spring 2008
<u>Materials Engineering, BS</u>	Curriculum substitution: change Science elective to: "Science elective to be selected from any 200-500 level course in BIO, BOT, CHEM, MCRO, PHYS, ASTR, GEOL, ZOO or any course in College of Engineering."	Summer 2007
<u>Materials Engineering, BS</u>	Curriculum substitution: change requirement of CPE/CSC 101 <i>to</i> : CPE/CSC 101 <i>or</i> CSC 234 & technical breadth elective <i>or</i> CSC 231 & technical breadth elective (for total of 4 units).	Summer 2007
<u>MATH 500</u>	Change: credit limit; add "Total credit limited to 12 units."	Winter 2008
<u>Math Minor</u>	Correction: the first sentence after the second heading should read: "A track consists of two courses from one of the groups A-L."	Summer 2007
<u>ME 555</u>	New course: "Micro Systems Laboratory (2)". Crosslisted as MATE 555.	Spring 2009
<u>Mechanical Engineering, BS</u>	Curriculum substitution: for the General Concentration, change requirements of EE 255 and EE 295 <i>to</i> : EE 255 and EE 295 <i>or</i> ME upper division technical elective (4).	Summer 2007
<u>PE 138</u>	Change: from (1) 1 activity <i>to</i> (1) 1 laboratory.	Winter 2009
<u>PEM/PEW 195</u>	New course: approved after printing of the 2007-09 Catalog: PEM/PEW 195 Golf (2) Practice time for members of NCAA Golf Team. 2 laboratories. Prerequisite: Approved member of team.	Fall 2007

<a href="#">PHYS 422</a>	Change: add crosslisted as EE 422.	Fall 2008
<a href="#">REC 260</a>	Change: from (3) 2 lectures, 1 activity <i>to</i> (4) 3 lectures, 1 activity. Change description and prerequisite.	Fall 2008
<a href="#">REC 342</a>	Change: from (4) 3 lectures, 1 laboratory <i>to</i> (4) 4 lectures. Change prerequisite.	Fall 2008
<a href="#">REC 581</a>	Change: total credit limit from 3 <i>to</i> 4 units.	Fall 2007
<a href="#">Recreation, Parks, &amp; Tourism Admin, BS</a>	Correction: LA 363 is now a 4-unit course; Major Courses' total units are 87, not 86/87; total free Electives's units are 9, not 9-10.	Summer 2007
<a href="#">RELS 378</a>	New course: "Religion and Contemporary Values (4)". GE C4.	Spring 2009
<a href="#">SCM 335</a>	New course: "Nuclear Science and Society (4) GE Area F".	Winter 2009
<a href="#">SCM 401</a>	Change: add crosslisted as CHEM 401.	Summer 2008
<a href="#">Software Engineering, BS</a>	Curriculum substitution: change requirement from CSC/CPE 102 to: CSC/CPE 102 <i>or</i> CSC/CPE 108.	Summer 2007
<a href="#">Software Engineering, BS</a>	Curriculum substitution: change requirement from CSC 353 to: CSC 353 <i>or</i> CSC 225.	Summer 2007
<a href="#">Soil Science, BS</a>	Curriculum substitution: change requirements of SS 461, 462, and 463 to: SS 461 <i>or</i> ERSC 461; SS 462 <i>or</i> ERSC 462; SS 463 <i>or</i> ERSC 463.	Summer 2007
<a href="#">SPAN 111</a>	Change: description.	Fall 2008
<a href="#">STAT 301</a>	Change: prerequisite.	Fall 2008
<a href="#">STAT 325</a>	Change: prerequisite.	Spring 2009
<a href="#">STAT 440</a>	New course: "SAS Certification Preparation (2)".	Spring 2009
<a href="#">STAT 465</a>	Change: from (4) 2 lectures, 2 activities <i>to</i> (4) 4 lectures.	Spring 2009
<a href="#">STAT 523</a>	New course: "Design and Analysis of Experiments I (4)".	Winter 2009
<a href="#">STAT 524</a>	New course: "Applied Regression Analysis (4)".	Spring 2009
<a href="#">TH 341</a>	Change: prerequisite.	Fall 2008
<a href="#">UNIV 321</a>	New course: "Undergraduate Research Methods and Practice (4)". Crosslisted as HNRS 321. Total credit limited to 8 units.	Winter 2009
<a href="#">UNIV 391</a>	New course: "Appropriate Technology for Impoverished Communities: Development (4)". Crosslisted as HNRS 391. GE D5.	Fall 2008
<a href="#">UNIV 470</a>	New Course: "Selected Advanced Topics (1-4)".	Spring 2009
<a href="#">USCP List of Courses</a>	Correction: Change RELS 336 and WS 336 to RELS 370 and WS 370 (Religion, Gender and Society (4) GE C4*) in the list on page 61 of the Catalog.  Correction: ES 350 and WS 350 offer GE Area F credit.	Summer 2007
<a href="#">WVIT 102</a>	Change: title and description.	Winter 2009
<a href="#">WVIT 103</a>	New course: "The Anatomy of a Wine (2)"	Winter 2009
<a href="#">WVIT 202</a>	Change: title and description. Change from (4) 3 lectures, 1 activity <i>to</i> (4) 4 lectures.	Winter 2009
<a href="#">WVIT 301</a>	New course: "Wine Microbiology (4)".	Winter 2009
<a href="#">WVIT 400</a>	New course: "Special Problems for Advanced Undergraduates (1-4)".	Spring 2008
<a href="#">WVIT 404</a>	Change: title, description and prerequisite.	Fall 2008
<a href="#">WVIT 405</a>	New course: "Winemaking II (4)".	Winter 2009
<a href="#">WVIT 406</a>	New course: "Winemaking III (4)".	Spring 2009



<a href="#">WVIT 463</a>	Change: title and course description.	Winter 2009
<a href="#">ZOO 321</a>	Change: description.	Spring 2009
<a href="#">ZOO 323</a>	Change: description.	Spring 2009
<a href="#">ZOO 329</a>	Change: description.	Spring 2009
<a href="#">ZOO 331</a>	Change: course description, and change from (5) 3 lectures, 2 activities <i>to</i> (5) 4 lectures, 1 laboratory.	Fall 2008
<a href="#">ZOO 332</a>	Change: from (5) 3 lectures, 2 activities <i>to</i> (5) 4 lectures, 1 laboratory.	Fall 2008

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## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [Agribusiness Department](#)

#### AGB–AGRIBUSINESS

##### AGB 101 Introduction to Agribusiness (4)

Orientation to the agribusiness sector of agriculture. An overview of the breadth, size, scope and management aspects of the agricultural business complex. 4 lectures.

##### AGB 105 Economic Calculus Laboratory (1) (CR/NC)

Facilitated study and discussion of theory, problems and application of calculus in economics. Credit/No Credit grading only. 1 activity. Corequisite: Concurrent enrollment in AGB 313.

##### AGB 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 can only be used to satisfy free electives. Credit/No Credit grading only. Prerequisite: Consent of department head.

##### AGB 202 Sales, Communication and Leadership in Agribusiness (4)

Self management, communication, and interpersonal skills necessary in developing managerial abilities, leadership qualities, and facilitating teamwork within the agribusiness sector. Industry opportunities ranging from input and output products and services along with government and special interest groups will be surveyed. 4 lectures. Prerequisite: AGB 101.

##### AGB 212 Agricultural Economics (4)

Theoretical development of factors affecting demand and supply for food and fiber and for agricultural inputs. Methods of selecting optimal levels of agricultural production and consumption variables. Evaluation of market structure and price formulation for agricultural products and resources. 4 lectures.

##### AGB 214 Agribusiness Financial Accounting (4)

Principles of financial accounting in agribusiness. Preparation for understanding and interpreting financial statements. Exploration of financial reporting standards to provide an understanding of how financial events are reflected in financial statements. The importance of social responsibility in accounting. The accounting cycle, from transactions posting to financial statements through spreadsheet applications. 3 lectures, 1 activity. Prerequisite: Sophomore standing.

##### AGB 301 Food and Fiber Marketing (4)

Food and fiber marketing, examining commodity, industrial, and consumer product marketing from a managerial viewpoint. A global perspective in understanding consumer needs and developing the knowledge of economic, political, social and environmental factors that affect food and fiber marketing systems. 4 lectures. Prerequisite: AGB 212/ECON 201.

##### AGB 302 Agricultural Associations and Cooperatives (4)

Purpose, kinds, organization and management of agricultural cooperatives. Evaluating cooperative performance. Emphasis on California cooperatives, international agricultural cooperatives, and strategic alliances. One-day field trip visiting agricultural cooperatives included. 4 lectures. Prerequisite: AGB 301.

##### AGB 303 Introduction to the Horse Racing Industry (4)

Descriptive analysis of horse racing industry: breeding farms, race tracks, trade associations, training issues, and auction sales. Industry structure, economic flows, contributions to state and local taxes, and racing law. Cultural influences of racing in Europe, Australasia, and Latin America. 4 lectures. Prerequisite: Junior standing.

##### AGB 310 Agribusiness Credit and Finance (4)

Financing California's agricultural industry. Sources of credit and types of loans used by agribusinesses. Costs of credit. Financial analysis of agricultural borrowers. Future and present value techniques used in evaluating agricultural investments. Agricultural financial management. Financial capital markets and leasing. 4 lectures. Prerequisite: One quarter of accounting or AGB 321.

##### AGB 312 Agricultural Policy (4)

Agricultural policy objectives and formulation, resource allocation and production adjustments. Survey of State and Federal agricultural policies as they influence the planning and practices of agribusiness. 4 lectures. Prerequisite: AGB 212; ECON 222.

##### AGB 313 Agricultural Economic Analysis (4)

Advanced agricultural microeconomics with emphasis on mathematical problem solving; production and cost functions, single and multiple input allocation, agricultural output combinations, agricultural market structures, and economics of size. 4 lectures. Prerequisite: AGB 212, MATH 221.

##### AGB 314 Fair and Fair Facility Management (4)

Fundamentals of the year round operation of a fair facility to include rental opportunities, master planning, and maintenance. Principles and procedures in planning, organizing, operating, and evaluating a fair. One day field trip required. 4 lectures. Prerequisite: Upper division standing.

##### AGB 315 Land Economics (4)

Economics of agricultural and rural land use. Incorporates production economics with welfare theory to explore society's implicit and explicit land use decisions and problems in California, the West and nationwide. Incorporates land use planning and its implicit economic content. 4 lectures. Prerequisite: AGB 312 and AGB 313.

##### AGB 317 Agriculture–Consumer Relationships (2)

Basic facts, public opinion and ways of developing greater understanding of agriculture, its nature, characteristics, problems and relationship to nonfarm persons. Consumer education programs and procedures. 2 seminars. Prerequisite: Upper division standing.

##### AGB 318 Global Agricultural Marketing and Trade (4)

Analysis of international marketing opportunities for agricultural products. Strategies for enhancing the performance of U.S. agricultural exports/imports. Impact of government trade policies and regulations, distribution systems, and the changing consumer. 4 lectures. Prerequisite: AGB 301, 312.

##### AGB 321 Farm Records (4)

Fundamentals of record keeping, kinds of records, inventory, depreciation, payrolls, cash and accrual basis of income tax reporting, financial statements and analysis. 3 lectures, 1 activity. Prerequisite: AGB 212/ECON 201.

##### AGB 322 Principles of Agribusiness Management (4)

Organization and operation of agribusinesses. Identification of factors affecting profitability. Evaluation of the business for increased efficiency and profit. Application of budgeting to representative firms and independent analysis of an agribusiness. 3 lectures, 1 activity. Prerequisite: AGB 212 and AGB 214 or AGB 321.

##### AGB 323 Agribusiness Managerial Accounting (4)

Agribusiness management with an emphasis on using accounting procedures that will provide useful information in making management decisions, setting objectives, and controlling operations. 3 lectures, 1 activity. Prerequisite AGB 214.

##### AGB 324 Agricultural Property Management and Sales (4)

Economic, legal and real estate principles in the investment, development, mortgaging and transferring of agricultural real estate. 3 lectures, 1 activity. Prerequisite: AGB 310 or consent of instructor.

##### AGB 326 Rural Property Appraisal (4)

Methods of rural appraisal, including farms, ranches and other rural properties, use of county records, appraisal practice on different types of rural properties, discussions with professional appraisers. 3 lectures, 1 activity. Prerequisite: AGB 310.

##### AGB 331 Farm Accounting (4)

Application of commercial accounting process to farm and ranch accounting problems. Emphasis on accounting systems that facilitate financial state-

ment presentation, tax preparation and ADP enterprise analysis. Income tax laws pertaining to agriculture. 3 lectures, 1 activity. Prerequisite: AGB 214.

**AGB 336 Commodity Markets in Agribusiness (4)**

Commodity market history, performance, and use in management of agribusiness. Techniques of analysis, hedging, speculation with applications to the agricultural business firm. 4 lectures. Prerequisite: AGB 212 and ECON 222, or consent of instructor.

**AGB 339 Internship in Agribusiness (1-12) (CR/NC)**

Selected students will spend up to 12 weeks with an approved agricultural firm engaged in production or related agribusiness. Time will be spent applying and developing agribusiness functional 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.

**AGB 360 Agribusiness Information Technology (4)**

Use of information technologies and advanced computer applications in agribusiness decision-making. Information search and retrieval technologies. Computer languages and programs developed as tools to assist in agribusiness problem-solving. 4 lectures. Prerequisite: AGB 212/ECON 201.

**AGB 370 World Food Economy (4)**

International agricultural production, economics, and distribution. Comparative and competitive advantage in world agriculture. Food security issues and regional analysis of agriculture policies. The future of agriculture from a global perspective. 4 lectures. Prerequisite: AGB 312 and AGB 313.

**AGB 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 or instructor.

**AGB 401 Managing Cultural Diversity in Agricultural Labor Relations (4)**

USCP

Agricultural labor trends and problems as determined by changes occurring in farming and farm related industries. Labor-management relations in agriculture; principles and procedures in organizing and managing the agricultural business personnel program. 4 lectures. Prerequisite: Senior standing.

**AGB 404 Food Retail Management (4)**

Uses and techniques in management of perishable and non-perishable food commodities at the retail level. Issues in traditional versus new models of retail with emphasis on the marketing mix. Introduction to vendor, category and shelf management. 4 lectures. Prerequisite: AGB 301.

**AGB 405 Agribusiness Marketing Research Methods (4)**

Agricultural marketing research data collection and analysis. Emphasis on food sector market segmentation, product positioning, new product testing, sales forecasting, and marketing plan development through secondary and primary data sources. Experimental research design and implementation. 4 lectures. Prerequisite: STAT 221, AGB 301.

**AGB 406 Agribusiness Marketing Planning (4)**

Client centered course where self-managed teams develop agribusiness marketing plan. Emphasis on developing presentation skills. Integration of marketing mix, particularly promotional elements in developing agribusiness marketing strategy emphasized. 4 lectures. Prerequisite: AGB 405.

**AGB 407 Agribusiness Marketing Plan Internship (4)**

A minimum of 120 hours spent with an approved agricultural marketing firm. Development of an agribusiness marketing plan. Integration of marketing mix, particularly promotional elements in developing agribusiness marketing strategy emphasized. Presentation of the marketing plan to corporate management and instructor. Prerequisite: AGB 339.

**AGB 409 California Agricultural Law (4)**

Historical and current sources of law, examination of judicial systems, application of contracts, agency, labor law, torts, property, air, and water law, business organizations, agricultural cooperatives, debtor and creditor rights and regulations that impact agricultural enterprises. 4 lectures. Prerequisite: BUS 207, senior standing or consent of instructor. *Changed effective Winter 2009.*

**AGB 410 Agricultural Lending (4)**

Structure and performance of the agricultural lending industry. Advanced agricultural loan analysis and risk assessment. Agricultural loan documentation, securitization of farm loans, and farm bankruptcy. Exploration of interest rate impacts on agricultural lending. 4 lectures. Prerequisite: AGB 214, AGB 310 and senior standing.

**AGB 412 Advanced Agricultural Policy (4)**

Agricultural resource allocation issues with emphasis on policies that impact the production of food and fiber and inputs used in their production. Special topics in agricultural resource allocation stressing issues and policies emphasizing economic externalities. 4 lectures. Prerequisite: AGB 312, AGB 315, AGB 370, and AGB 421 or AGB 433.

**AGB 418 Seminar in U.S./World Agricultural Trade Issues (2)**

Comparative analysis of agricultural infrastructures and trade policies of major U.S. trading partners within specific world regions (e.g., Latin America, Asia Pacific, Europe, etc.). Particular emphasis on cultural and geo-political influences on the development of world agricultural policies. The Schedule of Classes will list topic selected. 2 seminars. Prerequisite: AGB 318.

**AGB 421 Agribusiness Operations Analysis (4)**

Principles and procedures in agricultural business operations analysis and research. Evaluation of programs and problems to achieve optimal decisions. Production and financial data, statistics, pricing, costs, inventories, production level, and plant expansion or contraction. 4 lectures. Prerequisite: AGB 313, STAT 221.

**AGB 422 Logistics in Global Agribusiness (4)**

Scope and elements of the agribusiness logistics system including supply and distribution channels, transportation, inventory, warehousing, packaging, and order processing. 4 lectures. Prerequisite: AGB 318, STAT 221.

**AGB 427 Agricultural Estate Planning (2)**

Principles of estate planning with special emphasis on needs of owners of closely held farming businesses. How wills, property ownership, gifts, trusts and continuation agreements affect estate plans. 2 seminars. Prerequisite: Upper division standing.

**AGB 433 Agricultural Price Analysis (4)**

Application of statistical tools for price analysis. Emphasis on price making process for specific agricultural commodities. Utilization of USDA and CDFR market price reports and production estimate data in price forecasting and analysis. 2 two-hour lectures. Prerequisite: STAT 221 and AGB 313.

**AGB 435 Linear Programming in Agriculture (4)**

Application of linear programming to decision making by contemporary farm businesses. Solutions by graphical and mathematical models including appropriate computer software. Economic interpretation of solutions. Applications for multi-product, multi-function farms. Includes introduction to goal and risk programming, transportation models, and multi-period programming. 4 lectures. Prerequisite: AGB 313.

**AGB 440 Field Studies in Agribusiness (2)**

Visitation to selected agribusinesses. Organization, operation, services and problems considered. Prerequisite: Senior standing or consent of instructor. Can only be taken once for credit in the major.

**AGB 442 Agricultural Policy Resolution (4)**

Local, state, national, and international agricultural policy issues. Extensive research on one or two policy issues. Work with various policy groups at the local and state level to assist in analyzing a policy issue, and observe how the analysis is used to develop possible consensus among the different stakeholders to be affected by the policy. Review of entire process upon completion. 4 lectures. Prerequisite: AGB 412.

**AGB 443 Branded Wine Marketing (4)**

Wine pricing as it relates to quality, packaging, and service. Distribution options with emphasis on the three tier system, promotional strategies, including public relations, mass media advertising, personal selling, and direct marketing. Domestic and international marketplaces. 4 lectures. Prerequisite: AGB 301 or BUS 346 or consent of instructor.

**AGB 444 Wine Compliance and Market Analysis (4)**

Legal aspects of wine marketing with emphasis on Federal (BATF) requirements. Application of statistical theory to the collection, interpretation, and forecasting of wine and grape industry data with emphasis on production and sales. Introduction to standard accounting ratios. 4 lectures. Prerequisite: STAT 221 or STAT 252 or equivalent.

**AGB 445 Produce Marketing (2)**

Directed group study of fresh fruit and vegetable marketing. Includes analysis of terminal markets, retail marketing (supermarkets, farmer's markets, roadside stands), limited preserving and ripening, grading and inspection, economics of transportation, international marketing. 2 seminars. Prerequisite: Senior standing and AGB 301.

**AGB 446 Wine Market Analysis (2)**

Application of statistical theory to collection and interpretation of production/sales data. Also includes introduction to forecasting and decision theory. Financial ratios and industry averages. 2 seminars. Prerequisite: AGB 301 or consent of instructor.

**AGB 447 Wine Distribution and Pricing (2)**

Wine distribution channels with emphasis on agents, brokers, distributors, and retailers. Inventory management and distribution cooperatives. Domestic and international shipping regulations. The impact of price on distribution will be highlighted. 2 seminars. Prerequisite: AGB 301 or consent of instructor.

**AGB 448 Governmental Wine Regulations and Compliance (2)**

Legal aspects of wine marketing. Emphasis on federal (BATF) requirements as well as the operation and/or use of state tax laws and state monopolies that tend to restrict the free movement of wine. 2 seminars. Prerequisite: Consent of instructor.

**AGB 449 Wine Promotion and Packaging (2)**

All types of mass media promotional strategies and complete coverage of the following areas: personal selling, publicity, public relations, direct marketing, and direct promotions. Label design, packaging, and point of sale promotions. Ethics for responsible advertising. 2 seminars. Prerequisite: AGB 446 or consent of instructor.

**AGB 450 Agribusiness Strategy Formulation (4)**

Development of strategy for farms and farm related businesses where uncontrollable environment makes output and results highly unpredictable; emphasis on the total enterprise. Case analysis. 4 lectures. Prerequisite: Senior standing and AGB 323.

**AGB 451 Strategy and Cases in International Agribusiness (4)**

Exploration of environment, opportunities, and strategic challenges in the rapidly changing global food and fiber system. Developing coordination and control, challenges of worldwide management of functional areas of agribusiness. Focus is practical and managerial through extensive use of case studies. 4 lectures. Prerequisite: Senior standing, AGB 318, AGB 323.

**AGB 452 Agricultural Market Structure and Strategy (4)**

Development of skills for quantity and price determination in a noncompetitive setting. Emphasis on examining the agribusiness industry structures that exist and their effects on decision-making. The use of game theory demonstrated as a strategy formulation tool. 4 lectures. Prerequisite: AGB 313.

**AGB 455 Advanced Fair Management Seminar (2)**

Advanced studies in fair management with emphasis on budgets, contracts, entertainment, carnivals, exhibit programs, crowd control, master planning maintenance. 2 seminars. Prerequisite: AGB 314.

**AGB 456 Crop Management Problems (4)**

Management problems of crop farms and orchards. Crop enterprise costing procedures, equipment costing and replacement, scheduling of operations to obtain efficiencies. Determination of most profitable rotations and levels of input use. Includes whole farm budget development and analysis. 4 lectures. Prerequisite: AGB 322 and senior status.

**AGB 457 Livestock Management Problems (4)**

Analysis of actual livestock enterprise. Budgeting a ranch by enterprises. Analysis of internal problems such as bull purchase economics, feed buying chart, feedyard economics, cattle price relationships, livestock systems.

Includes whole farm budget development and analysis. 4 lectures. Prerequisite: AGB 322 and senior status.

**AGB 458 Dairy Management Problems (4)**

Analysis of actual dairy enterprise. Budgeting a dairy farm by enterprises. Analysis of problems such as load by load milk-feed analysis, value of milk quotas, most profitable concentrate to hay feeding. Includes whole farm budget development and analysis. 4 lectures. Prerequisite: AGB 322 and senior status.

**AGB 460 Research Methodology in Agribusiness (2)**

Empirical application of the scientific method as it relates to the design and development of Senior Project. Research plan is developed. First quarter of Senior Project. 2 seminars. Prerequisite: Senior standing and AGB 313.

**AGB 461 Senior Project (2)**

Completion of a project under faculty supervision. Research topics or projects typical of problems which graduates must solve in the agricultural, food and fiber industries. Project results are presented in a formal report. Minimum 60 hours total time. Prerequisite: Senior standing and AGB 460.

**AGB 463 Senior Seminar (2)**

Individual or group presentation for discussion of subjects and problems within the agribusiness field. The Schedule of Classes will list topic selected. Total credit limited to 4 units. 2 seminars. Prerequisite: Senior standing.

**AGB 485 Cooperative Education Experience in Agribusiness (6) (CR/NC)**

Part-time work experience with an approved Agribusiness 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 16 units. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**AGB 495 Cooperative Education Experience in Agribusiness (12) (CR/NC)**

Full time work experience with an approved Agribusiness 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 16 units. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**AGB 500 Individual Study in Agribusiness (1-6)**

Advanced independent study planned and completed under the direction of a member of the Agribusiness faculty. Total credit limited to 6 units. Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

**AGB 510 International Development and Agribusiness (4)**

Integration of agricultural development economics, developing economies, markets, and agribusiness with social and institutional limitations. 4 seminars. For students in MS in Agriculture Program/Specialization in Agribusiness. Prerequisite: Graduate standing or consent of instructor.

**AGB 514 Agribusiness Managerial Leadership and Communication (4)**

Current issues in agriculture addressed through the case analysis method. Emphasis on communication skills and leadership qualities, identifying key success requirements. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**AGB 539 Graduate Internship in Agribusiness (1-9)**

Application of theory to the solution of problems of agricultural production or related business in the field of Agribusiness. 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.

**AGB 543 Agribusiness Policy and Program Analysis (4)**

Economic, political, and social objectives of domestic agricultural policies and programs. Consequences of government's policies and programs to control production, allocate resources, support market prices, and provide benefits to food and fiber producers, marketers, and consumers. Topical analysis of current effort of government to direct agriculture. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**AGB 554 Food System Marketing (4)**

Major issues facing the food system marketer. Vertical and horizontal linkages, pricing in agricultural markets, management of price risk through futures markets and hedging, and public policy and consumer impacts on the system. Student involvement through case studies simulations, and presentations. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**AGB 555 Technological and Economic Change in Agribusiness (4)**

Ramifications and impacts in agribusiness firms from technological and economic changes. Emphasis on specific agribusiness firms and their managerial process of dealing with problems and opportunities in the operational environments of economic, technology, political, global, domestic and marketing. 4 seminars. Prerequisite: Graduate standing, or consent of instructor.

 **AGB 563 International Agribusiness Trade and Development (4)**

Agricultural trade dynamics in a world economy. Evaluation of multinational firms and unilateral and multinational government policy strategies in interacting with and expanding markets for agricultural trade. Agribusiness opportunities with social and institutional limitations; emphasis on environmental and sustainable trade issues. 4 seminars. Prerequisite: Graduate standing or consent of instructor. [\*Changed effective Winter 2009.\*](#)

**AGB 570 Selected Topics in Agribusiness (1–4)**

Directed group 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 12 units. 1 to 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**AGB 571 Selected Advanced Laboratory in Agribusiness (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.

**AGB 585 Cooperative Education Experience in Agribusiness (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.

**AGB 595 Cooperative Education Experience in Agribusiness (12)  
(CR/NC)**

Advanced study, analysis and full-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.

**AGB 599 Thesis in Agribusiness (1–9)**

Systematic research of a significant problem in Agribusiness. 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.

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for original descriptions.

### Agricultural Education & Communication Department

#### AGED–AGRICULTURAL EDUCATION

~~AGED 102 Personal Assessment (2) (CR/NC)~~ Change to:

#### AG 100 Orientation to the College of Agriculture, Food and Environmental Sciences (2) (CR/NC)

Designed to increase the student's academic, career, and personal self-assessment as it relates to the educational process. Study skill methods, campus academic regulations, available resources and issues that face many university students. Credit/no credit grading only. 2 activities. *Changed effective Fall 2008.*

#### AGED 200 Special Problems in Agricultural Education (1-4)

Individual investigation, research, studies or surveys of selected problems in Agricultural Communication/Agricultural Education. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

#### AGED ~~202~~ 102 Introduction to Agricultural Education (2)

Overview of agricultural education career pathways including goals and purposes. Kinds of classes and types of programs. Qualifications essential to success in teaching agriculture. Planned program of studies to meet requirement for teaching agricultural science and related disciplines. 2 lectures. *Changed effective Fall 2008.*

#### AGED 220 Agriculture Youth Conferences (2) (CR/NC)

Problems encountered and practices applied during the conduct of the annual FFA State Convention. Methods, procedures and materials adapted for use by the student in developing the committee system to produce conferences, conventions and workshops of all kinds and sizes. Total credit for AGED 220 and AGED 221 limited to 6 units. Credit/No Credit grading only. 2 activities. Prerequisite: Consent of instructor.

#### AGED 221 Agriculture Youth Conferences (3) (CR/NC)

Problems encountered and practices applied during the conduct of the annual FFA State Convention. Methods, procedures and materials adapted for use by the student in developing the committee system to produce conferences, conventions and workshops of all kinds and sizes. Total credit for AGED 220 and AGED 221 limited to 6 units. Credit/No Credit grading only. 3 activities. Prerequisite: Consent of instructor.

#### AGED 330 FFA and Supervised Agriculture Programs (6)

Implementation processes and operational procedures for initiating, conducting and integrating FFA activities and SOE Programs appropriate to community, school and student needs. Demonstration, application and observation of practices and techniques utilized by agriculture instructors in conducting organized classroom, shop, school farm, laboratory and home visit instruction in agriculture, FFA and SOE activities. 3 activities, and supervised work. Prerequisite: AGED 202.

#### AGED 339 Internship in Agricultural Education (1–12) (CR/NC)

Selected Agricultural Education 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.

#### AGED 400 Advanced Special Problems in Agricultural Education (1-4)

Individual investigation, research, studies or surveys of selected problems in Agricultural Communication/Agricultural Education. Total credit limited to

8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

#### AGED 404 Agricultural Leadership (3)

Emphasis upon equipping current and prospective leaders in agriculture with the background and skills to achieve their potential. Class members will assess their status as leaders and identify means to improve their effectiveness. Focus on the theoretical underpinnings of human motivation, personal leadership, and organizational development. 2 lectures, 1 activity. Prerequisite: PSY 201 or PSY 202.

#### AGED 410 Computer Applications in Agricultural Education (2)

Development of computer literacy for teaching agriculture. Analysis and specialization of hardware. Instruction in digital technology, TI network systems and software applicable to vocational agriculture. Will be Level I certified, which is required for teaching credential candidates. Prerequisite: AG 250 or CSC 110 and consent of instructor.

#### AGED 422 Organizing and Teaching K-6 Standards (4)

Objectives, content, techniques, materials, and recent trends of successful application of agricultural literacy and awareness to K-6 grade level standards. Ongoing projects, individual and group, allow for exploration and understanding of agriculture as a theme to teach all of the content areas, as well as assist in understanding the educational standards accompanying each lesson. 4 lectures. Prerequisite: Liberal Studies Preservice candidate.

#### AGED 424 Organizing and Teaching Agriculture (3)

Determining course objectives, content, and calendar for use by the teacher in classroom, shop and field instruction while assigned to community schools. Concurrent with student teaching. 3 activities. Prerequisite: AGED 438 and consent of instructor.

#### AGED 438 Instructional Processes in Agricultural Education (4)

Principles of specific agricultural teaching methods and developmentally appropriate pedagogy. Daily and unit lesson plans that adopt content, teaching methods, and assessment for English Learners and students with special needs. Class demonstrations in teaching procedures, analysis, assessment and reflection. 2 lectures, 2 activities. Prerequisite: AGED 330, EDUC 412, EDUC 414 and EDUC 416 or consent of instructor.

#### AGED 440 Student Teaching in Agricultural Education (6–12) (CR/NC)

Off-campus assignment to a selected cooperating public school. Participation in all phases of agriculture teacher duties and activities including departmental organization and administration. Prior approval and appointment necessary. Total credit limited to 18 units. Credit/No Credit grading only.

#### AGED 441 Student Teaching Practicum (2)

Problems encountered and practices applied during student teaching. Methods, procedures and materials adapted for use by the teacher concurrent with student teaching. 2 activities. Prerequisite: Consent of instructor.

#### AGED 460 Research Methodology in Agricultural Education and Communication (1)

Introduction of the research process and topic selection as it relates to the design and development of the senior project within the Agricultural Sciences major. 1 lecture. Prerequisite: Junior standing.

#### AGED 461 Senior Project I (1)

Empirical application of the scientific method as it relates to the selection of a project under faculty supervision. Projects typical of problems that graduates must solve in their field of employment. Minimum 30 hours total time. Prerequisite: AGED 460.

#### AGED 462 Senior Project II (1)

Completion of a project begun in AGED 461 under faculty supervision. Projects typical of problems that graduates must solve in their field of employment. Project results are presented in a formal report. Minimum 30 hours total time. Prerequisite: AGED 461 or consent of instructor.

#### AGED 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 topic

selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**AGED 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.

**AGED 481 Developing Digital Presentations for Instruction in Agricultural Education (1)**

Directed group study and individualized projects in the design and development of digital presentations in technical agriculture for use in teaching and program public relations. Total credit limited to 3 units. 1 laboratory. Prerequisite: admission to credential program.

**AGED 482 Teaching Resources and Curriculum Design (1)**

Traditional academic and student-centered approaches to gaining resources and curriculum design. Methods of using, and the development of the knowledge and skills related to planning, implementation and assessing the high school agriculture curriculum. Organization and management and their relationship to education effectiveness and productivity. 1 lecture. Prerequisite: student teacher candidate.

**AGED 500 Individual Study in Agricultural Education (1–3)**

Advanced independent study planned and completed under the direction of a member of the Agricultural Education and Communication faculty. Total credit limited to 6 units. Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

**AGED 513 Field Experience–Vocational Agriculture (1–3)**

Practice and techniques in management and supervision of vocational agriculture programs. Relationships among students, staff, community and school groups. Budgeting, staffing, records, reporting. Student activities and Future Farmers of America programs. Total credit limited to 6 units. Prerequisite: Prior approval and appointment.

**AGED 520 Program Development in Agricultural Education (3)**

Development of up-to-date approaches to a total integrated program based on occupational opportunities and community needs. Philosophy, organization and administration of agricultural education programs. Development in such areas as curriculum, supervised occupational experience, Future Farmers of America, and summer programs. 3 seminars.

**AGED 522 Instructional Programs in Agricultural Mechanics (3)**

Organizing the vocational agriculture mechanics curriculum and determining course content. Student demonstrations and presentations; evaluation and analysis. 1 seminar, 2 laboratories.

**AGED 525 Organizing Instruction for Growing and Selling Horticulture Products (3)**

Skills and techniques of propagation and production of horticulture crops. Scheduling, growing media, construction and use of forcing structures, and plant identification. Marketing plans and promotions. Teaching methods, curriculum development, and identification of resources and materials for horticultural instruction. 3 lectures. Prerequisite: HCS 120 or EHS 230, and senior or graduate standing. Open to agricultural educators or credential students only.

**AGED 530 Developing FFA and Supervised Agricultural Experience Programs in Secondary Education (3)**

Integrating FFA and supervised agricultural experience programs into the curriculum. Career development event implementation; record book usage; officer and committee training; recruitment; retention; retreat and leadership training. Current national and state initiatives and experiential learning opportunities in the workplace and entrepreneurial settings. Prerequisite: senior or graduate standing. Not open to students with credit in AGED 330. 3 lectures.



**AGED 537 Enhancing Instruction in Agricultural Biology (3)**

Teaching methods of important biological concepts using agriculture as the context. Assisting agriculture teachers in identifying proper pedagogical strategies to integrate activities and laboratories into existing agriculture biology courses, including leadership development opportunities and activities. Emphasis on appropriate teaching methods and techniques,

curriculum integration and application, and classroom resources. 3 seminars. Prerequisite: AGED 438 or consent of instructor, enrollment in agriculture teaching credential program or MS degree in Agricultural Education, or current agriculture teacher; undergraduate biology course (BIO 111 or equivalent). [New course effective Spring 2008.](#)

**AGED 539 Graduate Internship in Agricultural Education (1–9)**

Application of theory to the solution of problems of agricultural production or related business in the field of Agricultural Education. 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.

**AGED 570 Selected Topics in Agricultural Education (1–4)**

Directed group 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 12 units. 1 to 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**AGED 571 Selected Advanced Laboratory in Agricultural Education (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.

**AGED 580 Special Problems in Agricultural Education (1–3)**

Individual study of modern issues and problems conducted through research, planning and development. Field problems and in-service study in agricultural industry encouraged. Final written report required. Total credit limited to 9 units with not more than 3 units in any one quarter. Prior approval of instructor required.

**AGED 581 Graduate Seminar in Agricultural Education (3)**

Group study of selected developments, trends and issues in the field of Agricultural Education. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**BS AGRICULTURAL BUSINESS**

**2007-09 Cal Poly Catalog**

**Agribusiness Department**

**Agriculture Bldg. (10), Room 210**

**(805) 756-5000**

- 60 units upper division       GWR
- 2.0 GPA                               USCP

\* = Satisfies General Education requirement

**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
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 (B1)*	5
Any ASCI, PM or DSCI course .....	4
SS 121 Introductory Soil Science.....	4
Any FRSC, CRSC, HCS, PPSC or VGSC course..	4
AG 315/BRAE 340/BRAE 348/FNR 312/FNR 317/FNR 321/FSN 319 (Area F)* .....	4
Agricultural science electives.....	12/13
12-13 units in Agriculture with course prefixes other than AGC, AGED, REC, MSC and ERSC (except if crosslisted with SS). No AG prefixes except AG 315, <a href="#">AG 339 (4-23-08)</a> , AG 360 and AG 450. No more than a combined total of 4 units in enterprise projects, special problems, internship and AG 243.	
<b>53</b>	

**GENERAL EDUCATION (GE)**

72 units required; 24 units are in Support.  
→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 (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	

**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>ELECTIVES</b> .....	<b>11</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 or AGB 323 Agribusiness Managerial Accounting .....	4
AGB 410 Agricultural Lending .....	4
ECON 337 Money, Banking, and Credit .....	4
Advisor approved electives: AGB/BUS (300-400 level) or foreign language (any level) .....	4
<b>28</b>	

**Agribusiness Management Concentration**

AGB 321 Farm Records.....	4
AGB 322 Principles of Agribusiness Management	4
AGB 331 Farm Accounting or AGB 323 Agribusiness Managerial Accounting .....	4
AGB 433 Agricultural Price Analysis .....	4
AGB 435 Linear Programming in Agriculture .....	4
➡ <a href="#">AGB 456/404/452</a> .....	4
Advisor approved electives: AGB/BUS (300-400 level) or foreign language (any level) .....	4
<b>28</b>	

<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.



<b>Agribusiness Marketing Concentration</b>	
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
Advisor approved electives: AGB/BUS (300-400 level) or foreign language (any level).....	4
	<u>28</u>

<b>Agribusiness Policy Concentration</b>	
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 412 Advanced Agricultural Policy .....	4
AGB 421 Agribusiness Operations Analysis <i>or</i> AGB 433 Agricultural Price Analysis .....	4
AGB 442 Agricultural Policy Resolution .....	4
Advisor approved electives: AGB/BUS (300-400 level) or foreign language (any level).....	4
	<u>28</u>

<b>International Agribusiness Management Concentration</b>	
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 451 Strategy and Cases in International Agribusiness .....	4
BUS 433 International Finance .....	4
Area study concentration elective.....	4
To be selected from approved courses in anthro- pology, history, humanities, and foreign languages	<u>4</u>
	28

<b>Individualized Course of Study</b>	
Advisor and department head pre-approval of courses is required .....	28

## 2007-09 Cal Poly Catalog

### Social Sciences Department

#### ANT-ANTHROPOLOGY

**ANT 201 Cultural Anthropology (4)** **GE D3**  
Contemporary human cultures throughout the world. General patterns sought within the diversity of individual cultures. Includes such topics as: family organization; gender roles; adaptation to the environment; systems of economic exchange; political organization and leadership; religious beliefs and values; ethnicity and cultural pluralism; impact of Western culture on the developing world. 4 lectures.

**ANT 202 World Prehistory (4)** **GE D3**  
Development of the diverse human cultures of both the Old and New Worlds from the emergence of the first human ancestors (hominins) to the dawn of history; biological evolution, global cultural development, and adaptation before the advent of writing. 4 lectures.

**ANT 250 Biological Anthropology (4)** **GE B2**  
Biological aspects of human unity and diversity. Primate and human evolution, including anatomical, physiological and behavioral adaptations. Origin and diversity of modern races. 4 lectures.

**ANT 309 Elements of Archaeology (4)**  
Archaeological method and theory covering the history and development of archaeological thought, approaches to data recovery, dating and analysis of artifacts and ecofacts, the construction of models of prehistoric human behavior through application of archaeological and anthropological theories. 4 lectures. Prerequisite: ANT 201 or ANT 202, or consent of instructor.

**ANT 310 Archaeological Field Methods (4)**  
Hands-on introduction to the methods and techniques of archaeology with an emphasis on reconnaissance and survey. Training in artifact and ecofact identification with a focus on lithic technology. Practical experience in orienteering, map-reading, and simple cartography. Methodological approaches to both academic research questions and compliance with environmental planning mandates. 3 lectures, 1 laboratory. Prerequisite: ANT 202 or ANT 309, or consent of instructor.

**ANT 311 Archaeological Laboratory Methods (4)**  
Hands-on introduction to the methods employed in post-field processing, classification, analysis, and preservation of archaeological materials. Compilation of quantitative and qualitative information in data base format to assist in the classification and interpretation of faunal remains and artifacts. 3 lectures, 1 laboratory. Prerequisite: ANT 309 or ANT 310.

**ANT 312 Introduction to Cultural Resources Management (4)**  
Contemporary issues in the preservation of archaeological, historic, and ethnographic resources within the framework of legally mandated environmental planning. Introduction to federal, state, and local legislation pertinent to the identification, evaluation, and treatment of cultural resources. A history of preservation legislation, culminating with detailed discussion of Section 106 of the National Historic Preservation Act and the California Environmental Quality Act. 4 lectures. Prerequisite: ANT 201, ANT 202 or ANT 309, or consent of instructor.

**ANT 320 California's Native Past (4)**  
Overview of the paleoenvironment, prehistory, archaeology, and ethnography of Native California. The last 12,000 years of California's past from the arrival of the first human beings to the establishment of Spanish settlements in 1769, and the demise of native societies. 4 lectures. Prerequisite: ANT 201, or ANT 202, or consent of instructor.

**ANT 325 Precolumbian Mesoamerica (4)** **GE D5**  
Cultures of Mesoamerica (Mexico and Central America) from earliest times to the Spanish Conquest. Olmec, Teotihuacano, Zapotec, Maya and Aztec civilizations. Major topics include religion, politics, warfare, art, writing, calendrics, ecology and trade. 4 lectures. Prerequisite: Completion of GE Area A, one course in D2 and one course in D3. Social Sciences majors will not receive GE Area D5 credit.

**ANT 330 Indigenous South Americans (4)** **GE D5**  
Indigenous peoples of South America from the past to the present. Cross-cultural study of small-banded societies, tribes and large civilization states located from the Amazon basin to the Altiplano. Comparison of current state of indigenous rights and place in modern society. 4 lectures. Prerequisite: Completion of GE Area A and completion of two lower-division Area D courses.

**ANT 344 Sex, Death, and Human Nature (4)** **GE D5**  
How Darwinian processes of differential reproduction and mortality influence human interests, passions and behaviors. Theories of inclusive fitness, parental investment and senescence. Sex differences, sexual attraction, life histories, violence and aggression, including rape, homicide and infanticide. 4 lectures. Prerequisite: Completion of GE Area A, one course in D3 and one course in D4. Social Sciences majors will not receive GE Area D5 credit.

**ANT 345 Human Behavioral Ecology (4)** **GE D5**  
Biological and cultural influences of natural and sexual selection on individual behavior. Ecological effects on human behavior to reproduce and acquire resources. Scientific method for understanding foraging behavior, group living, social skills, kinship, parenting, religion, and mating. Cross-cultural, cross-sex, and cross-species comparisons. 4 lectures. Prerequisite: Completion of GE Area A, one course in B2 and one lower-division Area D course.

**ANT 360 Human Cultural Adaptations (4)** **GE D5**  
Social and cultural evolution from Paleolithic times to the present. Interactions of demographic, economic and ecological factors are emphasized. Main topics include human nature/culture, sex and gender, cooperation and conflict, the "agricultural revolution", state formation, social inequality and globalization. 4 lectures. Prerequisite: Completion of GE Area A, one course in D2 and one course in D3. Social Sciences majors will not receive GE Area D5 credit.

**ANT 401 Culture and Health (4)**  
Global perspective on the relationship between culture and health. Ecological factors influencing health and illness. Origins of disease and impact of diseases on society. Diet and nutrition. Classifications of illness causation. Kinds of curers. Relationship of gender and reproduction to illness. Pharmacology. Mental illness. Global health problems. Alternative health care modalities. Health-care needs of U.S. ethnic groups. 4 lectures. Prerequisite: Junior standing.

**ANT 415 Native American Cultures (4)** **USCP**  
Survey of Native American cultures from earliest times to present, emphasizing regional diversity in traditional lifeways. Origins of New World peoples, domestication, war, social organization, trade and gender roles. 4 lectures. Prerequisite: One upper division ANT course or consent of instructor.

**ANT 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 topics selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### Architecture Department

## ARCH-ARCHITECTURE

### ARCH 101 Survey of Architectural Education and Practice (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. 2 lectures.

### 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.

### 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.

### 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.

### 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 topic 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: GE Area A1 and one of the following Area C3 courses: ARCH 217, 218, 219, or ART 112. Architecture majors will not receive GE C4 credit.

**ARCH 326 Native American Architecture and Place (4) (Also listed as ES 326) 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: GE Areas A, C1 and C2.

**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 archi-

ture 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.

**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 441 Professional Practice (3)**

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. 3 lectures. Prerequisite: ARCH 342 and ARCH 353.

**ARCH 442 Professional Practice (3)**

Case study of an architectural project that addresses selected professional practice issues presented in ARCH 441. 3 lectures. Prerequisite: ARCH 342 and ARCH 353.

**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) (Also listed as CRP 447)**

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: Fourth year standing, or consent of instructor.

**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. 5 laboratories. Prerequisite:

ARCE 316, ARCH 353, ARCH 342, or consent of department head.

*Changed effective Winter 2009.*

**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)**

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 units; repeatable in same term. 3 lectures. Prerequisite: ARCH 342 or consent of instructor.

**ARCH 463 Undergraduate Seminar (2) (CR/NC)**

Discussion and lectures on problems of practice in architecture. Professional ethics. Students present organized material on some subject of interest 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 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 topic 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 topic selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

**ARCH 472 Housing Design Concepts (3)**

For students preparing for further study or practice relating to housing, urban design and new communities. This course will address design objectives, concepts, and current theories and forms in housing and mixed-use projects. 3 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 and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 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 and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 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.

**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 441, ARCH 442, 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.

**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

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presented by regular faculty and students. 2 seminars. Prerequisite: Graduate standing.

**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 specific topics 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 (3-6)**

Completion of a thesis embodying original research in an area of environmental design. Total credit limited to 9 units. Prerequisite: Consent of graduate advisor.

## BS ARCHITECTURAL ENGINEERING

### 2007-2009 Cal Poly Catalog

Architectural Engineering Department  
**Engineering West (21), Room 110**  
**(805) 756-1314**

- ☐ 60 units upper division      ☐ GWR  
 ☐ 2.0 GPA                              ☐ USCP

\* = Satisfies General Education requirement

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
<del>Approved professional electives</del> STAT 321 Prob & Stat for Engr (10-31-07) .....	4
	<b>76</b>

#### SUPPORT COURSES

ARCH 105 Professional Practice 1 .....	1
ARCH 106 Materials of Construction .....	2
ARCH 121, 122, 123 Design and Drawing 1.1, 1.2, and 1.3 .....	3,3,3
ARCH 221 Architectural Design Fundamentals .....	3
ARCH 217/ARCH 218/ARCH 219 (C3)* .....	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
	<b>84</b>

#### GENERAL EDUCATION (GE)

72 units required; 28 units are in Support.  
 →Minimum of 8 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 (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
	<b>44</b>

<b>ELECTIVES</b> .....	<b>0</b>
	<b>204</b>



## 2007-2009 Cal Poly Catalog

Updated Course Descriptions.  
For (former) printed catalog descriptions,  
[click here.](#)

### [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. Does not count for GE B2 for ASCI 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) (Also listed as VS 203)

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.

##### 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) (Also listed as PM 225)

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.

##### 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) (Also listed as VS 229) (formerly VS 223)

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.

##### 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. [Changed effective Spring 2008.](#)

##### 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 290 Animal Production and Management Enterprise (1-5) (CR/NC) (Also listed as PM 290)

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. [Changed effective Winter 2009.](#)



### **ASCI 304 Animal Genomics (3)**

Application of genetic principles for domestic animal improvement. Improving animal performance and health production through use of genetic markers and diagnostics, gene mapping, and related current technologies. 3 lectures. Prerequisite: BIO 302 or BIO 303 or BIO 351. [Changed effective Spring 2008.](#)

### **ASCI 305 Game Bird Propagation and Management (3)** (Also listed as PM 305)

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.

### **ASCI 310 Technical Veterinary Skills (4) (Also listed as VS 310)**

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.

### **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) (Also listed as VS 312)**

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.

### **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)** (Also listed as VS 321) (formerly VS 320)

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.

### **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)** (Also listed as PM 325)

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.

### **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 (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. Prerequisite: One course each in soil science, animal science and botany or crop science.

### **ASCI 330 Poultry Meat Production and Processing (4)** (Also listed as PM 330)

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.

### **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)**

(Also listed as PM 342) (formerly PM 345)

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: PM/ASCI 225.

### **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. A distance learning course. 3 lectures, 1 laboratory. Prerequisite: ASCI 224 and ASCI 220. [Changed effective Spring 2008.](#)

### **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 and ASCI 320.

**ASCI 360 Poultry Industry Seminar (3) (Also listed as PM 360)**

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.

**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 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 384 or PM/ASCI 330 or consent of instructor.

**ASCI 420 Animal 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 and ASCI 320.

**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.

**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) (Also listed as VS 438)**

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.

**ASCI 440 Immunology and Diseases of Animals (4) (Also listed as VS 440)**

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.

**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: AG 250 or 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. Online course. Credit/No Credit grading only. 1 seminar. Prerequisite: Junior standing. [Corrected effective Fall 2007.](#)

**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)**

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.

**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 topic 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 topic 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 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 485 Cooperative Education Experience in Animal Science (6) (CR/NC)**

Part-time work experience with an approved Animal Science 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 16 units. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**ASCI 490 Advanced Animal Production and Management Enterprise (1-5) (CR/NC) (Also listed as PM 490)**

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.

[Changed effective Winter 2009.](#)

**ASCI 495 Cooperative Education Experience in Animal Science (12) (CR/NC)**

Full time work experience with an approved Animal Science 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 16 units. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**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: ACI 403 or equivalent course.

**ASCI 540 Advanced Immunology and Diseases of Animals (4) (Also listed as VS 540)**

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.

**ASCI 541 Advanced Animal Immunology Laboratory (1) (Also listed as VS 541)**

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.

**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 topic selected. Total credit limited to 12 units. 1 to 4 seminars. 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.

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [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.

##### **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.

##### **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. Saturday field trips. 2 lectures, 2 laboratories.

##### **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. Saturday field trips. 2 lectures, 2 laboratories.

##### **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. Not open to students who have completed BIO 153 or BIO 162. 3 lectures, 1 laboratory. Recommended prerequisite: a course in chemistry.

##### **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.

##### **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: 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. Co-requisite: ENGR/BRAE 213.

##### **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.

##### **BIO 232 Nanotechnology, Human Biology, Ethics and Society (4) (Also listed as MATE 232)**

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: Instructor's consent 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 301 Environmental Science and Human Ecology (4)**

Introduction to natural processes regulating renewable and non-renewable physical, chemical, and biological resources. Human population ecology and the influence and interactions of human populations on/with physical, chemical, and non-human biological resources. Principles of management, environmental science, and conservation biology that lead to equilibrium or self-sustaining conditions. 4 lectures. Prerequisite: BIO 160, 162.

##### **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.

##### **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: One course for GE Area B2 in Biology.

##### **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 course in biology (BIO, ZOO, BOT or MCRO prefix), completion of GE Area B, and junior standing. Not open for major credit in Biological Sciences (or Ecology and Systematic Biology majors on prior catalogs).

**BIO 317 The World of Spatial Data and Geographic Information Technology (4)** **GE Area F**  
(Also listed as FNR/GEOG/LA 317)

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: Any CSC course, completion of GE Area B, and junior standing.

**BIO 318 Freshwater Ecology (4)** (formerly BIO 418)

Biological, physical, and chemical dynamics of aquatic systems surrounded by land including lakes, streams, wetlands, and estuaries. 3 lectures, 1 laboratory. Prerequisite: BIO 263 or consent of instructor. Recommended: College-level course in chemistry.

**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. [New course effective Winter 2009.](#)

**BIO 343 Principles of Systematic Biology** Course Change; see BIO 443

**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. [Changed effective Winter 2009](#)

**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)** (Also listed as CHEM 375)

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. [Changed effective Fall 2008.](#)

**BIO 391 Field Quarter I – Field Ecology (4)**

Field studies of terrestrial and aquatic ecosystems of California. Investigation of habitat diversity, environmental factors, composition and functional biology, and seasonal progression of animal and plant communities. Several extended field trips. 2 lectures, 2 laboratories. Prerequisite: BIO 160, BIO 162, BIO 263 and BIO 325; corequisite: BIO 392, BIO 393, BIO 400 (2 units).

**BIO 392 Field Quarter II – Field Botany (4)**

Terrestrial and aquatic plant communities of California. Field identification of native and introduced plants in nature. Factors affecting plant distribution and relationships. Several extended field trips. 2 lectures, 2 laboratories. Prerequisite: BIO 160, BIO 162, BIO 263, and BIO 325; corequisite: BIO 391, BIO 393, BIO 400 (2 units); recommended: BOT 313. Students completing BIO 392 will not be able to receive degree credit for BOT 433 as well.

**BIO 393 Field Quarter III – Field Zoology (4)**

Terrestrial and aquatic animal communities of California. Natural history, population and community ecology, and identification of vertebrates and invertebrates. Determinants of animal distribution. Major mechanisms determining diversity. Several extended field trips. 2 lectures, 2 laboratories. Prerequisite: BIO 160, BIO 162, BIO 263 and BIO 325; corequisite: BIO 391, BIO 392, BIO 400 (2 units).

**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 (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, 2 laboratories. Prerequisite: BIO 162, and BIO 303 or BIO 351.

**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)** (Also listed as FNR/SS 421)

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.

#### **BIO 424 Organizing and Teaching Life Sciences (4)**

Objectives, content, techniques, material, and recent trends of successful instruction in secondary school biology, including strategies for English language learners (ELL) and special needs students. 4 lectures. Prerequisite: Consent of instructor.

#### **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 437 Marine Resources (4)**

Biology of historical, current, and potential marine resources including both technical means used to harvest and biological factors important in achieving a sustainable yield. Identification, life histories, ecology, culture, and economics of pertinent organisms. 3 lectures, 1 laboratory. Prerequisite: BIO 160, BIO 162, and BIO 263 or consent of instructor.

#### **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 441 Bioinformatics Applications (4) (Also listed as CHEM 441) (formerly BIO 447)**

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.

#### **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. [Changed effective Winter 2009.](#)

#### **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 topic 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 topics 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) (Also listed as CHEM 476)**

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. [Changed effective Fall 2008.](#)

#### **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. Total credit limited to 16 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. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**BIO 500 Individual Study (1–3)**

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 thesis program. Total credit limited to 3 units. 1-3 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 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 570 Selected Topics in Biology (1–4)**

Directed group study of selected topics for graduate students. The Schedule of Classes will list topics for selection. Total credit limited to 12 units. 1 to 4 seminars. Prerequisite: Graduate standing in Biological Sciences 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 9 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 5 units. 1 activity. Prerequisite: Graduate standing in Biological Sciences or consent of instructor.

**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 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing in Biological Sciences and consent of instructor.

**BIO 599 Thesis (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 laboratories. Prerequisite: Graduate standing in Biological Sciences; consent of instructor, and consent of thesis committee.



## BS BIOMEDICAL ENGINEERING

### 2007-09 Cal Poly Catalog

Biomedical and General Engineering Department  
 Engineering Bldg. (13), Room 260  
 (805) 756-6400

- ☐ 60 units upper division      ☐ GWR  
 ☐ 2.0 GPA                              ☐ USCP

\* = Satisfies General Education requirement

#### MAJOR COURSES

ENGR 110 Engineering Science I.....	3
BMED 111 Biomedical Engrg Calculations .....	3
BMED 212 Intro to Biomedical Engrg Design .....	3
BMED 310 Biomed. Engrg Measurement/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 481, 482 or ENGR 462 Senior Project .....	4
	<b>67</b>

#### SUPPORT COURSES

BIO 161 Intro to Cell & Molecular Bio (B2/B4)* .....	4
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 (10-30-07).....	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>1</sup> Advisor approved math and science electives .....	16
CE 204 Mechanics of Materials I.....	3
CSC 101 Fundamentals of Computer Science or CSC 234 C and Unix .....	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 .....	3
ME 341 Fluid Mechanics I.....	3
	<b>91</b>

#### GENERAL EDUCATION (GE)

72 units required; 32 units are in Support.

→See page 56 for complete GE course listing.

→Minimum of 8 units required at the 300-400 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**

#### ELECTIVES .....

**0**

**198**

<sup>1</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.

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [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 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: ME 211 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 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, 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. 2 lectures, 2 laboratories. Prerequisite: ME 212, 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 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 topics 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. *Changed effective Winter 2009.*

### 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 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 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, BIO 161 or consent of instructor.

### 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 530 Biomaterials (4) (Also listed as MATE 530)**

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.

**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 topics selected. Total credit limited to 8 units. 4 lectures. Prerequisite: Graduate standing in biomedical engineering or consent of department chair.

**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 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 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.

## 2007-2009 Cal Poly Catalog

Updated Course Descriptions.  
For (former) printed catalog descriptions,  
[click here.](#)

### Biological Sciences Department

#### **BOT–BOTANY**

##### **BOT 121 General Botany (4) GE B2 & B4**

The anatomy, physiology, reproduction, and importance of plants. 3 lectures, 1 laboratory. [Changed effective Spring 2008.](#)

##### **BOT 221 California Plants and Plant Communities (4) (Also listed as LA 221)**

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: BIO 114 or BOT 121 or consent of instructor.

##### **BOT 238 Central Coast Flora and Vegetation (3)**

Field identification of native plants and plant communities of the California Central Coast. Factors that affect plant growth in natural environments. 2 lectures, 1 laboratory. Prerequisite: BOT 121.

##### **BOT 264 Diversity of Plants and Algae (4)**

Structure, reproduction, ecology, evolution and the economic significance of the major groups of plants and algae. 2 lectures, 2 laboratories. Prerequisite: BIO 162 or BOT 121 or consent of instructor.

##### **BOT 311 Plants, People and Civilization (4) GE B5**

Human uses of plants for food, beverage, medicine, fiber, recreation, and rituals. Uses of plants by different cultures throughout the world and the social, economical, and environmental importance of plants in our lives. 3 lectures, 1 laboratory. Prerequisite: One course from GE Area B2.

##### **BOT 313 Taxonomy of Vascular Plants (4)**

Introduction to classification and identification of vascular plants, emphasizing major plant families; field and herbarium techniques. 2 lectures, 2 laboratories. Prerequisite: BIO 162 or BOT 121.

##### **BOT 323 Plant Pathology (4)**

Comprehensive study of the causes and effects of disease in plants. Designed to lead to an understanding of the science and modern control methods. 2 lectures, 2 laboratories. Prerequisite: BIO 162 or BOT 121.

##### **BOT 324 Ornamental and Forest Pathology (4)**

Causes and effects of diseases of important ornamental and forest plants, disease agents (life cycle, host range, environmental relationships), and modern approach to control. 2 lectures, 2 laboratories. Prerequisite: BIO 162 or BOT 121.

##### **BOT 326 Plant Ecology (4)**

Plant communities, population dynamics, and effects of the following environmental factors on plant growth and development: soil, water, temperature, light, atmosphere, topography, organisms, and fire. 3 lectures, 1 laboratory. Prerequisite: BIO 114, BIO 162, or BOT 121.

##### **BOT 329 Plants, Food, and Biotechnology (4) GE Area F (Also listed as HCS 329)**

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.

##### **BOT 334 Morphology of Vascular Plants (4)**

Phylogenetic relationships of the plant kingdom as illustrated by comparative morphology of the vascular plants including living and fossil forms. 2 lectures, 2 laboratories. Prerequisite: BIO 160, BOT 162 and BOT 313.

##### **BOT 335 Plant Anatomy (4)**

Microscopic study of vascular plants dealing with the origin, development and structure of cells, tissues and organs. 2 lectures, 2 laboratories. Prerequisite: BIO 162 or BOT 121.

##### **BOT 431 Advanced Plant Pathology (4)**

Methods, instruments, and materials used in diagnosis of plant diseases and in plant disease research. 2 lectures, 2 laboratories. Prerequisite: BOT 323 or BOT 324.

##### **BOT 433 Field Botany (4)**

Field studies of California's diverse vegetation and flora. Factors affecting the distribution of plants and plant communities and their ecological relationships. Identification of plants and plant communities in the field. Several field trips required including two weekend trips to California's deserts and mountains. 2 lectures, 2 laboratories. Prerequisite: BOT 313 or consent of instructor.

##### **BOT 437 Phycology (4)**

Comprehensive examination of the ecology, life histories, functional morphology, physiology, and taxonomy of marine and freshwater algae. Laboratories emphasize species endemic to the central coast of California. 2 lectures, 2 laboratories. Prerequisite: BIO 162.

##### **BOT 450 Plant Biotechnology Laboratory (2) (Also listed as HCS 450)**

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.

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [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

(Also listed as ENGR 213)

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. Co-requisite: BIO 213.

### 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) (Also listed as FNR 247)**

Use and care of tapes, staff compass, abney levels, theodolites, and GPS receivers. Keeping field notes, measurements by tape. Closed and open traverse by compass and theodolite. Turning angles and determining directions of lines. Map reading and public land description. GPS measurements. 1 lecture, 1 laboratory. Prerequisite: MAPE Score 8, prerequisite or concurrent: FNR 215. *Corrected effective Summer 2007.*

**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.

**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)**  
(formerly BRAE 226)

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: PHYS 206, PHYS 256, 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. *Changed effective Fall 2008.*

**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.

**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: Completion of GE Area B and junior standing.

**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 AG 250 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-AE 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 topic 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 topic 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. Total credit limited to 16 units. Degree credit limited to 6 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. Total credit limited to 16 units. Degree credit limited to 6 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 topic 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 topic 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.



## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [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. The course explores the importance of social responsibility in accounting through spreadsheet applications and Internet resources. 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 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: Completion of GE Areas A, D1 and D2. Business Administration majors will not receive GE Area D5 credit.

##### **BUS 319 Accounting Information Systems (4)**

Comprehensive coverage of manual and computerized accounting processes and internal controls. Documenting information systems. Identifying control weaknesses within information systems to comply with Sarbanes-Oxley Act. 3 lectures, 1 activity. Prerequisite: BUS 214.

##### **BUS 320 Taxation of Business Entities (4)**

Federal income taxation of the various forms of business entities. Introduction to broad range of tax concepts and types of taxpayers. Role of taxation in the business decision-making process. 4 lectures. Prerequisite: BUS 212 or BUS 214 and 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. *Changed effective Fall 2008.*

##### **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; and for all other majors, either ECON 201 or ECON 222. *Changed effective Winter 2009.*

**BUS 350 The Global Environment (4)** **GE Area F**  
(Also listed as AG/EDES/ENGR/HUM/SCM/UNIV 350)

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: Completion of GE Areas A and B and junior standing.

**BUS 360, 361 Undergraduate Integrated Core Curriculum I, II (12)**

The foundation knowledge and skills required of all business concentrations. Integration of accounting, finance, marketing, operations management, government and social influences. Organizational behavior and international topics in one two-quarter curriculum, based on the approved business core. 10 lectures, 2 activities per course. Prerequisite: BUS 207, BUS 214, BUS 215, BUS 391, ECON 221, ECON 222, MATH 221, STAT 251, STAT 252.

**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. [Changed effective Fall 2008.](#)

**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 Performance and Knowledge Management (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 215.

**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. [Changed effective Fall 2008.](#)

**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).

**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.

**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 (4)**

Coverage of the deductions and credits applicable to individuals. Training and practice in the preparation of state and federal income tax returns. Under supervision of qualified professionals, tax preparation sites are operated to provide free tax assistance to community residents. 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. [Changed effective Fall 2008.](#)

**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. Total credit limited to 16 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. [Changed effective Fall 2008.](#)

**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. *Changed effective Fall 2008.*

**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 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 topic 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 Organization Development Programs (4)**

Analysis of development programs in organizations. Review of development and trends in the field of organizational development. Application of behavioral and organizational science knowledge and social technology to programs in organizations for the purpose of improving effectiveness and sustainability. 4 seminars. Prerequisite: BUS 387 and 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 342 and BUS 346; BUS 310 recommended; Business majors must have formally declared their concentration to enroll. [Changed effective Fall 2008.](#)

**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 499 Data Communications and Networking (4)**

Combines the fundamental concepts of data communications and networking 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.

**BUS 501 Managerial Accounting and Managerial Economics I (5)**

Accounting portion of course covers applications of accounting to management decision-making, planning, and control. Cost behavior analysis, budgets, performance reporting, plus motivational and behavioral considerations. Economics portion of course covers demand and supply analysis, static and dynamic market equilibrium analysis, and elasticities. 5 lectures. Prerequisite: Graduate standing.

**BUS 502 Managerial Finance and Managerial Economics II (4)**

Finance portion of course covers short-term financial management, investment decisions, and cost of capital determination. Economics portion of course covers consumer choice analysis, theory of the firm, production theory, and market structures. 4 lectures. Prerequisite: BUS 501.

# BS BUSINESS ADMINISTRATION

## 2007-09 Cal Poly Catalog

[Orfalea College of Business](#)

**Business Bldg. (03), Room 455**

**805 756-2704**

- 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

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
Select one of the following: .....	4
IT 326, 330, 341 371	
International business. <i>Select one:</i> .....	4
BUS 302, 303, 402, 407, 410, 427, 433, 446;	
ECON 330.	
Senior Project. <i>Select:</i>	
BUS 461 and BUS 462, or BUS 463 or BUS 464	4
Concentration courses ( <i>see following</i> ) .....	24-28
	<b>72-76</b>

### 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
STAT 251 Statistical Inference-Mgmt. I (B1)* .....	4
STAT 252 Statistical Inference-Mgmt. II .....	5
	<b>25</b>

### GENERAL EDUCATION (GE)

72 units required; 12 units are in Support.  
 →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 (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 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
	<b>60</b>

<b>ELECTIVES</b> .....	<b>19-23</b>
	<b>180</b>

### CONCENTRATIONS (select one of the seven)

#### ACCOUNTING CONCENTRATION

BUS 319 Accounting Information Systems.....	4
BUS 320 Taxation of Business Entities .....	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
Four units of electives from any 400 level	
Accounting elective.....	4
	28

#### ENTREPRENEURSHIP and SMALL BUSINESS CONCENTRATION

BUS 310 Introduction to Entrepreneurship .....	4
<del>BUS 436 Entrepreneurial Finance .....</del>	<del>4</del>
<del>BUS 451 Product Development and Launch .....</del>	<del>4</del>
BUS 488 Planning and Managing New Ventures.....	4
Select two courses from: .....	8
BUS 311, 418, 436, 451, 470	
IT 326, 428, 470	
(4-23-08)	
Electives selected from: .....	12
BUS 308, 311, 384, 402, 405, 418, 419, 430, 436,	
451, 470, 475, 477, 478, 494,	
IT 326, 402, 407, 428, 470	
(4-23-08)	
	28

#### FINANCIAL MANAGEMENT CONCENTRATION

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 .....	4
Advisor approved electives.....	12
	28

**INFORMATION SYSTEMS CONCENTRATION**

BUS 290 <i>or</i> CSC/CPE 101 <i>or</i> CSC/CPE 237 .....	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
Advisor approved electives .....	8
Select two courses from the following:	
BUS 491, 493, 494, 496, 498, 499	
	<hr/>
	28

**INTERNATIONAL BUSINESS CONCENTRATION**

BUS 302 International and Cross Cultural Mgmt. ....	4
BUS 402 International Business Management .....	4
BUS 403 Adv. Seminar in International Mgmt. ....	4
Electives selected from the following courses:.....	16
BUS 303, 311, 405, 406, 407, 410, 433, 446;	
ECON 303, 304, 325, 401	
	<hr/>
	28

**MANAGEMENT CONCENTRATION**

BUS 382 Organizations, People and Technology .....	4
BUS 384 Human Resources Management.....	4
BUS 407 Managing People in Global Environment....	4
BUS 475 Staffing.....	4
BUS 477 Organization Development Programs.....	4
Advisor approved electives .....	8
Select one course from the following:	
BUS 386, 471, 472, 473, 478, 483, 488, 489	
	<hr/>
	28

**MARKETING MANAGEMENT CONCENTRATION**

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
	<hr/>
	24

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [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. [New course, effective Fall 2008.](#)

#### **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. 3 lectures, 1 laboratory. Prerequisite: Passing score on the ELM examination for MATH 116 eligibility, or an ELM exemption, or MATH 104.

#### **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 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.

#### **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. 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 MATH 104.

#### **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. 3 lectures, 1 laboratory. Prerequisite: CHEM 124 or consent of course coordinator.

#### **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. 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.

#### **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. 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)**

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 or CHEM 128 or equivalent.

#### **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. [New course effective Winter 2009.](#)

#### **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 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.

**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 or CHEM 127 or equivalent.

**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 111 or 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: Completion of GE Area B, including a chemistry course (CHEM), a course in biology (BIO, MCRO or ZOO), and junior standing.

**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. Use of applicable literature and databases. 2 laboratories. Prerequisite: CHEM 231/331 and CHEM 352.

**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. 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. [Changed effective Fall 2008.](#)

**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)  
(Also listed as BIO 375)**

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. [Changed effective Fall 2008.](#)

**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)**  
(Also listed as SCM 401)

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.  
*Changed effective Summer 2008.*

**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) (Also listed as BIO 441)**  
(formerly BIO 447)

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.

**CHEM 443 Organic Chemistry Concepts for Materials Engineering (1) (CR/NC)**

Introduction to organic chemistry of polymers and basic methods of polymer analysis. Designed for students with little or no organic chemistry background. Not open to Chemistry or Biochemistry majors. Credit/No Credit grading only. 1 activity. Prerequisite: CHEM 125 or CHEM 129; corequisite: CHEM 444.

**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 217/317 or concurrent enrollment in CHEM 443.

**CHEM 445 Polymers and Coatings II (3)**

Introduction to polymerization methods and mechanisms. Chemistry of initiators, catalysts and inhibitors. 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.

**CHEM 446 Surface Chemistry of Materials (3)**  
(Also listed as MATE 446)

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 course in engineering thermodynamics.

**CHEM 447 Polymers and Coatings Laboratory I (2)**

Synthesis and characterization of polymers. Experimental techniques of step growth and chain growth polymerization. Experimental methods of molecular weight determination. Experimental methods of thermal, spectroscopic, and mechanical analysis. 2 laboratories. Prerequisite: CHEM 444. Recommended: CHEM 445 or concurrent.

**CHEM 448 Polymers and Coatings Laboratory II (2)**

Experimental techniques of producing and characterizing coatings. Compounding and formulating modern protective coatings. Modern methods of testing protective coatings. Surface preparation techniques. 2 laboratories. Prerequisite: CHEM 444, 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 217/317 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 topic 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 topic 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 473 Immunochemistry (3)**

Theory and practice of immunochemistry including the structure, genetics, chemical modification and production of antibodies, immunochemical techniques and the biochemistry of the immune defense process. Not open to students with credit in BIO 426. 3 lectures. Prerequisite: CHEM 371 or consent of instructor. Recommended: CHEM 373 or BIO 351.

**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) (Also listed as BIO 476)**

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. [Changed effective Fall 2008.](#)

**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 analytical 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. Total credit limited to 16 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. Total credit limited to 16 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. Not open to students with credit in CHEM 444. 3 lectures. Prerequisite: CHEM 351.

**CHEM 545 Polymer Synthesis and Mechanisms (3)**

Polymerization methods and mechanisms; chemistry of initiators, catalysts and inhibitors; use of representative types; synthesis, film formation, structure and properties of polymers commonly used in coatings and adhesives. Polymer nomenclature. Not open to students with credit in CHEM 445. 3 lectures. Prerequisite: CHEM 317 or equivalent.

**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. Fabrication and testing of conducting polymeric materials. 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. Not open to students with credit in CHEM 448. 2 laboratories. Prerequisite: CHEM 317; 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. 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. 2 laboratories. Corequisite: CHEM 550.

**CHEM 570 Directed Graduate Study (3)**

Directed graduate study in specialized advanced topics related to graduate internship. Topics developed jointly by faculty research advisor and industrial research supervisor. Available only to students while on graduate industrial internship. Topics chosen to highlight the industrial experience. Student expected to work independently and report weekly to faculty advisor and industrial supervisor. Total credit limited to 9 units. Corequisite: CHEM 598.

**CHEM 598 Graduate Internship (3)**

Supervised industrial graduate internship in polymers and coatings science. Provides students with industrial research experience. Requires approval of graduate advisor. Students engage in industrial research and development at an approved industry, make regular reports back to graduate advisor, and present formal report and seminar on work each quarter. Total credit limited to 9 units. Prerequisite: CHEM 545, CHEM 547, CHEM 548, CHEM 550, CHEM 551.

**BS CITY AND REGIONAL PLANNING**

**2007-09 Cal Poly Catalog**

[City and Regional Planning](#)

**Dexter Bldg. (34), Room 251  
(805) 756-1315**

- 60 units upper division       GWR
- 2.0 GPA                               USCP

\* = Satisfies General Education requirement

**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 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
CRP 436 Collaborative Planning .....	4
CRP 461, CRP 462 Senior Project I, II <i>or</i> CRP 463 Senior Project Professional Practice.....	4
Advisor approved electives .....	12
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**SUPPORT COURSES**

EDES 101 Intro to Arch and Env Design .....	2
FNR 306/FNR 319/BIO 112 .....	4
GEOL 102 (B3)*/GEOL 205 (B3*)/CHEM 110 (B3&B4)* .....	4
LA 213 <i>or</i> LA 220 <i>or</i> CRP 211 (4-23-08) .....	4
MATH 118 Pre-Calculus Algebra (B1)* .....	4
POLS 375/471/516.....	4
STAT 221 Intro to Probability & Statistics (B1)* .....	5
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**GENERAL EDUCATION (GE)**

- 72 units required; 12 units are in Support.
- 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 (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 (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>60</b>
<b>ELECTIVES</b> .....	<b>0</b>
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	<b>180</b>

## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [Construction Management Department](#)

### CM—CONSTRUCTION MANAGEMENT

#### 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. 3 laboratories. Prerequisite: CM 211.

#### CM 221 Concrete Technology (3)

Modern concepts which form the basis for solutions to problems of concrete construction. Includes significant developments in concrete chemistry and strength theory. Concrete mix design, physical properties of concrete, use of admixtures, concrete batching, curing and testing. Includes physical testing of designed mixes. 2 lectures, 1 laboratory. Prerequisite: ARCH 105 and ARCH 106.

#### CM 315 Fiscal and Project Feasibility (4) (Also listed as CRP 315)

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.

#### 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.

#### 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 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)

*Corrected effective Summer 2007; see [Updates](#)*

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 4 units, ~~with a maximum of 2 units per quarter.~~ Prerequisite: Consent of instructor. *Changed effective Spring 2009.*

#### CM 430 Collaborative Process (3) (Also listed as EDES 430)

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.

#### CM 431 Integrated Project Services (3) (Also listed as EDES 431)

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.

#### 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 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 332, CM 431.

**CM 443 Management of the Construction Firm (3)**

Applications of strategic management techniques and business strategy for the long-range direction of the construction firm. 3 activities. Prerequisite: CM 341, CM 342, CM 343, CM 352, CM 353 and CM 364.

**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 452 and CM 454.

**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 topic 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 topic 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 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. Total credit limited to 16 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. Total credit limited to 16 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: CM 331 or consent of instructor.

**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: CM 333, 4th year architectural practice or consent of instructor.

**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: CM 454 or consent of instructor.

**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: CM 542 or consent of instructor.

**CM 570 Selected Advanced Topics in Construction Management (4)**

Directed study of selected topics in Construction Management. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

**BS COMPUTER SCIENCE**

**2007-09 Cal Poly Catalog**

**Computer Science Department**

**Computer Science Bldg. (14), Room 254  
(805) 756-2824**

- 60 units upper division       GWR
- 2.0 GPA                               USCP

\* = Satisfies General Education requirement

**MAJOR COURSES**

CSC 101 Fundamentals of Computer Science I.....	4
CSC 102 Fundamentals of Computer Science II or CSC 108 Accelerated Intro to Computer Science (9-25-07) .....	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 Design and Assembly Language Programming, and Lab (3,1) or CSC 225 Intro to Computer Organization (4) .....	4
CSC 300 Professional Responsibilities .....	4
CSC 307 Intro to Software Engineering (4) or †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
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
Advisor approved technical electives.....	24/20

**89**

**SUPPORT COURSES**

BIO 213 and ENGR/BRAE 213 (B2)* .....	2,2
ENGL 149 Technical Writing for Engineers (A3)* .....	4
MATH 141, 142 Calculus I, II (B1)* .....	4,4
STAT 321 Prob/Stats for Engrs/Scientist (B6)* .....	4
Approved support electives .....	8
(See <a href="http://www.eadvise.calpoly.edu">www.eadvise.calpoly.edu</a> for approved electives)	
Mathematics/statistics electives. Select from .....	8
CSC 142; MATH 143, 206, 241, 244, 248, 306, 335, 336, 437, 470; STAT 322.	
Science elective (Add'l Area B)* Select from .....	4
BIO 111, 115, 151; BOT 121; CHEM 124; MCRO 221, 224; PHYS 141 (no double counting of units).....	
Physical science electives (B3/4)* (Add'l Area B)* .....	12
CHEM 124, 125, 129 or PHYS 141, 132, 133	

**52**

**GENERAL EDUCATION (GE)**

72 units required; 32 units are in Support.  
→See page 56 for complete GE course listing.  
→Minimum of 8 units required at the 300-400 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

**40**

**ELECTIVES.....**

**0**

**181**

†CSC 309 counts as technical elective.

Subject to CSC Department guidelines; contact the College of Engineering Advising Center ([www.eadvise.calpoly.edu](http://www.eadvise.calpoly.edu)) for additional information and agreement form. Technical electives must be approved in advance.



## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [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)** (Also listed as CSC 101)

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).

#### **CPE 102 Fundamentals of Computer Science II (4)** (Also listed as CSC 102)

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.

#### **CPE 103 Fundamentals of Computer Science III (4)** (Also listed as CSC 103)

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.

#### **CPE 108 Accelerated Introduction to Computer Science (4)** (Also listed as CSC 108)

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.

#### **CPE 129 Digital Design (3) (Also listed as EE 129)**

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). 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 169.

#### **CPE 169 Digital Design Laboratory (1) (Also listed as EE 169)**

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. 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 129.

#### **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 229 Computer Design and Assembly Language Programming (3) (Also listed as EE 229)**

Design and implementation of digital computer circuits via CAD tools for programmable logic devices (PLDs). Basic computer design with its data path components and control unit. Introduction to assembly language programming of an off-the-shelf RISC-based microcontroller. 3 lectures. Prerequisite: CPE 129&169 with a C- grade or better. Concurrent: CPE 269.

#### **CPE 235 Fundamentals of Computer Science for Scientists and Engineers I (4) (Also listed as CSC 235)**

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.

#### **CPE 236 Fundamentals of Computer Science for Scientists and Engineers II (4) (Also listed as CSC 236)**

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.

#### **CPE 237 Introduction to Computer Science with Applications I (4)** (Also listed as CSC 237)

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.

#### **CPE 238 Introduction to Computer Science with Applications II (4)** (Also listed as CSC 238)

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.

#### **CPE 269 Computer Design and Assembly Language Programming Laboratory (1) (Also listed as EE 269)**

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. 1

laboratory. Prerequisite: CPE 129&169 with a C-grade or better.  
Concurrent: CPE 229.

**CPE 270 Computer Graphics Applications (4)**  
(Also listed as CSC 270)

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.

**CPE 300 Professional Responsibilities (4) (Also listed as CSC 300)**

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 307 or CSC/CPE 309.

**CPE 305 Individual Software Design and Development (4)**  
(Also listed as CSC 305)

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 353 or CSC/CPE 357.

**CPE 307 Introduction to Software Engineering (4)**  
(Also listed as CSC 307)

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.

**CPE 308 Software Engineering I (4) (Also listed as CSC 308)**

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 103 with a grade of C- or better, and CSC/CPE 357 or CSC/CPE 353.

**CPE 309 Software Engineering II (4) (Also listed as CSC 309)**

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.

**CPE 315 Computer Architecture (4) (Also listed as CSC 315)**

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.

**CPE 316 Micro Controllers and Embedded Applications (4) (Also listed as CSC 316)**

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.

**CPE 329 Programmable Logic and Microprocessor-Based Systems Design (4) (Also listed as EE 329)**

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. Prerequisite: EE 307&347 with a C- grade or better, CPE 229&269 with a C- grade or better.

**CPE 336 Microprocessor System Design (4) (Also listed as EE 336)**

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, and assembly language programming techniques. Architecture and design of sampled data and digital control systems. Case studies of representative applications. 3 lectures, 1 laboratory. Prerequisite: CPE 129&169 with a C- grade or better.

**CPE 350 CPE Capstone Preparation (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 353 Systems Programming for Software Engineers (4)**  
(Also listed as CSC 353)

Assembly language and C programming; I/O and systems level programming; interrupt handlers. Technical elective credit not allowed for CSC/CPE majors. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103 with a grade of C- or better.

**CPE 357 Systems Programming (4) (Also listed as CSC 357)**

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 CSC/CPE 229.

**CPE 365 Introduction to Database Systems (4)**  
(Also listed as CSC 365)

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.

**CPE 366 Database Modeling, Design and Implementation (4) (Also listed as CSC 366)**

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.

**CPE 369 Distributed Computing I (4) (Also listed as CSC 369)**

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 or CSC/CPE 353.

**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)**  
(Also listed as CSC 402)

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.

**CPE 405 Software Construction (4) (Also listed as CSC 405)**

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.

**CPE 406 Software Deployment (4) (Also listed as CSC 406)**

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.

**CPE 409 Current Topics in Software Engineering (4)  
(Also listed as CSC 409)**

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.

**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)(Also listed as CSC 416)**

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.

**CPE 427 Digital Computer Subsystems (4) (Also listed as EE 427)**

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.

**CPE 430 Programming Languages I (4) (Also listed as CSC 430)**

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 either CSC/CPE 357 or CSC/CPE 353.

**CPE 431 Programming Languages II (4) (Also listed as CSC 431)**

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.

**CPE 432 Digital Control Systems (3) (Also listed as EE 432)**

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.

**CPE 435 Introduction to Object Oriented Design Using Graphical User Interfaces (4) (Also listed as CSC 435)**

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.

**CPE 437 Dynamic Web Development (4) (Also listed as CSC 437)**

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. [New course effective Spring 2009.](#)

**CPE 438 Digital Computer Systems (3) (Also listed as EE 438)**

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.

**CPE 439 Computer Peripheral Interfacing (4) (Also listed as EE 439)**

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.

**CPE 448 Bioinformatics Algorithms (4) (Also listed as CSC 448)**

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.

**CPE 449 Current Topics in Algorithms (4) (Also listed as CSC 449)**

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.

**CPE 450 CPE Capstone Project (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)  
(Also listed as CSC 453)**

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 305 or both CSC/CPE 315 and CSC/CPE 357 .

**CPE 454 Implementation of Operating Systems (4)  
(Also listed as CSC 454)**

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.

**CPE 456 Introduction to Computer Security (4)  
(Also listed as CSC 456)**

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 300 or CPE 350.

**CPE 458 Current Topics in Computer Systems (4)  
(Also listed as CSC 458)**

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.

**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)**  
(Also listed as CSC 464)

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 either CSC/CPE 357 or CSC/CPE 305.

**CPE 465 Advanced Computer Networks (4) (Also listed as CSC 465)**

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.

**CPE 466 Knowledge Discovery from Data (4)**  
(Also listed as CSC 466)

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. [New course effective Spring 2009.](#)

**CPE 468 Database Management Systems Implementation (4)**  
(Also listed as CSC 468)

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.

**CPE 469 Distributed Computing II (4) (Also listed as CSC 469)**

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.

**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 topic selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**CPE 471 Introduction to Computer Graphics (4)**  
(Also listed as CSC 471)

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 353 or CSC/CPE 357.

**CPE 472 Digital Control Systems Laboratory (1)**  
(Also listed as EE 472)

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.

**CPE 473 Advanced Rendering Techniques (4)**  
(Also listed as CSC 473)

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.

**CPE 474 Computer Animation (4) (Also listed as CSC 474)**

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.

**CPE 476 Real-Time 3D Computer Graphics Software (4)**  
(Also listed as CSC 476)

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.

**CPE 478 Current Topics in Computer Graphics (4)**  
(Also listed as CSC 478)

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.

**CPE 480 Artificial Intelligence (4) (Also listed as CSC 480)**

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.

**CPE 481 Knowledge Based Systems (4) (Also listed as CSC 481)**

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.

**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)**  
(Also listed as CSC 483)

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.

**CPE 484 User-Centered Interface Design and Development (4)**  
(Also listed as CSC 484)

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.

**CPE 489 Current Topics in Artificial Intelligence (4)**  
(Also listed as CSC 489)

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.

**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. 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. 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. Total credit limited to 24 units. Prerequisite: Sophomore standing and consent of instructor.

**CPE 520 Computer Architecture (4) (Also listed as CSC 520)**

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.

**CPE 522 Advanced Real-Time Embedded Systems Design (4)**  
(Also listed as EE 522)

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 329 with a C- grade or better or equivalent, or consent of instructor. [New crosslisted course, effective Spring 2009.](#)

**CPE 556 Computer Security (4) (Also listed as CSC 556)**

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. [New course effective Spring 2009.](#)

**CPE 564 Computer Networks: Research Topics (4)**  
(Also listed as CSC 564)

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.

**CPE 569 Distributed Computing (4) (Also listed as CSC 569)**

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 or CSC/CPE 353 and graduate standing, or consent of instructor.

**CPE 580 Artificial Intelligence (4) (Also listed as CSC 580)**

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.

**CPE 581 Computer Support for Knowledge Management (4)**  
(Also listed as CSC 581)

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.

## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [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. 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. [Changed effective Winter 2009.](#)

#### 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. [Changed effective Fall 2008.](#)

#### 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. Prerequisite: CRP 212.

#### CRP 215 Planning for and with Multiple Publics (4) (Also listed as ES 215)

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.

#### 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 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) (Also listed as CM 315)

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.

#### 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: Completion of Area A and two courses from D1, D2, D3, D4. City and Regional Planning majors will not receive GE Area D5 credit.

#### 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.

#### 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 375 Technology and the Environment: A Seminar on Contemporary Issues (4) (Also listed as HNRS 375)

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.

**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 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.

➔ **CRP 404 Environmental Law (3) (Also listed as FNR 404)**

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. [Changed effective Fall 2008.](#)

➔ **CRP 408 Water Resource Law and Policy (3) (Also listed as FNR 408)** ➔

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: FNR 302 or instructor approval, senior standing or graduate standing. [Changed effective Fall 2008.](#) ➔

**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) (5)** ➔

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. [Changed effective Fall 2008.](#)

**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 and third-year standing, 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: senior standing, or consent of instructor.

**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 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. [Changed effective Fall 2008.](#)

**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. [Changed effective Spring 2009.](#)

**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. [Changed effective Winter 2009.](#)

**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.

**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. [Changed effective Winter 2009.](#)

**CRP 447 Design Regulations (4) (Also listed as ARCH 447)**

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: Fourth year standing, or consent of instructor.

**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. [New course effective Winter 2009.](#)

**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 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 (FNR 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** corequisite: CRP 410. *Changed effective Fall 2008.*

**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 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 topic 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 topic 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.

**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: Junior 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 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. [\*Changed effective Spring 2009.\*](#)

**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 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.

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### 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) (Also listed as CPE 101)

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).

### CSC 102 Fundamentals of Computer Science II (4) (Also listed as CPE 102)

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.

### CSC 103 Fundamentals of Computer Science III (4) (Also listed as CPE 103)

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.

### CSC 108 Accelerated Introduction to Computer Science (4) (Also listed as CPE 108)

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.

### 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 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.

### 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 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 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: CPE 129&169; CSC/CPE 102.

### 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 or MATH 132; PHYS 121 or PHYS 131.

### 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 or MATH 132.

### CSC 235 Fundamentals of Computer Science for Scientists and Engineers I (4) (Also listed as CPE 235)

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.


**CSC 236 Fundamentals of Computer Science for Scientists and Engineers II (4) (Also listed as CPE 236)**

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.

**CSC 237 Introduction to Computer Science with Applications I (4) (Also listed as CPE 237)**

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.

**CSC 238 Introduction to Computer Science with Applications II (4) (Also listed as CPE 238)**

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. 

**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 selected language. 3 lectures, 1 laboratory. Prerequisite: Knowledge of a programming language.

**CSC 270 Computer Graphics Applications (4) (Also listed as CPE 270)**

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.


**CSC 300 Professional Responsibilities (4) (Also listed as CPE 300)**

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 307 or CSC/CPE 309.

**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: Completion of GE Area B, and junior standing.

**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) (Also listed as CPE 305)**

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 353 or CSC/CPE 357.

**CSC 307 Introduction to Software Engineering (4) (Also listed as CPE 307)**

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.

**CSC 308 Software Engineering I (4) (Also listed as CPE 308)**

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 103 with a grade of C- or better, and CSC/CPE 357 or CSC/CPE 353.

**CSC 309 Software Engineering II (4) (Also listed as CPE 309)**

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.

**CSC 310 Computers for Poets (4) GE Area F  
(Also listed as HNRS 311) [Change effective Winter 2008](#)**

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.

**CSC 315 Computer Architecture (4) (Also listed as CPE 315)**

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.

**CSC 316 Micro Controllers and Embedded Applications (4) (Also listed as CPE 316)**

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.

**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. [Change effective Spring 2009.](#)

**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, cryptology, dynamic and linear programming, and exhaustive search. 4 lectures. Prerequisite: CSC/CPE 103, with a grade of C- or better, and MATH 142 and either STAT 312 or STAT 321.

**CSC 353 Systems Programming for Software Engineers (4)  
(Also listed as CPE 353)**

Assembly language and C programming; I/O and systems level programming; interrupt handlers. Technical elective credit not allowed for CSC/CPE majors. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103 with a grade of C- or better.

**CSC 357 Systems Programming (4) (Also listed as CPE 357)**

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 CSC/CPE 229.

**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)  
(Also listed as CPE 365)**

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.

**CSC 366 Database Modeling, Design and Implementation (4)  
(Also listed as CPE 366)**

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.

**CSC 369 Distributed Computing I (4) (Also listed as CPE 369)**

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 or CSC/CPE 353. ➔

**CSC 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.

**CSC 402 Software Requirements Engineering (4)  
(Also listed as CPE 402)**

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.

**CSC 405 Software Construction (4) (Also listed as CPE 405)**

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.

**CSC 406 Software Deployment (4) (Also listed as CPE 406)**

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.

**CSC 409 Current Topics in Software Engineering (4)  
(Also listed as CPE 409)**

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.

**CSC 416 Autonomous Mobile Robotics (4) (Also listed as CPE 416)**

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.

**CSC 430 Programming Languages I (4) (Also listed as CPE 430)**

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 either CSC/CPE 357 or CSC/CPE 353.

**CSC 431 Programming Languages II (4) (Also listed as CPE 431)**

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.

**CSC 435 Introduction to Object Oriented Design Using Graphical User Interfaces (4) (Also listed as CPE 435)**

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.

**CSC 437 Dynamic Web Development (4) (Also listed as CPE 437)**

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. [New course effective Spring 2009.](#)

**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 448 Bioinformatics Algorithms (4) (Also listed as CPE 448)**

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.

**CSC 449 Current Topics in Algorithms (4) (Also listed as CPE 449)**

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.

**CSC 453 Introduction to Operating Systems (4)  
(Also listed as CPE 453)**

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 305 or both CSC/CPE 315 and CSC/CPE 357.

**CSC 454 Implementation of Operating Systems (4)  
(Also listed as CPE 454)**

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.

**CSC 456 Introduction to Computer Security (4)  
(Also listed as CPE 456)**

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 300 or CPE 350.

**CSC 458 Current Topics in Computer Systems (4)  
(Also listed as CPE 458)**

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.

**CSC 464 Introduction to Computer Networks (4)  
(Also listed as CPE 464)**

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 either CSC/CPE 357 or CSC/CPE 305.

**CSC 465 Advanced Computer Networks (4) (Also listed as CPE 465)**

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.

**CSC 466 Knowledge Discovery from Data (4)  
(Also listed as CPE 466)**

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. [New course effective Spring 2009.](#)

**CSC 468 Database Management Systems Implementation (4)  
(Also listed as CPE 468)**

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.

**CSC 469 Distributed Computing II (4) (Also listed as CPE 469)**

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.

**CSC 471 Introduction to Computer Graphics (4)  
(Also listed as CPE 471)**

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 353 or CSC/CPE 357.

**CSC 473 Advanced Rendering Techniques (4)  
(Also listed as CPE 473)**

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.

**CSC 474 Computer Animation (4) (Also listed as CPE 474)**

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.

**CSC 476 Real-Time 3D Computer Graphics Software (4)  
(Also listed as CPE 476)**

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.

**CSC 478 Current Topics in Computer Graphics (4)  
(Also listed as CPE 478)**

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.

**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) (Also listed as CPE 480)**

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.

**CSC 481 Knowledge Based Systems (4) (Also listed as CPE 481)**

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.

**CSC 483 Current Topics in Human-Computer Interaction (4)  
(Also listed as CPE 483)**

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.

**CSC 484 User-Centered Interface Design and Development (4)  
(Also listed as CPE 484)**

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.

**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)**  
(Also listed as CPE 489)

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.

**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 topic 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. 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. 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. 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) (Also listed as CPE 520)**

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.

**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)**

General 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 subroutines. Intercommunication between input/output and processors. 4 seminars. Prerequisite: CSC/CPE 453 and graduate standing, or consent of instructor.

**CSC 556 Computer Security (4) (Also listed as CPE 556)**

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. [New course effective Spring 2009.](#)

**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 and graduate standing, or consent of instructor.

**CSC 564 Computer Networks: Research Topics (4)**  
(Also listed as CPE 564)

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.

**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) (Also listed as CPE 569)**

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 or CSC/CPE 353 and graduate standing, or consent of instructor.

**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, CSC 530, CSC 540, CSC 550, CSC 560 and CSC 580, and other topics as needed. The Schedule of Classes will list topic selected. Topic 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) (Also listed as CPE 580)**

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.

**CSC 581 Computer Support for Knowledge Management (4)  
(Also listed as CPE 581)**

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.

**CSC 590 Seminar in Computer Science (3)**

Current problems and research in the field of computer science through discussions and selected readings. Group study of selected advanced topics. 3 seminars. 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 599 Thesis/Project (2–3) (2–3)**

Individual research or activity under faculty supervision leading to an acceptable thesis or project. Prerequisite: Graduate standing and consent of instructor.

**BS EARTH SCIENCES**  
**2007-09 Cal Poly Catalog**  
[Earth and Soil Sciences Department](#)  
**Science Bldg. (52), Room C-43**  
**(805) 756-2261 FAX (805) 756-5412**

- 60 units upper division       GWR  
 2.0 GPA                               USCP

\* = Satisfies General Education requirement

**MAJOR COURSES**

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
ERSC 144 Introduction to Earth Systems .....	4
ERSC/GEOG 250 Physical Geography .....	4
ERSC/GEOG 333 Human Impact on the Earth .....	4
ERSC/GEOG 414 Global & Regional Climatology .....	4
ERSC/SS 110 Orientation in Earth & Soil Sciences .....	1
ERSC 223 Rocks and Minerals.....	4
ERSC 323 Geomorphology.....	4
ERSC 461, 462 Senior Project I, II.....	1,3
FNR/LA 318 Applications in GIS or GEOG 318 Applic in GIS (10-30-07).....	3-4
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)* Concentration (see below; 4 units B1)* .....	4 41-42
<b>123-124</b>	

**GENERAL EDUCATION (GE)**

72 units required; 16 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 (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>	<b>4</b>
(BRAE 340 recommended for Geosciences Teaching Concentration)	

**56**

**ELECTIVES .....** **0-1**

**180**

**CONCENTRATIONS (select one):**

**Environmental Interpretation and Assessment Concentration**

CRP 420 Land Use Law .....	4
ERSC 202 Soil Erosion and Water Conservation .....	4
ERSC/GEOG 325 Climate and Humanity .....	4
ERSC 463 Undergraduate Seminar.....	2
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
Restricted electives .....	12
<b>42</b>	

**Geosciences Teaching Concentration**

ASTR 102 Introduction to the Stars and Galaxies .....	4
BIO 113 Animal Diversity and Ecology.....	4
EDUC 300 Intro to the Teaching Profession .....	3
GEOG 301 Geography of Resource Utilization .....	4
GEOG 325 Climate and Humanity .....	4
GEOL 203 Fossils and the History of Life .....	4
GEOL 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 or EDUC 480 Computer Based Curriculum .....	4/3
<b>41-42</b>	

**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
Restricted electives .....	12
<b>42</b>	

**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
Restricted electives (min 18 units 300-400 level)...	28
<b>42</b>	



# MS Economics

## 2007-09 Cal Poly Catalog

**Chris Carr, Associate Dean**  
**Graduate Programs and Faculty Development**  
**Business Bldg. (03), Room 409**  
**805 756-2637**  
***mba@calpoly.edu***

### General Characteristics

The master of science degree program in economics is a full-time, four-quarter program designed to provide advanced preparation in economics for individuals desiring careers as economists in the academic, governmental, business, and financial communities. The program provides the technical skills required to engage in quantitative economic analyses that involve forecasting, market assessment, economic feasibility studies, commodity pricing and data analysis.

### Prerequisites

For admission to the program with a classified or conditionally classified status, a student should hold a bachelor's degree from an accredited institution with a minimum grade point average of 2.5 in the last 90 quarter units (60 semester units) attempted and have completed coursework in intermediate microeconomics, intermediate macroeconomics, econometrics, calculus, and statistics. Applicants are required to submit scores for the General Test of the Graduate Record Examination. An applicant who meets these standards but lacks the prerequisite coursework may be admitted as a conditionally classified student and must make up any deficiencies before advancement to classified graduate standing.

### Program of Study

Graduate students must file formal study plans with their advisor, department, college, and university graduate studies office no later than the end of the quarter in which the 12th unit of approved coursework is completed. The formal program of study must include a minimum of 45 units (at least 29 of which must be at the 500 level).

Advancement to master's degree candidacy requires completion of a minimum of 24 units of required courses, specified in a formal program of study, with a minimum grade point average of 3.0. Students must maintain a minimum GPA of 3.0 in all coursework completed subsequent to admission to the program.

### Culminating Experience

Students who choose the coursework option instead of the thesis option are required to pass a written comprehensive exam in economics.

## Curriculum in MS Economics

ECON 510 Quantitative Methods .....	4
ECON 511 Microeconomic Analysis .....	4
ECON 512 Macroeconomic Analysis .....	4
ECON 520 Advanced Econometrics I .....	4
ECON 522 Advanced Econometrics II .....	4
Advisor Approved Electives (400-500 level).....	17
To be selected with advisor's approval from economics or other courses in masters programs, such as: Master of Business (GSB), Agribusiness (AGB), Master of City and Regional Planning (CRP), Engineering, Mathematics, Master of Public Policy. Maximum 12 units from courses other than ECON.	
ECON 599 Thesis (4, 4) <i>or</i>	
Comprehensive exam <i>and</i> 8 units additional coursework .....	<u>8</u>
	45
(Minimum 29 units at 500 level)	

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [College 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.

##### EDUC 207 The Learner's Development, Culture and Identity in Educational Settings (4) (Also listed as CD 207)

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. Prerequisite: PSY 201 or PSY 202.

##### EDUC 300 Introduction to the Teaching Profession (3) (CR/NC)

Supervised observation and participation in cooperating public schools. A minimum of forty-five hours of observation and participation. Discussion focuses on instructional practice and subject matter taught in grades observed, as well as the historical, philosophical, and social foundation of American public education. Total credit limited to 6 units. Credit/No Credit grading only. 2 lectures, 1 activity. Prerequisite: Junior standing or consent of instructor.

##### 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. 2 seminars, 2 activities. Prerequisite: Completion of GE Area A.

##### 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 412 Schooling 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: Admission to the Single Subject Program. Concurrent: EDUC X410 and EDUC 414. *Changed effective Fall 2008.*



##### 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: Admission to the Single Subject Credential Program or consent of instructor. Concurrent: EDUC X410 and EDUC 412. *Changed effective Fall 2008.*



##### 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). *Changed effective Fall 2008.*

##### 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. *Changed effective Fall 2008.*

##### EDUC 420 Professional Development and Collaboration (4) (CR/NC)

Further development in the areas of assessment and teaching special needs students. Knowledge and skills needed for successful collaboration with other education professionals. Credit/No Credit grading only. 2 lectures, 2 activities. Prerequisite: EDUC 412, EDUC 414, EDUC 416 and content methods course. Concurrent: EDUC 418 and EDUC 469 (except 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 428 Teaching K-3 Reading, Language Arts, and Children's Literature with a Multicultural Perspective (4)

Knowledge and skills for planning, teaching, and evaluating in a balanced, comprehensive, research-based primary (K-3) language arts program, with fieldwork, to ensure children of all abilities and backgrounds success as citizens who read, write, speak, listen and think effectively. 2 seminars, 2 activities. Prerequisite: Must be admitted into the Multiple Subject Credential Program (STEP I or STEP A).

**EDUC 429 Teaching 4-8 Grade Reading, Language Arts, and Children's Literature with a Multicultural Perspective (4)**

Knowledge and skills for planning, teaching, and evaluating in a balanced, comprehensive, research-based 4-8 grade language arts program, with fieldwork, to ensure children of all abilities and backgrounds success as citizens who read, write, speak, listen and think effectively. 2 seminars, 2 activities. Prerequisite: Must meet all requirements for acceptance into the Multiple Subject Credential Program and EDUC 428.

**EDUC 430 Teaching Reading and Language Arts with a Multicultural Perspective (6)**

Development of knowledge and skills for planning, implementing, and evaluating the teaching of a balanced, comprehensive, research-based reading and language arts program in grades K-8 with attention to children of all abilities and backgrounds. State and national trends. Language development. 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 327 and MATH 326.

**EDUC 433 Bilingual Foundations (2)**

Limited to students seeking BCLAD Certification. Theories, methods, and techniques in bilingual education. 2 seminars. Prerequisite: Spanish proficiency, junior status and/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 431, and admission to STEP II or STEP B 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. 4 seminars. Prerequisite: EDUC 310 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) (Also listed as PSY 444)**

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 or CD 209, and EDUC 440 or consent of instructor.

**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 (2)**

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. 2 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 454, 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 466, EDUC 467, EDUC 468.

**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 topic 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. [New course effective Spring 2009.](#)

**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 (3)**

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. 2 seminars, 1 activity. Prerequisite: Computer literacy, CSC 488 or CSC 416, or equivalent.

**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) (formerly EDUC 452)**

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) (formerly EDUC 450)**

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 on 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 573 Field Experience, Counseling (I–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 6-12 units may be applied toward MA Education. Prerequisite: EDUC 555, EDUC 560 and Advancement to Candidacy. *Corrected/effective Summer*

07.

**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 UCTE 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 UCTE master's inquiry course sequence. Completion of an inquiry project required. 2 seminars, 2 activities. Prerequisite: EDUC 589.

**EDUC 599 Thesis or Project (3) (3)**

Completion of a thesis or project pertinent to the field of education. Student must register for each quarter of advisement. Prerequisite: Consent of graduate committee and supervising faculty member(s).

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [Electrical Engineering Department](#)

### EE–ELECTRICAL ENGINEERING

#### 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, op-amp circuits. 2 lectures. Prerequisite: MATH 142 or equivalent. Concurrent or prerequisite: PHYS 133. Suggested: EE 111/151.

#### EE 129 Digital Design (3) (Also listed as CPE 129)

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). 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: EE 169.

#### 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) (Also listed as CPE 169)

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. 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: EE 129.

#### 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. Energy storage elements, RC and RL circuits, and phasors. 3 lectures. Prerequisite: EE 112 with a C- grade or better, PHYS 133. Prerequisite or Concurrent: MATH 244. Concurrent: EE 241.

#### EE 212 Electric Circuit Analysis III (3)

AC power, 3-phase circuits. Mutual inductance, series and parallel resonance and two-port networks. 3 lectures. Prerequisite: MATH 244, EE 211 with a C- grade or better. 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 with a C- grade or better. Recommended: MATH 241.

#### EE 229 Computer Design and Assembly Language Programming (3) (Also listed as CPE 229)

Design and implementation of digital computer circuits via CAD tools for programmable logic devices (PLDs). Basic computer design with its data path components and control unit. Introduction to assembly language programming of an off-the-shelf RISC-based microcontroller. 3 lectures. Prerequisite: EE 129&169 with a C- grade or better. Concurrent: EE 269.

#### 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 with a C- grade or better, PHYS 133, EE 151 for EE students and CPE 169 for CPE students. Prerequisite or concurrent: MATH 244. Concurrent: EE 211.

#### 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 with a C- grade or better 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 with a C- grade or better, or EE 201&251. Concurrent: EE 295.

#### EE 269 Computer Design and Assembly Language Programming Laboratory (1) (Also listed as CPE 269)

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. 1 laboratory. Prerequisite: EE 129&169 with a C- grade or better. Concurrent: EE 229.

#### 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 with a C- grade or better 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 with a C- grade or better, 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 129&169 with a C- grade or better, EE 306&346 with a C- grade or better. Concurrent: EE 347, EE 229 (may be taken previously).



**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 with a C- grade or better, EE 307&347 with a C- grade or better. 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, with a C- grade or better.

**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. [Change effective Winter 2008.](#)

**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 with a C- grade or better. Concurrent: EE 368.

**EE 329 Programmable Logic and Microprocessor-Based Systems Design (4) (Also listed as CPE 329)**

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. Prerequisite: EE 307&347 with a C- grade or better, EE 229&269 with a C- grade or better.

**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 with a C- grade or better. Concurrent: EE 375.

**EE 336 Microprocessor System Design (4) (Also listed as CPE 336)**

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, and assembly language programming techniques. Architecture and design of sampled data and digital control systems. Case studies of representative applications. 3 lectures, 1 laboratory. Prerequisite: EE 129&169 with a C- grade or better.

**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 with a C- grade or better, 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 with a C- grade or better, 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 129&169 with a C- grade or better, EE 306&346 with a C- grade or better. Concurrent: EE 307, EE 229 (may be taken previously).

**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 with a C- grade or better, EE 307&347 with a C- grade or better. 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 216 for BRAE majors. Concurrent: EE 321. [Change effective Winter 2008.](#)

**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 with a C- grade or better. Concurrent: EE 328.

**EE 375 Electromagnetic Fields and Transmission Laboratory (1) (formerly EE 442)**

Transmission line characterization. Load determination and standing wave patterns using the slotted line technique. Application of the Smith Chart in transmission line characterization and impedance matching techniques. Time domain response to voltage pulses. 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 with a C- grade or better.

**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 with a C- grade or better 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 with a C- grade or better, EE 335 with a C- grade or better. 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 with a C- grade or better, 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 with a C- grade or better, EE 328&368 with a C- grade or better, EE 329 with a C- grade or better. 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 409&449 (or concurrent) and EE 255&295, 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.

#### EE 413 Advanced Electronic Design (4)

Advanced design of electronic circuits and subsystems. Design as a process. Implementation of specific design projects. 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 with a C- grade or better.

#### 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 with a C- grade or better, EE 328 with a C- grade or better.

#### 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 with a C- grade or better 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 with a C- grade or better. 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. [Corrected effective Fall 2008.](#)

#### 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 with a C- grade or better.

#### EE 422 Polymer Electronics Laboratory (1) (Also listed as PHYS 422)

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. [Changed \(crosslisted\) effective Fall 2008.](#)

#### 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) (Also listed as CPE 427)

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 with a C- grade or better.

#### 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 with a C- grade or better, EE 308&348 with a C- grade or better or consent of instructor.

#### EE 432 Digital Control Systems (3) (Also listed as CPE 432)

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, EE 368 recommended. Concurrent: EE 472.

#### 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) (Also listed as CPE 438)

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.

#### EE 439 Computer Peripheral Interfacing (4) (Also listed as CPE 439)

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 with a C- grade or better, or consent of instructor.

#### 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 with a C- grade or better, EE 335 with a C- grade or better. 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 with a C- grade or better, EE 328&368 with a C- grade or better, EE 329 with a C- grade or better. 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 with a C- grade or better, EE 314 with a C- grade or better.

**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 with a C- grade or better. 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 with a C- grade or better, EE 335 with a C- grade or better. 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 topic 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 topic selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Consent of instructor.

**EE 472 Digital Control Systems Laboratory (1)  
(Also listed as CPE 472)**

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.

**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 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. Total credit limited to 6 units. Prerequisite: Sophomore standing and consent of instructor.

**EE 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. Total credit limited to 18 units. Prerequisite: Sophomore standing and consent of instructor.

**EE 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. Total credit limited to 24 units. Prerequisite: Sophomore standing and consent of instructor.

**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 with a C- grade or better 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 with a C- grade or better 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 with a C- grade or better 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 with a C- grade or better 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 407 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. Arithmetic units, control units, memories and memory subsystems. Peripheral equipment. Cost and speed trade-offs in the design of such systems. 4 seminars. Prerequisite: EE 329 with a C- grade or better, or equivalent, and graduate standing or consent of instructor.

**EE 522 Advanced Real-Time Embedded Systems Design (4)**  
(Also listed as CPE 522)

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 329 with a C- grade or better or equivalent, or consent of instructor. [Changed effective Spring 2009.](#)

**EE 523 Digital Systems Design (4)**

Design of asynchronous sequential machines. Selected automata theory topics include state compatibility analysis, state partition analysis, threshold logic, fuzzy logic. Modern digital system design. Analysis of MOS-LSI multiphase logic structures. Comparison of digital subsystems. Microprocessor as a digital subsystem module. 3 seminars, 1 laboratory. Prerequisite: EE 329 with a C- grade or better and EE 307 with a C- grade or better, and graduate standing or consent of instructor.

**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 with a C- grade or better 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 with a C- grade or better 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, holo-graphy. 4 seminars. Prerequisite: EE 402 or equivalent, EE 314 with a C- grade or better 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 topic selected. Total credit limited to 8 units. 1-4 seminars. Prerequisite: Graduate standing or consent of instructor.

**EE 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.

**EE 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.

**EE 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.

**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.

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [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: Exposition for English as a Second Language Students (4) GE A1

Writing and stylistic analysis of expository papers. Study and application of techniques of exposition. Critical reading of models of effective writing. Additional emphasis on grammar and writing issues appropriate for English

as a Second Language students. 4 lectures. Prerequisite: ENGL 111, 112, or 113 or consent of instructor.

##### ENGL 134 Writing: Exposition (4) GE A1

Writing and stylistic analysis of expository papers. Study and application of techniques of exposition. Critical reading of models of effective writing. 4 lectures. Prerequisite: Satisfactory score on the English Placement Test.

##### ENGL 145 Reasoning, Argumentation, and Writing (4) GE A3 (Also listed as HNRS/COMS 145)

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 and A2.

##### ENGL 148 Reasoning, Argumentation and Professional Writing (4) GE A3 (Also listed as HNRS 148)

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.

##### ENGL 149 Technical Writing for Engineers(4) GE A3 (Also listed as HNRS 149)

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. [Corrected effective Winter 2009](#)

##### ENGL 203 Core I: Old English/Medieval (4)

Representative canonical and non-canonical readings in the literature of the period, including *Beowulf*, Dante, the Pearl Poet, Chaucer, Medieval theater, 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: Renaissance (4)

Representative canonical and non-canonical readings in the literature of the period, including Shakespeare, Spenser, Milton, Donne, Jonson, and others, as chosen by the instructor. 4 lectures. Prerequisite or concurrent: ENGL 203; for English majors only.

##### ENGL 205 Core III: 1660–1798 (4)

Representative canonical and non-canonical readings in the literature of the period, including Pope, Swift, Austen, representative American Colonial writers, one playwright, 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.

##### ENGL 231 Masterworks of British Literature from the Late 18<sup>th</sup> Century to the Present (4) (Also listed as HNRS 232) 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.  
[Changed effective Spring 2009.](#)

**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.

**ENGL 251 Great Books I: Introduction to Classical Literature (4) (Also listed as HNRS 251) 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.

**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.

**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.

**ENGL 260 Children's Literature (4) (Also listed as LS 260)**

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.  
[Changed effective Spring 2009.](#)

**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.

**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.

**ENGL 303 Core IV: 1798–1865 (4)**

Representative canonical and non-canonical readings in the literature of the period, including Wordsworth, Coleridge, Keats, Emerson, Hawthorne, and others, as chosen by the instructor. 4 lectures. Prerequisite or concurrent: ENGL 205; for English majors only.

**ENGL 304 Core V: 1865–1914 (4)**

Representative canonical and non-canonical readings in the literature of the period, including Dickinson, Whitman, Arnold, James, Hardy, and others, as chosen by the instructor. 4 lectures. 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, including Yeats, Joyce, Woolf, Eliot, Faulkner, 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.

**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.

**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.

**ENGL 330 British Literature in the Age of Belief: 1485–1660 (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 (art-work and music) illustrating key themes. 4 lectures. Prerequisite: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**ENGL 350 The Modern Novel (4) GE C4 GWR**

Readings in the modern novel in its historical and cultural context. 4 lectures. Prerequisite: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. Recommended: completion of Area C3. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. Recommended: Completion of Area C3. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. Recommended: Completion of Area C3. English majors will not receive GE C4 credit.

**ENGL 380 Literary Themes (4)****GE C4 GWR****(Also listed as HNRS 380)**

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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**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: Completion of GE Area A and one course from Area C. English majors will not receive GE C4 credit.

**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: Completion of GE Area A and one course from Area C. English majors will not receive GE C4 credit.

**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: Completion of GE Area A and one course from Area C. English majors will not receive GE C4 credit.

**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) (Also listed as HNRS 411)**

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.

**ENGL 412 New Media Arts II (4) (Also listed as HNRS 412)**

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.

**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)**

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 technology in the classroom. 5 lectures. Prerequisite: Completion of GE Area A, 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 topics 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 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

16 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. Total credit limited to 16 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 8 units of successful graduate work.

**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.

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [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) (Also listed as BRAE 213)

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. Co-requisite: BIO 213.

#### 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 Applications of CAD and Rapid Prototyping for Biomedical Engineering Design (4)

Technical communication principles. Project requirements, definition and development of design documents. Description of manufacturing processes. Reliability and quality of engineered products and systems. Prototyping and production of biomedical implements. 3 lectures, 1 laboratory. Prerequisite: ENGR 110, MATH 141 or 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: Completion of GE Area B, junior standing or consent of instructor.

#### 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 350 The Global Environment (4)

GE Area F

(Also listed as AG/BUS/EDES/HUM/SCM/UNIV 350)

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: Completion of GE Areas A and B and junior standing.

#### 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 440 Biomedical Engineering Design I (4)

The special requirements of materials and manufacturing processes required by biomedical engineering applications. Design, development and production of prototypes of biomedical implements. 3 lectures, 1 laboratory. Prerequisite: ME 212, IME 314, CE 204, CSC 234, GE Area B2 life science and upper-division science course, or consent of instructor.

#### 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. See The Schedule of Classes for topic selected. 4 lectures. Prerequisite: MATH 242, ME 313 or consent of instructor. [Changed effective Winter 2009.](#)

#### 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. [New course effective Winter 2009.](#) [Corrected effective Spring 2009.](#)

#### 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. [New course effective Spring 2009.](#)

#### **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. 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. 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. 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. See The Schedule of Classes for topic selected. 4 lectures. Prerequisite: ENGR 451 or consent of instructor. [Changed effective Winter 2009.](#)

#### **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 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.

## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [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 304 Process Thermodynamics (4)

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. 4 lectures. Prerequisite or concurrent: CHEM 125, ENVE 331.

#### 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: MATH 241, PHYS 133, and CSC 234 or 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: Completion of GE Area B and junior standing. *Changed effective Winter 2009.*

#### ENVE 325 Environmental Air Quality (3)

Consideration of ambient air contamination inside and outside. Factors included in establishing, monitoring and maintaining air quality standards. 3 lectures. Prerequisite: CHEM 125.

#### 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, 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 ENVE 325, and ENVE 331.

#### ENVE 416 Environmental Process Modeling (4)

Introduction to automatic control instrumentation. Methods of analysis of control systems. Analytical determination of control response. Modeling of pollution control and natural systems. 4 lectures. Prerequisite: ME 341; ENVE 304, ENVE 331.

#### ENVE 421 Mass Transfer Operations (3)

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. 3 lectures. Prerequisite: ENVE 304, ENVE 325, ENVE 331, and ME 341.

#### 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, STAT 312, and ENGL 149.

#### ENVE 434 Water Quality Measurements (4)

Aquatic environmental chemistry and water quality measurement. 3 lectures, 1 laboratory. Prerequisites: CHEM 129, CHEM 312, ENVE 330 or ENVE 331. FNR majors should consult instructor regarding this prerequisite.

#### ENVE 436 Introduction to Hazardous Waste Management (3)

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. 3 lectures. Prerequisite: ENVE 325 and ENVE 331, or equivalent.

#### ENVE 438 Water and Wastewater Treatment Design (3)

Design of facilities for physical and chemical treatment of water and wastewater, biological treatment of wastewater, and treatment and disposal of sludge. Design of land treatment systems and septic tanks. Use of computers for design problems. 3 lectures. Prerequisite: ENVE 331 and ME 341.

#### 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 CE 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 for reference library and formal oral reports. 2 laboratories. Prerequisite: ENVE 466. Note: although ENVE 467 substitutes for ENVE 462, students may not use repeat credit for the purpose of increasing GPA.

**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 topic 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 topic 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. 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. 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. 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 535 Advanced Wastewater Treatment (3)**

Operations and processes used in tertiary treatment. Chemical coagulation, flocculation, sedimentation, filtration, absorption. Methods for removal of phosphorus, nitrogen, solids and organics. Integration of advanced wastewater treatment processes. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**ENVE 536 Biological Wastewater Treatment Processes Engineering (3)**

Fundamentals of biological wastewater treatment. Suspended and attached-growth bioreactors. Activated sludge and trickling filter design. Biological nitrification and denitrification. Anaerobic treatment processes. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

**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 topic 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 topic 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.



# BS ENVIRONMENTAL HORTICULTURAL SCIENCE

## 2007-09 Cal Poly Catalog

[Horticulture and Crop Science Department](#)  
**Agricultural Sciences Bldg. (11), Room 244**  
**(805) 756-2279/1237**

- 60 units upper division       GWR
- 2.0 GPA                               USCP

\* = Satisfies General Education requirement

### 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
HCS 463 Senior Seminar	1
Concentration courses	43
	<b>91</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 <del>201/207</del> <a href="#">Business Law Survey Legal Responsibilities of Business</a>	<del>3</del> 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)* (MATH 116 & MATH 117 substitute)	4
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

**49- 50**

### GENERAL EDUCATION (GE)

72 units required; 24 units are in Support.  
 →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 (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 Concentrations	0
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#### ELECTIVES

**0**

**188- 189**

*Corrected 11/17/08*

### 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	3
BRAE 340 Irrigation Water Management (Area F)*	4
Advisor approved electives	12
	<b>43</b>

#### Nursery and Floriculture Production Concentration

EHS 128 Principles of Horticultural Design	3
EHS 245 Horticulture Production Technologies	3
EHS 340 Principles of Greenhouse Environment	4
EHS 342 Potted Plant Production	4
EHS 424 Nursery Crop Production	4
EHS 210/EHS 310/HCS 339 Enterprise Project/ Internship	4
BRAE 340 Irrigation Water Management (Area F)* <i>or any Area F course</i>	4
Advisor approved electives	17
	<b>43</b>

#### Turfgrass Management Concentration

EHS 127 Introduction to Landscape Graphics	4
HCS 339 Internship	3
EHS 343 Turfgrass Management	4
EHS 433 Advanced Turfgrass Science	4
EHS 434 Landscape Management	4
BRAE 337 Landscape Irrigation	3
BRAE 340 Irrigation Water Management (Area F)*	4
BUS 384 Human Resource Management	4
Advisor approved electives	13
	<b>43</b>

**Individualized Course of Study**

EHS 128 Principles of Horticultural Design .....	3
BRAE 340 Irrigation Water Management (Area F)* or any Area F course.....	4
36 units, 16 of which must be upper division EHS	36
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.	

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## EXPERIMENTAL COURSES

(Summer 2007 through Spring 2009)

*Valid academic courses that are not included in the University Catalog. They provide an opportunity for experimentation without delays for courses that are necessary, before new courses and programs can be reviewed for inclusion in the University Catalog.*

### AERO X517 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.

### AGED X538 Laboratory Integration in Agricultural Education (3)

Teaching important science concepts using agriculture as the context. Assisting agriculture teachers in identifying and integrating agriscience activities and laboratories into existing agriculture courses. Emphasis on appropriate teaching methods and techniques, curriculum integration and application, and classroom resources. 3 lectures. Prerequisite: AGED 438 or consent of instructor, enrollment in teaching credential program or MS degree in Agricultural Education, or current agriculture teacher.

### ARCE X410 Integrated Building Envelopes (4) (Also listed as ARCH/CM X410)

Multidisciplinary exploration of the value and collaboration required of an integrated project team approach to the design and construction of sophisticated building envelopes. Team taught by instructors and practitioners from each of the following disciplines: architecture, architectural engineering and construction management. 4 lectures. Prerequisite: 4th year standing or consent of instructor.

### ARCE X449 Light Gauge Steel Design Laboratory (3)

Analysis and design of light-gauge steel structural members subjected to bending, shear, and axial forces. Project based design and constructability of light-gauge structural systems including gravity framing, diaphragms, shear walls and their connections. 3 laboratories. Prerequisite: ARCE 303 and ARCE 451.

### ARCH X410 Integrated Building Envelopes (4) (Also listed as ARCE/CM X410)

Multidisciplinary exploration of the value and collaboration required of an integrated project team approach to the design and construction of sophisticated building envelopes. Team taught by instructors and practitioners from each of the following disciplines: architecture, architectural engineering and construction management. 4 lectures. Prerequisite: 4th year standing or consent of instructor.

### ASCI X366 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/VS 229.

### ASTR X324 Longitude, Navigation, and Timekeeping (4) GE Area F

The state of navigation prior to 1800 and the world wide problem of determining

longitude at sea. Emphasis on time and timekeeping, John Harrison, historical and modern-day navigation technology, basic laws of motion, celestial navigation, and technological solutions to societal problems. 4 lectures. Prerequisite: Completion of GE Area B and junior standing.

#### CHEM X240 ARGO Float Deployment (1) (CR/NC)

Student participation in the ARGO float program which collects data about the temperature and salinity of seawater world-wide, both at the surface and at depths up to 2000 meters. Credit/No Credit grading only. 1 lecture. Available to students aboard *The Golden Bear* on the Cal Poly at Sea Cruise.

#### CM X410 Integrated Building Envelopes (4) (Also listed as ARCE/ARCH X410)

Multidisciplinary exploration of the value and collaboration required of an integrated project team approach to the design and construction of sophisticated building envelopes. Team taught by instructors and practitioners from each of the following disciplines: architecture, architectural engineering and construction management. 4 lectures. Prerequisite: 4th year standing or consent of instructor.

#### CPE X105 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. Concurrent: Enrollment in CPE 101.

#### CPE X133 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). 3 lectures, 1 laboratory. Prerequisite: CSC 101 or equivalent.

#### CPE X171 Introduction to Interactive Entertainment (4) (Also listed as CSC X171)

Use of click-and-drag software application to create an entertaining or informative, socially responsible application, such as a game. Collaborative work in teams 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.

#### CPE X350 Capstone Preparation (1)

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. 1 laboratory. Prerequisite or concurrent: CPE 329.

#### CRP X424 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, CRP 501, or equivalent.

#### CRP X445 Planning and Urban Ecology (4)

Introduction to urban ecology as an organizing framework for addressing environmental problems. Exploration of an urban ecological research question through quantitative stream assessment and qualitative social survey data collection and analysis. 3 lectures, 1 laboratory. Prerequisite: Junior, senior or graduate standing.

#### CSC X171 Introduction to Interactive Entertainment (4) (Also listed as CPE X171)

Use of click-and-drag software application to create an entertaining or informative, socially responsible application, such as a game. Collaborative work in teams 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.

**DMHS X351 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: FNR 202 or completion of GE Area B3 or consent of instructor.

**DMHS X352 Terrorism: Understanding the Threat (3)**

Theories, procedures, and practices to prepare field responders, first level governmental supervisors and managers in appropriate local emergency operations centers' response to a terrorist incident. 2 lectures, 1 activity. Prerequisite: DMHS X351 or consent of instructor.

**ECON X409 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.

**EDUC X410 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. Credit/No Credit grading only. 2 lectures, 2 activities. Prerequisite: Admission to the Single Subject credential program or consent of instructor. Concurrent enrollment: EDUC 412 and EDUC 414.

**EDUC X433 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 will be 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 by consent of instructor.

**EHS X430 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.

**ENGL X201 Introduction to Literary Studies (4)**

Introduction to the major genres typical of literature in different periods. Introduction to the forms of writing and research methods typical of literary criticism. 4 lectures. Prerequisite: Completion of GE Area A.

**ENGL X382 LGBT Literature and Media (4) GE C4**

Representations of lesbian, gay, bisexual, transgendered individuals and issues, late 19 th century to the present. Topics covered: the closet, homophobia, coming out, AIDS, same-sex marriage, intersections of sexuality, race, class, gender identity. 4 lectures. Prerequisite: Completion of GE Areas A and C1.

**ES X340 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 comprehensive consideration of the contexts of cultural production. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 lectures. Prerequisite: Completion of GE Areas A1 and C1, C2 or C3, junior standing, or consent of instructor. Recommended completion of ES 112, or ES 241, or ES 242. Ethnic Studies majors do not receive GE credit.

**FRSC X211 Survey of Viticulture (4)**

*(Also listed as WVIT X211)  
Valid through Fall 2008*

Introduction to wine grape growing including the life cycle of the vine, site selection and the concept of "terroir", factors and practices influencing wine quality, sustainable vineyard practices, and the business of viticulture. 4 lectures.

HCS X415 Floral Design for Agricultural Educators (1)

Floral design practices, techniques and construction used in teaching floral design in a classroom setting. The designs and instruction required for orchestrating the designs in the State FFA Contest. 1 activity. Prerequisite: Credential candidate with teaching technique coursework, or consent of instructor.

HIST X510 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 or consent of instructor.

HNRS X324 The Historical Novel in the United States , 1960s to the Present (4) GE D5  
(Also listed as HIST 324)

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: Completion of Ge Area A, D1 and any other lower-division Area D course.

HNRS X347 African American Literature (4) GE C4 USCP GWR  
(Also listed as ENGL 347)

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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

HNRS X380 Ecolit: Reading and Writing the Landscape (4) GE C4  
(Also listed as ENGL 380's approved topic of same name)

Nature writing or ecoliterature, an ancient literary genre that has achieved new prominence among critics, teachers, writers and readers. A balance of humanities and science, art and nature, reading and writing, talking and walking. Great works of environmental literature and their traditions, the geography and ecology of Cal Poly's ten thousand acres, and practical methods of observation and expression. 4 lectures. Prerequisite: Completion of GE Area A.

HNRS X424 Design of Museum Displays on Science, Engineering and Technology (4)  
(Also listed as UNIV X424)

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 and senior standing or consent of instructor.

HNRS X491 Poly D-Lab I: Appropriate Technology for Impoverished Communities: Development (4) GE D5  
(Also listed as UNIV X491)

A broad overview of international development and appropriate design for sustainability. In addition to academic 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 and consent of instructor.

HNRS X492 Poly D-Lab II: Appropriate Technology for Impoverished Communities: Design (4) (Also listed as UNIV X492)  
Valid Winter 2009 through Spring 2009

Hands-on design studio course. Design for underserved communities. Work in multidisciplinary teams in collaboration with community partners and field practitioners. Development of a working prototype and group presentation. 3 lectures, 1 laboratory. Prerequisite: Junior standing and consent of instructor. Recommended: UNIV 391.

HNRS X492 Poly D-Lab II: Appropriate Technology for Impoverished Communities: Design (4) (Also listed as UNIV X492)

*Valid Spring 2008 through Fall 2008*

Hands-on design studio course. Design for underserved communities. Work in multidisciplinary teams in collaboration with community partners and field practitioners. Development of a working prototype and group presentation. 4 lectures. Prerequisite: Junior standing and consent of instructor. Recommended: UNIV X491.

IT X545 Product Conceptualization and Execution Using Rapid Prototyping (4)

Product development using current solid modeling and rapid prototyping technologies. Comprehensive simulation of the product development life cycle from initial concept to completed prototype. Applications of three-dimensional solid modeling and rapid prototyping to follow a product from conception to completion. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate programs.

LS X475 Teaching Standards Based Art in the Elementary Classroom: A Distance Learning Course (4)

*Valid Fall 2008 through Summer 2009*

Online, distance learning course providing a thorough understanding of standards-based, visual art concepts for K-6 learning, focusing on the elements of art, principles of design, and fostering artistic perception within historical and cultural contexts. The events and theories influencing current practices in art education. 4 lectures. Prerequisite: LS 270.

LS X475 Teaching Standards Based Art in the Elementary Classroom: A Distance Learning Course (1-5)

*Valid Spring 2007 through Summer 2008*

Distance learning course fulfilling content preparation for teaching candidates to meet state and national requirements to teach the arts in K-8. Development of lessons anchored on significant works of art which facilitate artistic perception, historical/cultural implications, aesthetic valuing, and creative skills. The Schedule of Classes will list topic selected. 1-5 lectures. Prerequisite: Two or more years of transferable college coursework. GE Area A requirements met.

LS X476 Elementary Learning Through Art-making Processes (4)

Primarily online, distance learning course providing analysis and practice of skills and techniques to facilitate K-6 learning through art-making processes, which will be deconstructed into inquiry through anchor artworks, techniques, criteria development, aesthetic valuing, assessment, curriculum integration and technology. 4 lectures. Prerequisite: LS 475.

LS X477 Myth and Folklore in Art for Elementary Classrooms (4)

Online, distance-learning examination of symbols, metaphors, attributes of myths and folktales in artworks and literature. How both image and story are used for teaching standards-based integrative lessons in art and other content areas in the elementary classroom. 3 lectures, 1 activity. Prerequisite: LS 270.

MATE X424 Design of Educational Museum Displays for Materials Engineering (2)

Design and creation of interactive museum displays that highlight materials science and engineering. Projects done in teams and used in the SciTechatorium at the Santa Fe-Bellvue Elementary school in Avila . Educational presentations. 2 activities. Prerequisite: MATE 210 or consent of instructor.

MATE X555 Micro Systems Laboratory (2) *(Also listed as ME X555)*

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: ME 341, MATE 430 or consent of instructor; corequisite: MATE X550 or consent of instructor.

MATH X316 Introduction to Linear Algebra II Laboratory (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 X504 Advanced Mathematical Topics for Teachers (1-4) (CR/NC)

Advanced mathematical topics for practicing credentialed teachers. Professional growth

through improvement of teachers' mathematical content knowledge. Pedagogical approaches to the teaching of mathematics using technology, discussion, reflection, and hands-on activities. Content varies according to teaching level. The Schedule of Classes will list topic selected. Total credit limited to 12 units. Credit/No Credit grading only. Not open to students in major or master's degree program in mathematics. 1-4 activities. Prerequisite: Multiple Subject or Single Subject teaching credential or consent of instructor.

ME X555 Micro Systems Laboratory (2) *(Also listed as MATE X555)*

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: ME 341, MATE 430 or consent of instructor; corequisite: MATE X550 or consent of instructor.

PE X150 Intermediate Karate (1) (CR/NC)

A continuation of PE 138. Training in the traditional martial art of Shorin-ryu Karate. Systematic introduction to self-defense techniques, blocking and striking combinations, Kata, and fighting skills. More emphasis of conditioning, physical contact and bag work. Total credit limited to 2 units. Credit/No Credit grading only. 1 activity. Prerequisite: PE 138 or consent of instructor.

PHYS X115 Physics of Sound and Music (4) GE B3

Fundamental physical principles 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: MATH 116 or MATH 104 or consent of instructor.

PHYS X118 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 for PHYS 121 or PHYS 141. 4 lectures. Prerequisite: MATH 118 and high school trigonometry, or MATH 119.

POLS X295 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 X380 Religion and Politics in the Israeli-Palestinian Conflict (4)  
*(Also listed as RELS X380)*

The Israeli-Palestinian conflict. Examination of the root causes of the conflict, its current manifestation, and possibilities for solutions from the perspective of religious studies and political science. 4 lectures. Prerequisite: POLS 225 or POLS 229, or RELS 309.

POLS X395 Advanced Mock Trial (2) (CR/NC)

Advanced preparation for participation in collegiate Mock Trial competitions. Emphasis on advanced topics and techniques related to evidence, trial procedure, objections, and witness examination. Extensive hands-on practice in arguing legal cases. Credit/No Credit grading only. Total credit limited to 4 units, with a maximum of 2 units per quarter. 2 lectures. Prerequisite: POLS X295 or consent of instructor.

PSY X375 Forensic Psychology (4)

The application and practice of psychology in both the civil and criminal justice systems, with the following topics examined: police and investigative psychology, family forensic psychology, correctional psychology, expert witness testimony, and assessment techniques in forensic psychology. 4 lectures. Prerequisite: PSY 201 or PSY 202.

RELS X205 Jesus (4)

Exploration and analysis of the person of Jesus. Examination of our sources of knowledge about him, his self-understanding, and various interpretations of him in historical, comparative, and contemporary settings. 4 lectures.

RELS X380 Religion and Politics in the Israeli-Palestinian Conflict (4)



*(Also listed as POLS X380)*

The Israeli-Palestinian conflict. Examination of the root causes of the conflict, its current manifestation, and possibilities for solutions from the perspective of religious studies and political science. 4 lectures. Prerequisite: POLS 225 or POLS 229, or RELS 309.

SCM X302 Science Teaching Practicum (2) (CR/NC)

Early teaching experience in an on-campus middle school informal science teaching and learning environment. Principles of standards-based inquiry-driven science education; lesson design, implementation and assessment. Intended for undergraduates exploring science teaching as a career. Total credit limited to 4 units. Credit/No Credit grading only. 1 seminar, 1 laboratory.

SCM X335 Nuclear Science and Society (4) GE Area F

Scientific and public policy aspects of nuclear phenomena as represented in technology, warfare, health and medicine, and the environment. Topics include: nuclear proliferation, reactor design and safety, nuclear accidents, disposal of radioactive waste, nuclear medicine, food irradiation, and nuclear fusion. 4 lectures. Prerequisite: Junior standing, completion of GE Area B or consent of instructor.

STAT X523 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 513 or consent of instructor. Not available to students with credit for STAT 323.

UNIV X424 Design of Museum Displays on Science, Engineering and Technology (4)  
*(Also listed as HNRS X424)*

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 and senior standing or consent of instructor.

UNIV X491 Poly D-Lab I: Appropriate Technology for Impoverished Communities: Development (4) GE D5  
*(Also listed as HNRS X491)*

A broad overview of international development and appropriate design for sustainability. In addition to academic 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 and consent of instructor.

UNIV X492 Poly D-Lab II: Appropriate Technology for Impoverished Communities: Design (4) *(Also listed as HNRS X492)*  
*Valid Winter 2009 through Spring 2009*

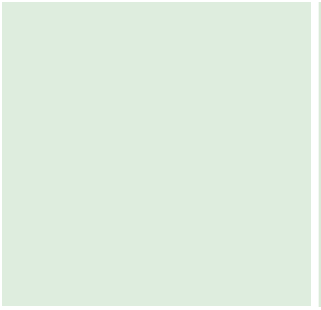
Hands-on design studio course. Design for underserved communities. Work in multidisciplinary teams in collaboration with community partners and field practitioners. Development of a working prototype and group presentation. 3 lectures, 1 laboratory. Prerequisite: Junior standing and consent of instructor. Recommended: UNIV 391.

UNIV X492 Poly D-Lab II: Appropriate Technology for Impoverished Communities: Design (4) *(Also listed as HNRS X492)*  
*Valid Spring 2008 through Fall 2008*

Hands-on design studio course. Design for underserved communities. Work in multidisciplinary teams in collaboration with community partners and field practitioners. Development of a working prototype and group presentation. 4 lectures. Prerequisite: Junior standing and consent of instructor. Recommended: UNIV X491.

WVIT X211 Survey of Viticulture (4)  
*(Also listed as FRSC X211)*  
*Valid through Fall 2008*

Introduction to wine grape growing including the life cycle of the vine, site selection and the concept of "terroir", factors and practices influencing wine quality, sustainable vineyard practices, and the business of viticulture. 4 lectures.



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Updated on: 10/29/08  
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## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [Natural Resources Management Department](#)

### FNR–FORESTRY AND NATURAL RESOURCES

#### **FNR 101 Natural Resources Management and Society (3)**

Integrated development, utilization and management of the nation's and world's natural resources for the continuous benefit of humankind and the conservation of the resources. Discussion of natural resources management practices and technologies which may provide a more flexible range of societal benefits for the wise use of our natural resources. 3 lectures.

#### **FNR 112 Parks and Outdoor Recreation (3)**

Introduction to national, state, county, city and private park systems. History, philosophy, policy and principles of the formation, administration and functioning of wildland recreational units at the park, county, regional, national, and international levels. 3 lectures.

#### **FNR 140 Careers in Forestry and Environmental Management (1) (CR/NC)**

Analysis and development of career goals in natural resources. Acquainting students with potential career options and preparation of academic plans at Cal Poly. Credit/No Credit grading. 1 activity.

#### **FNR 201 Introduction to Forest Ecosystem Management (3)**

Fundamentals of forestry including basic silviculture, forest protection, measurement and policy. Integrated resource management of forest lands for water production, forage, recreation, wildlife, and timber. 3 lectures.

#### **FNR 202 Environmental Management (3)**

Environmental management as a process within functioning societies seeking a harmonious balance between human activities and intrinsic behavior of the natural environment. Major components of the natural environment and the political and social activities that impact that environment. 3 lectures.

#### **FNR 203 Resource Law Enforcement (3) (Also listed as REC 203)**

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.

#### **FNR 204 Wildland Fire Control (3)**

Fire control techniques used on various wildland fuels. Elementary fire physics, fuels, weather, fire behavior, tactics and fire suppression techniques, line construction, "mop-up", fire line safety, air operations and fire organization. Meets basic wildland fire fighter certification requirements for the USDA Forest Service. Partially meets California Department of Forestry Firefighter I requirements. 2 lectures, 1 laboratory.

#### **FNR 208 Dendrology (4)**

Identification, classification, silvical characteristics, distribution, environmental requirements and economic importance of woody plants in shrub, woodland, and forest ecosystems of the United States. Emphasis on species located in the Pacific Coastal, Sierran, and Cascade ecosystems. 2 lectures, 2 laboratories. Recommended prerequisite: BOT 121 or BIO 152.

#### **FNR 215 Land and Resource Measurements (2)**

Introduction to land and resource measurement technology and methods – field instruments, property description, map and photograph reconciliation, data accuracy and precision. Trigonometric functions and fundamental identities especially as applied to natural resources applications. Course may be offered at Swanton Pacific Ranch during week prior to beginning of fall quarter, or weekend field trips. 1 lecture, 1 laboratory.

#### **FNR 220 Forest Resources Enterprise Project (1–4) (CR/NC)**

Selection and completion of a forest 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 8 units. Credit/No Credit grading only. Prerequisite: FNR 201 or equivalent.

#### **FNR 247 Forest Surveying (2) (Also listed as BRAE 247)**

Use and care of tapes, staff compass, abney levels, theodolites, and GPS receivers. Keeping field notes, measurements by tape. Closed and open traverse by compass and theodolite. Turning angles and determining directions of lines. Map reading and public land description. GPS measurements. Weekend field trips required. 1 lecture, 1 laboratory. Prerequisite: MAPE Score 8, prerequisite or concurrent: FNR 215. *Corrected effective Summer 2007.*

#### **FNR 260 Forest Practices and Environmental Protection (4)**

Relationships between forest ecosystem management, forest practices, harvesting methods, timber harvest planning, components of forest harvesting, harvesting effects; cost analysis of harvesting methods; safety management; value-added forest utilization; environmental protection; and road location. Overnight or weekend field trips required. 3 lectures, 1 laboratory. Prerequisite: FNR 201. Recommended: FNR 247.

#### **FNR 290 Intercollegiate Forestry Activities (1) (CR–NC)**

Beginning through advanced skills in the event areas of college forestry activities. Instruction in use of specialized equipment and safety. Minimum of 4 hours of laboratory per week. Total credit limited to 8 units. Credit/No Credit grading only. Prerequisite: Enrollment limited to those qualified to compete in intercollegiate forestry activities and consent of instructor.

#### **FNR 300 Computer Applications in Resource Management (2) (Also listed as REC 300)**

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.

#### **FNR 306 Natural Resource Ecology and Habitat Management (4)**

Resource ecology and management implications in the major ecosystems of North America. Importance of maintaining the natural dynamics of energy flow and nutrient cycles at the community and ecosystem level for the benefit of society. Humanity's role as a principal factor of change of the resources in natural systems. 3 lectures, 1 laboratory. Prerequisite: BIO 162 or BOT 121 or equivalent.

#### **FNR 307 Fire Ecology (3)**

Effects of wildland fires on shrub, woodland, and forest environments to include fuels, plants, soil, water, wildlife, and air. Emphasis on western U.S. forest and shrub ecosystems. 2 lectures, 1 laboratory. Prerequisite: FNR 201; recommended: FNR 306.

#### **FNR 308 Fire and Society (4) (Also listed as ES 308)**

**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: Completion of GE Areas A, D1 and D3.

#### **FNR 311 Environmental Interpretation (4) (Also listed as REC 311)**

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.

#### **FNR 312 Technology of Wildland Fire Management (4)**

**GE Area F**

Models and technology to solve complex land management problems. Historic, current and future perspectives of wildland fire in California. Sustainability and ecosystem health. Assumptions and limitations of fire behavior and suppression models. 3 lectures, 1 activity. Prerequisite: Completion of GE Area B, and junior standing.

**FNR 315 Measurements and Sampling in Forested Environments (4)**

Principles and methods of sampling and measurement for forest and natural resource quantities and qualities. Modeling and estimation for tree volumes, stand structure and composition, and related forest vegetation. Applications in sampling, statistical and inventory techniques. 2 lectures, 2 laboratories. Overnight, weekend field laboratories required. Prerequisite: STAT 217/218, BRAE/FNR 247; recommended: MATH 161 or MATH 221 or equivalent.

**FNR 317 The World of Spatial Data and Geographic Information Technology (4) GE Area F  
(Also listed as BIO/GEOG/LA 317)**

Basic foundation for understanding the world through geographic information and tools available to utilize spatial data. Application of Geographic Information Systems (GIS) and related technologies, including their scientific basis of operation. Not open to students with credit in FNR 318. 3 lectures, 1 activity. Prerequisite: A course in computer science, completion of Area B, and junior standing.

**FNR 318 Applications in GIS (3) (Also listed as LA 318)**

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.

**FNR 319 Natural Resource Ecology, Theories and Applications (4) (Also listed as HNRS 319) 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.

**FNR 320 Watershed Management and Restoration (4)  
(formerly FNR 419)**

Hydrologic cycle concepts and measurement. Analysis and measurement of watershed processes. Watershed management including restoration, erosion, and review of forest practice rules. Saturday and/or weekend field trip required. 3 lectures, 1 laboratory. Prerequisite: SS 121, FNR 306, FNR/LA 318.

**FNR 321 Water Systems Technology, Issues and Impacts (4) GE Area F**

Sustainable strategies and technologies to enhance freshwater supplies and marine habitats. Systems treated include artificial wetlands, stormwater, drinking water, agricultural and industrial waste water. 3 lectures, 1 activity. Prerequisite: Completion of GE Area B, and junior standing.

**FNR 323 Human Dimensions in Natural Resources Management (4) GE D5**

Social, economic, political and ecological conditions and institutions that influence decisions affecting the environment; examination of human-caused environmental impacts and how they in turn influence social institutions. 4 lectures. Prerequisite: Completion of GE Area A and two courses from Areas D1, D2, D3. Forestry and Natural Resources majors will not receive GE Area D5 credit.

**FNR 326 Natural Resources Economics and Valuation (4)**

Theory of efficient use of renewable and nonrenewable natural resources, including methods for attaching value to marketable and non-market natural resources. Environmental economic theories and techniques to address allocation of water, timber, wildlife/fisheries, open space, and recreation. 3 lectures, 1 activity. Prerequisite: MATH 161 or MATH 221 or equivalent, GE Area D2 (ECON 201 recommended), AGB 212 or consent of instructor.

**FNR 335 Conflict Management in Natural Resources (4)**

Application of behavioral science principles and techniques in the management of natural resource systems. Management of internal and external human resource issues and concerns in natural resources

organizations is emphasized. 3 lectures, 1 laboratory. Prerequisite: FNR 201 or FNR 202; PSY 201 or PSY 202 recommended.

**FNR 339 Internship in Forest and Natural Resources (1-12) (CR/NC)**

Selected students will spend up to 12 weeks with an approved firm or agency engaged in forest or natural resources management. Applying and developing managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Credit/No Credit grading. Prerequisite: Consent of instructor.

**FNR 340 Wildland Fire Management (3)**

Wildland fuels, fire weather, and fire danger ratings in chaparral, grassland, and forested areas. Advanced modeling of surface and crown fire behavior. Fire management strategies and implications, policies and objectives of fire management organizations. Saturday field trips may be required. 3 lectures. Prerequisite: FNR 204 or consent of instructor.

**FNR 350 Urban Forestry (3)**

Establishment and management of municipal forests, wildland-urban interface, wildlife habitat, and pollution abatement. Management of forest areas requiring special attention because of heavy recreational use, fire hazard, watershed, and societal values. Full-day field trips may be required. 2 lectures, 1 laboratory. Prerequisite: FNR 208.

**FNR 360 Ethnicity and the Land (4) GE C4 USCP  
(Also listed as ES 360)**

A comparative study of the ethnic, cultural and gender influences that shape people's perceptions, attitudes and behavior toward terrestrial and aquatic resource values and uses. 4 lectures. Prerequisite: Completion of GE Area A and one course from Area C1, C2, or C3. Junior standing. Recommended: one lower division Ethnic Studies course and an introductory natural resources course.

**FNR 362 Survey and Management of Mediterranean Ecosystems (4)**

Woody vegetation found in worldwide Mediterranean ecosystems. Distribution, historical development and uses of these ecosystems. Emphasis on chaparral management techniques and effects of management on fire, water production, biomass potential. 3 lectures, 1 laboratory. Prerequisite: FNR 306 or equivalent.

**FNR 365 Silviculture and Vegetation Management (4)**

Applied forest ecology and prescriptions for achieving forest ecosystem management; dynamic relations among trees, biological communities, environmental factors, and land use. Vegetation manipulation and reforestation methods. Overnight and/or weekend field trips required. 3 lectures, 1 laboratory. Prerequisite: FNR 208, FNR 315; recommended: FNR 306.

**FNR 400 Special Problems for Advanced Undergraduates (2-4)**

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Consent of department head.

**FNR 402 Forest Health (4)**

Impact and losses to forested areas caused by physical and biotic agents (such as insects and diseases) other than fire; relation of direct and indirect control practices to forest management. Saturday field trips required. 3 lectures, 1 laboratory. Prerequisite: FNR 208 or equivalent, FNR 306 or equivalent.

**FNR 404 Environmental Law (3) (Also listed as CRP 404)**

Detailed examination 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. [Changed effective Fall 2008.](#)

**FNR 408 Water Resource Law and Policy (3) (Also listed as CRP 408)**

Detailed examination of the various legal systems of water use, regulation and management in California and the United States. Discussion on 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: FNR 306 or equivalent or instructor approval, senior standing or graduate standing. [Changed effective Fall 2008.](#)

**FNR 410 Resource Recreation Management (4)**  
(Also listed as REC 410)

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: FNR 112 or consent of instructor.

**FNR 412 Forest and Natural Resources Senior Assessment Project (3)**

Principles and practices of integrated sampling and inventory of natural resource values in terrestrial ecosystems, culminating in a student project report. 2 lectures, 1 laboratory. Prerequisite: FNR 306 or equivalent, and FNR 326.

**FNR 414 Sustainable Forest Management (4)**

Biophysical, economic, social and political influences on optimal forest management for purposes of providing sustained yields of goods and services. Growth and yield modeling; forest investment analysis; sustainable forest production; harvest schedule modeling. Day field trip required. 3 lectures, 1 laboratory. Prerequisite: FNR 326, FNR 365.

**FNR 416 Environmental Impact Analysis and Management (4)**

National Environmental Policy and California Environmental Quality Acts as applied to environmental and natural resource management problems and projects. Intent, purpose and history of the laws; differences between laws identified. Request for proposals and preparation of environmental assessment documents covered. 3 lectures, 1 laboratory. Prerequisite: FNR 306 or equivalent, and FNR 335 or equivalent.

**FNR 417 Resource Recreation Planning (3) (Also listed as REC 417)**

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: FNR 112 or consent of instructor.

**FNR 418 Applied GIS (3)**

Acquisition, organization and analysis of spatial data from diverse sources using Geographic Information System (GIS) software. GIS modeling applications and validation techniques used in development and preparation of client-driven projects. 1 lecture, 2 activities. Prerequisite: FNR/LA 318.

**FNR 420 Advanced Watershed Hydrology (4)**

Sources of streamflow and processes by which watersheds undergo change from natural and anthropogenic processes. Fluvial processes, sediment transport and channel restoration techniques. Influences of forest and range management on water resources including water quality and analytical techniques. Weekend field trips required. 3 lectures, 1 laboratory. Prerequisite: FNR 320 or equivalent or graduate standing.

**FNR 421 Wetlands (4) (Also listed as BIO/SS 421)**

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.

**FNR 425 Applied Resource Analysis (4)**

Environmental impacts in responses to resource management, projects, programs and activities. Preparation, implementation, and coordination of environmental plans. Criteria for measurements, interpretation, and evaluation. Resource inventories, analysis, synthesis, evaluation, environmental assessment writing and preparation. 3 lectures, 1 laboratory. Prerequisite: FNR 416.

**FNR 434 Wood Properties and Products (4)**

Principles of wood properties and efficient use of renewable wood resources including methods for using wood as an energy source. Weekend or full-day field trips required. 3 lectures, 1 laboratory. Prerequisite: FNR 201 and FNR 260 or consent of instructor.

**FNR 435 Natural Resources Policy Analysis (4)**

Policy process approach to understanding the efforts to resolve natural resource problems in the public and private sector. Principles and techniques used to analyze the effects of environmental policies. Analysis of major federal and state environmental laws. 4 lectures. Prerequisite: FNR 326, FNR 335.

**FNR 450 Community Forestry (3)**

Development and management of the urban/wildland interface. Socio-economic problems related to forest tree establishment, care, and removal utilization. International implications also covered. Weekend or full-day field trips required. 2 seminars, 1 laboratory. Prerequisite: FNR 350 or consent of instructor.

**FNR 455 Wildland-Urban Interface Fire Protection (3)**

Social, economic, political, and technological issues affecting fire management in urbanized landscapes where fire continues its ecological role. Fire risk analysis; needs assessment, legislative codes, standards and policies; liability issues; evacuation; incident response planning. 2 lectures, 1 laboratory. Prerequisite: FNR 340 or consent of instructor.

**FNR 461, 462 Senior Project I, II (3) (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 180 hours total time.

**FNR 465 Ecosystem Management (4)**

Applied integration of biophysical, economic and socio-political sciences. Principles, concepts and techniques designed to utilize resources while sustaining ecosystem health within acceptable limits of change. Ecosystem assessment, planning, management and monitoring project. 3 lectures, 1 laboratory. Prerequisite: FNR 326, FNR 416 and consent of instructor.

**FNR 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 topic selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Consent of instructor.

**FNR 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.

**FNR 472 Leadership Practice (1) (Also listed as REC 472)**

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.

**FNR 475 Sustainable Forest and Environmental Practices (15)**  
(Also listed as HNRS 475)

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.

**FNR 500 Individual Study (1-3)**

Advanced independent 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.

**FNR 502 Resource Conservation (3)**

Conservation, planning and administration for broad treatment of land, water, mineral, forest, range, and wildlife resources. 3 seminars. Prerequisite: Graduate standing and consent of instructor.

**FNR 503 Tropical Forest Ecosystem Management (3)**

Tropical forest ecosystem classification, function and limitations. Applied tropical forest management systems; tropical problems, management, and political strategies; over-grazing and desertification; overcutting and fuelwood shortages. 3 seminars. Prerequisite: Graduate standing or consent or instructor.

**FNR 504 Agroforestry Systems (2)**

Principles and practical applications of tree crop systems which are managed to provide fuel, fiber, fodder, and food. Tree crop identification and tree product uses. Plantation design, establishment, and cultural practices. Soil management. Integration of forest, and range management practices and values. Special applications to tropical forest ecosystems. 2 lectures. Prerequisite: Graduate standing or consent of instructor.

**FNR 521 Natural Resources Management for Educators (3)**

Philosophy (theoretical and applied) of natural resource management strategies functioning in today's environment. Ecological principles applicable to specific resource components as they relate to the present perception of today's resource base, use demands and projected utilization. 3 seminars. Prerequisite: Graduate standing.

**FNR 530 Social Systems in Natural Resources Management (3)**

Theories and methods for incorporating community in the management of forest resources. Approaches to conflict resolution between resource owners and community stakeholders using tools such as GIS. 2 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**FNR 532 Applications in Biometrics and Econometrics (4)**

Parametric and semi-parametric statistical methods in modeling biological and economic phenomena. Biometric modeling of stand growth and inventory. Econometric modeling of market and environmental values. 3 lectures, 1 laboratory. Prerequisite: One course in undergraduate statistics, graduate standing, or consent of instructor.

**FNR 534 Forest Ecosystem Modeling (3)**

Methods and modeling approaches used in quantifying ecological processes and conditions associated with forested ecosystems, such as fire behavior, hydrologic processes, terrestrial and aquatic habitat condition using GIS and other models. The Schedule of Classes will list topic selected; sections not repeatable. 2 lectures, 1 laboratory. Prerequisite: One course in undergraduate statistics, graduate standing, or consent of instructor.

**FNR 539 Graduate Internship in Forest Resources(1-9)**

Application of theory to the solution of problems of forest resources 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.

**FNR 570 Selected Topics in Forest Resources (1-4)**

Directed group study of selected topics for advanced students. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 1-4 seminars. Prerequisite: Graduate standing or consent of instructor.

**FNR 571 Selected Topics in Forest Resources Laboratory (1-4)**

Directed group laboratory of selected topics for advanced students. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 1-4 laboratories. Prerequisite: Graduate standing or consent of instructor.

**FNR 575 Applications in Advanced Watershed Hydrology (2)**

Techniques and applications in watershed hydrology to real-world projects. Projects could include water quality or quantity assessments, water quality or channel morphology monitoring, and structural and non-structural enhancements for channel and upland watersheds, culminating in a final report and presentation. 2 laboratories. Prerequisite: FNR 420 and graduate standing, or consent of instructor.

**FNR 581 Graduate Seminar in Forestry and Environmental Sciences (3)**

Student study and presentation of selected developments, trends and problems in the field of forest and natural resources. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

**FNR 599 Thesis (1-9)**

Individual research in forest or natural resources management under the general supervision of faculty, leading to a graduate thesis. Degree credit limited to 9 units. Prerequisite: Graduate standing and consent of instructor.

## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [Horticulture and Crop Science Department](#)

### FRSC—FRUIT SCIENCE

#### FRSC 123 Beekeeping (3)

Studies and exercises in the handling of European honey bees with special reference to pollination of commercial crops. Honey processing and marketing. Hive inspection and disease detection. 2 lectures, 1 laboratory.

#### FRSC 132 Pomology I (4)

Orchard design and development, cultural practices, physiological responses of trees to cultural practices, propagation and strategies to maximize orchard profitability and sustainability. 3 lectures, 1 laboratory. Prerequisite: HCS 120.

#### FRSC 133 Pomology II (4)

Analysis of production and management strategies for major fruit and nut crops in California. 3 lectures, 1 laboratory. Prerequisite: FRSC 132.

#### FRSC 202 Enterprise Project (2–4) (CR/NC)

Beginning field experience in management of orchards and vineyards or honeybees, under faculty supervision. Project participation is subject to approval by the department head and the Cal Poly Corporation. Degree credit limited to 4 units. Credit/No Credit grading only. 1 lecture, variable practicum. Prerequisite: HCS 110, or consent of instructor.

#### FRSC 210 Viticultural Practices (2)

Propagation, layout and planting of a new vineyard, including irrigation and trellis system installations and management practices of established vineyards. Total credit limited to 4 units. 2 activities.

#### FRSC 211 Survey of Viticulture (4)

Introduction to winegrowing including the life cycle of the vine, site selection and the concept of “terroir”, factors and practices influencing wine quality, sustainable vineyard practices, and the business of viticulture. 4 lectures. *New course effective Winter 2009.*

#### FRSC 230 California Fruit Growing (4)

Interrelationship of climate and cultural techniques on orchard productivity. California's place in the international production-marketing scheme. Field trip required. Not open to students majoring in Fruit Science. 3 lectures, 1 laboratory.

#### FRSC 231 Viticulture I (4)

Understanding of internal and external factors affecting vine productivity. Historical and international perspectives on grape growing. Vineyard production strategies. 3 lectures, 1 laboratory.

#### FRSC 331 Viticulture II (4)

Factors influencing vine physiology and winegrape quality. Recent advances in irrigation strategies, canopy management, and pest control. Budgets for profitable operation and mechanized viticulture. Field trip required. 3 lectures, 1 laboratory. Prerequisite: FRSC 231.

#### FRSC 342 Citrus and Avocado Fruit Production (4)

World citrus and avocado production and marketing. Orchard management techniques. Relationship of environment to species, cultivar, and rootstock selection. Field trip to a major California production area required. 3 lectures, 1 laboratory. Prerequisite: HCS 120 or FRSC 230, or consent of instructor.

#### FRSC 402 Enterprise Project Management (2–4) (CR/NC)

Advanced experience in production of orchards and vineyards. Development of a plan for field operations, a marketing plan, and a budget. Management decision-making. Project participation is subject to approval by the department head and the Cal Poly Corporation. Degree credit limited

to 2 units. Credit/No Credit grading only. 1 lecture, variable practicum. Prerequisite: FRSC 202, and consent of instructor.

#### FRSC 415 Grapevine Physiology (4)

Understanding of grapevine physiology, including anatomy, taxonomy, physiological growth processes, growth cycle phenology, bud break, flowering, fruit set, berry ripening. 3 lectures, 1 laboratory. Prerequisite: FRSC 231, FRSC 331 or consent of instructor.

#### FRSC 422 Tropical and Subtropical Crop and Fruit Production (4) (Also listed as CRSC 422)

Production, distribution and utilization of major agronomic, vegetable, fruit and nut crops of economic importance in tropical and subtropical areas. Weather systems, climates, soils, and cropping systems of tropical and subtropical areas. Field trip required. 3 lectures, 1 laboratory. Prerequisite: 100/200-level plant production course, or consent of instructor.

#### FRSC 599 Thesis in Fruit Science (1–9)

Systematic research of a significant problem in Fruit 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.

## 2007-2009 Cal Poly Catalog

**Updated Course Descriptions.**  
**For (former) printed catalog descriptions,**  
**[click here.](#)**

### [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. [Changed effective Fall 2008.](#)
- 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. [Changed effective Fall 2008.](#)
- ➔ **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. [Changed effective Fall 2008.](#)
- 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.
- 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. [Changed effective Fall 2008.](#)
- 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.

#### **FSN 263 Preparation for Professional Practice (2)**

Understanding professional roles in nutrition and food science settings, including dietetics, the food industry, and community and service areas. Discussion of ethics and professional characteristics leading to successful employment. Development of professional portfolios. 2 seminars. Prerequisite: FSN 101, FSN 210, and sophomore standing.

#### **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, or consent of instructor.

#### **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. [Changed effective Fall 2008.](#)

#### **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 111, 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. [Changed effective Fall 2008.](#)

#### **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. 3 lectures, 1 activity. Prerequisite: Completion of GE Area B, and junior standing.



**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) (Also listed as FR 322)**

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.

**FSN 323 Statistical Quality Control (3)**

Application of statistical methods in quality control programs and evaluation of design and production in the food industry. Emphasis on role of statistical quality control in total quality management. Computer software will be utilized in statistical quality control processes. 3 lectures. Prerequisite-site: STAT 218 for Food Science majors and FSN 230 for non-majors.

**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. [Changed effective Fall 2008.](#)

**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. [Changed effective Fall 2008.](#)

**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 104; 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. [Changed effective Fall 2008.](#)

**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) (Also listed as WVIT 342)**

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.

**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. Changed effective Fall 2008.](#)

**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. [Changed effective Fall 2008.](#)

**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.

**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. [Changed effective Fall 2008.](#)
- ➡ **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. [Changed effective Fall 2008.](#)
- ➡ **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. [Changed effective Fall 2008.](#)
- 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 240, 241*) 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. Prerequisite: FSN 429.
- 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. [Changed effective Fall 2008.](#)
- ➡ **FSN 464 Course Change; see FSN 365** [Changed effective Fall 2008.](#)
- 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 topic 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 topic 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 16 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 16 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 topic 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 topic 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.

# Academic Requirements and Policies

Academic Records Office and Registration Information (805) 756-2531

Evaluations (805) 756-2396, Veterans Affairs Coordinator (805) 756-2531

## PLACEMENT TEST REQUIREMENTS

The California State University requires that each entering undergraduate, except those who qualify for an exemption, take the CSU Entry Level Mathematics (ELM) examination and the CSU English Placement Test (EPT) after admission and prior to enrollment. These placement tests are not a condition for admission to the CSU, but they are a condition of enrollment. They are designed to identify entering students who may need additional support in acquiring college entry-level English and mathematics skills necessary to succeed in CSU baccalaureate-level courses. Undergraduate students who do not demonstrate college-level skills in English and/or mathematics should enroll in appropriate remedial courses or programs during the first term of their enrollment.

## English Placement Test (EPT)

### Purpose of the EPT

The EPT is designed to assess the level of reading and writing skills of entering undergraduate students so that they can enroll in appropriate courses. Those undergraduate students who do not demonstrate college-level skills will be advised to enroll in courses or programs designed to help them attain these skills. The test is not a condition for admission to the CSU, but it is a condition of enrollment. Students may take the EPT only once. It may not be repeated.

### Who Must Take the EPT

The CSU English Placement Test must be completed by all entering undergraduates with the exception of those who present proof of one of the following.

- a score of "Exempt" on the augmented English CST, i.e., the CSU Early Assessment Program (EAP), taken in grade 11 as part of the California Standard Test.
- a score of 550 or above on the Verbal section of the College Board SAT taken on or after April 1, 1995 or later.
- a score of 680 or above on the re-centered and adjusted College Board SAT II Writing Test taken May 1998 or later.
- a score of 24 or above on the enhanced ACT English Test taken October 1989 or later.
- a score of 3, 4, or 5 on either the Language and Composition or the Composition and Literature examination of the College Board Advanced Placement program.

- for transfer students, completion and transfer of a course that satisfies the General Education or the Intersegmental General Education Transfer Curriculum (IGETC) written communication requirement, provided this course was completed with a grade of C or better.

## REGISTRATION HOLDS/DISENROLLMENT

CSU Trustee policy requires that all non-exempt students take the EPT examination after admission and before enrollment in the CSU. At Cal Poly, failure to take the EPT examination or show documented exemption before enrollment will result in a hold on registration privileges and may lead to disenrollment from the University.

Registration materials for the EPT will be mailed to all students subject to the requirement. The materials also may be obtained from the Test Office (805-756-1551).

## Remediation

In addition, students who do not demonstrate requisite competence are required to enroll in appropriate remedial or developmental courses beginning in their first term in order to complete the requirements during the first year of enrollment (ENGL 102, 103, 112, or 113). All students who score low on the EPT are required to enroll in ENGL 103 Writing Lab concurrently with ENGL 134 Writing: Exposition or ENGL 133 Writing Exposition for English as a Secondary Language (ESL). Failure to successfully complete ENGL 103 will result in a grade of F in ENGL 134 or ENGL 133.

Students who do not make adequate progress in developing foundational skills within the first year of enrollment will face disqualification from the University.

## Entry Level Mathematics (ELM) Exam

### Purpose of the ELM

The ELM examination is designed to assess the skill levels of entering CSU students in the areas of mathematics typically covered in three years of rigorous college preparatory courses in high school (normally Algebra I, Algebra II, and Geometry). Undergraduate students who do not demonstrate college-level skills will be advised to enroll in courses or programs designed to help them attain these skills. The ELM is not a condition for admission to the CSU, but it is a condition of enrollment.

### Who Must Take the ELM

All entering undergraduates must take the ELM examination before enrolling in a course that satisfies the college-level mathematics requirement of the General Education-Breadth program. Exemptions from the test are given only to those students who can present proof of *one of the following*:

- a score of “Exempt” on the augmented mathematics California Standards Test, i.e., the CSU Early Assessment Program (EAP), taken in grade 11.
- a score of “Conditionally Exempt” on the augmented CST, i.e., the CSU Early Assessment Program (EAP) PLUS successful completion of a Senior-Year Mathematics Experience (SYME).
- a score of 550 or above on the mathematics section of the College Board SAT or on the College Board SAT Subject Tests-Mathematics Tests Level I, IC (Calculator), II, or IIC (Calculator).
- a score of 23 or above on the ACT Mathematics Test.
- a score of 3 or above on the College Board Advanced Placement Calculus examination (Calculus AB or BC) or Statistics examination.
- for transfer students, completion and transfer of a course that satisfies the General Education or Intersegmental General Education Transfer Curriculum (IGETC) quantitative reasoning requirement, provided the course was completed with a grade of C or better.

#### REGISTRATION HOLDS/DISENROLLMENT

CSU Trustee policy requires that all non-exempt students take the ELM examination after admission and before enrollment in the CSU. At Cal Poly, failure to take the ELM examination or show documented exemption before enrollment will result in a hold on registration privileges and may lead to disenrollment from the University.

In addition, students who do not demonstrate requisite competence are required to enroll in appropriate remedial or developmental programs during the *first term* of enrollment and each subsequent term until such time as they demonstrate competence. Students who do not demonstrate proficiency within the first year of enrollment will face disqualification from the University.

At Cal Poly, students **may not** enroll in any college level mathematics or statistics course without satisfying the ELM requirement.

Students who need to take the ELM exam will be sent the information about the exam and how to register. This information is also available from the ELM/MAPE Office (805-756-2268), or online at [www.calpoly.edu/~math/elmmape.html](http://www.calpoly.edu/~math/elmmape.html)

### Cal Poly Mathematics Placement Examination (MAPE)

The Cal Poly Mathematics Placement Exams are diagnostic exams given by the Mathematics Department to place students who have satisfied the ELM requirement in the appropriate math course. **The MAPE is not intended for all students, so please read the following information carefully.**

#### Precalculus MAPE

Students who anticipate taking Trigonometry, Calculus, or Mathematics for Elementary Teaching (MATH 119, 141, 161, 221, or 327) must pass the precalculus MAPE unless they have presented proof of *one* of the following exemptions:

- a score of 600 or above on the mathematics section of the SAT I Test or on the SAT II Mathematics Tests Level I, IC (Calculator), II, or IIC (Calculator);
- a score of 30 or above on the American College Testing (ACT) Mathematics Test;
- a score of 3 or above on the College Board Advanced Placement Mathematics (Calculus AB or BC) examination;
- completion of MATH 118 at Cal Poly *or* transfer of a college course equivalent to MATH 118

**NOTE: For MATH 141**, students must also have credit for college or high school trigonometry, completed with grade C or better.

#### Intermediate Algebra MAPE

Students who anticipate taking Precalculus Algebra (MATH 118) must pass the intermediate algebra MAPE unless they have presented proof of one of the following exemptions:

##### For MATH 118:

- a score of 550 or above on the mathematics section of the SAT I Test or on the SAT II Mathematics Tests Level I, IC (Calculator), II, or IIC (Calculator);
- a score of 23 or above on the American College Testing (ACT) Mathematics Test; *or*
- a score of 65 or above on the ELM test.

**NOTE:** Students who have satisfied the ELM requirement and are planning to take MATH 112 or MATH 116 do *not* need to take the MAPE.

Students who need to take a math placement exam must do so prior to enrollment. The MAPE is free and offered regularly throughout the year. For information, contact the ELM/MAPE Office (805-756-2268) or the Math Department Office (805-756-2206).

## EVALUATION OF TRANSFER CREDIT

The Office of Academic Records evaluates previous college work as it relates to the requirements at Cal Poly. Each student seeking a degree will be issued an Evaluation of Transfer Credit statement, which will serve as a basis for determining the remaining requirements for the student's specific degree objective. Semester units transferred to Cal Poly will be converted to quarter units by multiplying the semester units by one and one-half.

Evaluation of Transfer Credit statements are completed automatically after students are admitted. It is important that new transfer students review their previous college work in terms of the degree and credential requirements outlined in the catalog to make a tentative selection of courses for their first quarter of enrollment. Students should consult a faculty advisor in their major department or the appropriate Advising Center for assistance in the selection of courses.

The evaluation remains valid as long as the student matriculates for the term specified, pursues the objective declared, and remains in continuous attendance.

While students may follow the specific catalog year academic requirements on which their Evaluation of Transfer Credit is based, they will be responsible for complying with changes in other regulations, policies, and procedures, which may appear in subsequent catalogs.

### Credit for Community College Courses

Course credit earned in accredited community colleges will be evaluated by the Evaluations Unit in the Office of Academic Records in accordance with the following provisions:

- Community college credit is allowed up to a maximum of 105 quarter units (70 semester units). Credits and grades earned above the maximum allowable may be used only to satisfy subject and grade point requirements but they may not be applied toward the total units required for graduation.
- Upper division credit will not be allowed for community college work.

Cal Poly maintains articulation agreements at [www.assist.org](http://www.assist.org) with all of the California Community Colleges (CCC), the California State University (CSU) and University of California (UC) campuses. The CCC campuses publish the CSU General Education (GE) and Intersegmental General Education Transfer Core (IGETC) course lists on the ASSIST website.

Transfer credit for GE courses will be 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. Many Cal Poly programs require specific GE courses in the Major and/or Support; these courses must be met with articulated equivalencies. See catalog page 56 and following for General Education requirements.

## OTHER ACADEMIC CREDIT

### Advanced Placement (AP) Credit

Cal Poly grants credit for AP exams successfully completed through the College Board AP program. AP scores may be requested from Educational Testing Service (ETS)/AP Programs and should be sent to Cal Poly electronically. Exams passed with a score of 3 or higher result in nine (9) quarter units of credit, except where otherwise noted. *To request scores: ETS/AP Program, PO Box 6671, Princeton, NJ 08541-6671 or (609) 771-7300.*

Credit may vary from year to year, as Cal Poly requirements and AP Exams change. AP credit matrices are available on the Office of Academic Records website:

[www.ess.calpoly.edu/records](http://www.ess.calpoly.edu/records). The AP exams for May 2007 will be available after publication of this catalog. The following table indicates credit likely to be given, based on past experience. It should be viewed as a guideline only and is subject to change:

ADVANCED PLACEMENT EXAM CREDIT - 2006		
Exam Name	#	Credit Granted & GE Area (GE)
<b>Art History</b>	13	ART 112 plus electives (C3)
<b>Art: Drawing</b>	14	9 units electives
<b>Art: 2-D Design</b>	15	9 units electives
<b>Art: 3-D Design</b>	16	9 units electives
<b>Biology:</b>	20	Score 3 = BIO 111 or 115 plus electives (B2 & B4) Score 4 or 5 = BIO 111 or 115 or 151 or 161 or BIO 213/ENGR 213 plus electives (B2 & B4)
<b>Calculus AB</b>	66	MATH 141 or 161 or 221 or 112 or 118 or 118 & 119 plus GE B1 electives. (B1)
<b>Calculus BC</b>	68	MATH 141 & 142 or 161 & 162 or 141 & 182 or 112 or 118 or 118 & 119 or 221 plus GE B1 electives. (B1)
<b>Calculus BC: AB Subscore</b>	69	MATH 141 or 161 or 221 or 112 or 118 or 118 & 119 plus GE B1 electives. (B1)
<i>Note: If both Calculus AB &amp; BC exams are passed, credit is extended only for Calculus BC, since BC duplicates AB material.</i>		
<b>Chemistry</b>	25	Score 3 = CHEM 110 or 111 or 124 or 127 plus electives. (B3 & B4)
		Score 4 or 5 = CHEM 110 or 111 or 124 or 127 plus electives; check with the Chemistry Dept. for possible credit for CHEM 125 or 128. (B3 & B4)
<i>Note: 2007 AP Exam Yr: Score of 3 = CHEM 110 or 111 plus electives. Score 4 or 5 MAY give credit for CHEM 124 or 127 plus electives upon consultation with the Chemistry Dept Chair and course coordinator.</i>		

ADVANCED PLACEMENT EXAM CREDIT - 2006		
Exam Name	#	Credit Granted & GE Area (GE)
Computer Sci: Test A	31	Score 3 = 9 units electives Score 4 or 5 = CSC 101 plus electives
Computer Sci: Test AB	33	Score 3 = 9 units electives Score 4 or 5 = CSC 101 plus electives
<i>Note: If both Computer Science A &amp; AB are passed, credit is extended for Computer Science AB, since AB duplicates the A material.</i>		
Economics: Micro	34	ECON 221 plus electives
Economics: Macro	35	ECON 222 plus electives (D2)
English: Lang & Comp	36	ENGL 134 plus electives (A1)
English: Lit & Comp	37	Score 3 = ENGL 134 plus electives (A1)
English: Lit and Comp	37	Score 4 or 5 = ENGL 134 & GE C1 Lit (4 units) plus 1 elective (A1 & C1) English Majors only: ENGL 134 plus electives (A1 only)
<i>Note: If both English Lit/Comp &amp; Lang/Comp are passed, only 4.5 units of credit are awarded for the second exam (total of 13.5 units).</i>		
Environmental Science	40	FNR 101 plus electives
European History	43	HIST 111 plus electives
French: Language	48	Score 3 = FR 121 plus electives Score 4 or 5 = FR 121 & 122 plus 1 elective
French: Literature	51	Score 3 = FR 121 plus electives Score 4 = FR 121 & 122 plus 1 elective Score 5 = FR 121 (1 unit) & 122 & 233 (233 = C1)
<i>Note: If both French Language &amp; Literature are passed, only 4.5 units of credit are awarded for the second exam (total of 13.5 units).</i>		
German Language	55	Score 3 = GER 121 plus electives Score 4 or 5 = GER 121 and 122 plus 1 elective
Govt & Politics: Comparative	58	9 units electives
Govt & Politics: United States	57	Upon completion of POLS 111 (1 unit CA Govt.) 3 units of credit are awarded for GE D1 (no credit for USCP) plus electives
Human Geog	53	GEOG 150 plus electives (D3)
Italian Language & Culture	58	Score 3 = FORL 121 plus electives Score 4 or 5 = FORL 121 & 122 plus 1 elective

ADVANCED PLACEMENT EXAM CREDIT - 2006		
Exam Name	#	Credit Granted & GE Area (GE)
Latin: Virgil	60	Score 3 = FORL 121 plus electives Score 4 or 5 = FORL 121 & 122 plus 1 elective
Latin: Literature	61	Score 3 = FORL 121 plus electives Score 4 or 5 = FORL 121 & 122 plus 1 elective
<i>Note: If both Latin Virgil &amp; Latin Literature are passed, only 4.5 units of credit are awarded for the second exam (total of 13.5 units).</i>		
Music Theory	75	MU 101 plus electives (C3)
Physics B	78	Score 3 = PHYS 104 plus electives. Present lab book to Physics Dept. for review and <i>possible</i> lab credit) (B3)
		Score 4 or 5 = PHYS 121 (1 unit) & 122 & 123 (B3 & B4)
Physics C: Mechanics	80	Score 3 = PHYS 121 plus electives (B3 & B4) Score 4 or 5 = PHYS 131 plus electives (B3 & B4)
<i>Note: If both Physics B &amp; C: Mechanics are passed, credit is extended for Physics C (total of 9 units), since C duplicates the B material.</i>		
Physics C: Electricity & Magnetism	82	Score 3 = PHYS 123 plus electives (B3) Score 4 or 5 = PHYS 133 plus electives (B3 & B4)
Psychology	85	Score 3 = PSY 201 or 202 plus electives (D4)
		CD/PSY Majors only: Score 4 or 5 = PSY 201 or 202 (D4) plus lower-division concentration/ICS electives, if approved by dept. advisor.
Spanish: Language	87	Score 3 = SPAN 121 plus electives Score 4 or 5 = SPAN 121 & 122 plus 1 elective
Spanish: Literature	89	Score 3 = SPAN 121 plus electives Score 4 = SPAN 121 and 122 plus 1 elective Score 5 = SPAN 121 (1 unit), 122, and 233 (233 only = C1)
<i>Note: If both Spanish Language and Literature are passed, only 4.5 units of credit are awarded for the second exam (total of 13.5 units).</i>		
Statistics	90	Score 3 = STAT 130 plus electives (B1)
		Score 4 or 5 = STAT 211 or 217 or 218 or 221 or 251 plus electives (B1)

ADVANCED PLACEMENT EXAM CREDIT - 2006		
Exam Name	#	Credit Granted & GE Area (GE)
U. S. History	07	Upon completion of POLS 111 (1 unit CA Govt.), then 3 units of credit are awarded for <b>GE D1</b> (no credit for USCP) plus electives
<i>Note: If both US History &amp; US Govt/Politics are passed, upon completion of POLS 111, 3 units of credit are awarded for GE D1 (no credit for USCP) plus electives</i>		
World History	93	HIST 215 plus electives ( <b>D3</b> )

### International Baccalaureate (IB) Exam Credit

The Cal Poly Academic Senate adopted a credit policy regarding the IB program in February 1990, as follows:

The International Baccalaureate Diploma shall be considered in lieu of a high school diploma for admission to the University.

Credit will be awarded for classes at the **Higher** level.

All credit is given on a credit/no credit basis; no units are calculated into the GPA.

For each exam score of 5 or higher, a maximum of 8 units of **elective** credit shall be awarded.

Course-specific credit may be granted with the concurrence of the academic department.

The following table indicates credit likely to be given, based on past experience. It should be viewed as a guideline only and is subject to change:

International Baccalaureate Exam Credit - 2006	
Exam Name	Credit Given & GE Area (GE)
<b>Biology</b> Grade of 5 or 6	BIO 111 or 115 plus electives ( <b>B3 &amp; B4</b> )
Grade of 7	BIO 111 or 115 or 151 plus electives ( <b>B3 &amp; B4</b> )
<b>Chemistry:</b>	CHEM 110 or 111 or 127+128 or 124 (see Chem Dept for possible credit for CHEM 125) plus electives <i>possible</i> ( <b>B3 &amp; B4</b> )
<i>Note: 2007 AP Exam Yr: CHEM 110 or 111 plus electives. Credit MAY give credit for CHEM 124 or 127 plus electives upon consultation with the Chemistry Dept Chair and course coordinator.</i>	
<b>Computer Science</b>	8 units electives
<b>Economics:</b>	ECON 222 plus electives ( <b>D2</b> )
<b>English:</b> Grade of 5	8 units electives
Grade of 6 or 7	ENGL 253 plus electives ( <b>C1</b> )
<b>History:</b> European	HIST 111 plus electives
American	Upon completion of POLS 111 (1 unit of Calif Govt), 3 units of IB exam credit are awarded for Area D1 (no credit for USCP) plus electives ( <b>D1</b> )

International Baccalaureate Exam Credit - 2006	
Exam Name	Credit Given & GE Area (GE)
<b>Language A1/A2:</b> French	FR 305 plus electives ( <b>C4</b> )
German	GER 305 plus electives ( <b>C4</b> )
Spanish	SPAN 305 plus electives ( <b>C4</b> )
<b>Language B:</b> French	FR 301 plus electives
German	GER 301 plus electives
Spanish	SPAN 301 plus electives
<b>Mathematics:</b>	MATH 141 or 161 or 221 plus electives ( <b>B1</b> )
<b>Philosophy</b>	8 units electives
<b>Physics:</b>	PHYS 121 & 122 & 123 ( <b>B3 &amp; B4</b> )
<b>Psychology:</b>	PSY 201 or 202 plus PSY prefix electives ( <b>D4</b> )
<b>Social Anthropology</b>	ANT 201 and GEOG 150 ( <b>D3</b> )

### Credit for Non-collegiate Instruction

Cal Poly grants undergraduate degree credit for successful completion of non-collegiate instruction, either military or civilian, appropriate to the baccalaureate, which has been recommended by the Commission on Educational Credit and Credentials of the American Council on Education. The number of units allowed are those recommended in the Guide to the Evaluation of Educational Experience in the Armed Services and the National Guide to Educational Credit for Training Programs.

### Credit for Military Service

Nine quarter units of elective credit will be allowed toward graduation to any student submitting evidence of satisfactory completion of basic training in the military service of the United States. Credit is allowed in accordance with the recommendations by the Commission on Educational Credit and Credentials of the American Council on Education. The number of units allowed are those recommended in the *Guide to the Evaluation of Educational Experience in the Armed Services*. Credit is not given for college level General Educational Development Tests. No grade points are assigned in connection with units of credit allowed for military service. The units allowed are not included in scholarship computations.

### Credit by Examination

Cal Poly grants credit to those students who pass examinations that have been approved for credit systemwide. These include the Advanced Placement Examination and some College Level Entrance Program (CLEP) examinations.

CLEP tests acceptable for credit are:

- College Algebra-Trigonometry with a passing score of 49;
- General Chemistry with a passing score of 48;



- Calculus with Elementary Functions with a passing score of 51.

4.5 quarter units of credit may be earned with an assigned grade of credit (CR), which is not included in the GPA calculation.

Credit for CLEP and other externally developed examinations will *not* be awarded if any of the following apply:

- examination previously taken within the past year;
- equivalent degree credit or duplicate credit has already been granted;
- credit has been granted for previous coursework or for a previously completed more advanced or higher level examination.

### Challenging Cal Poly Courses

A student may challenge a course in which he or she is qualified through previous education by taking an examination developed at the campus. Credit shall be awarded to those who pass them successfully. A student may not petition for credit by examination if the student has *ever* been enrolled in the course. Credit shall not be awarded when credit has been granted at a level more advanced than that represented by the course.

The credit by examination option is only available to regular Cal Poly students during a term in which they are officially enrolled. The graded credit by examination petition must be received by the Office of Academic Records prior to the beginning of the term after which credit is to be granted. A fee is charged for such an exam.

The examination may include written, oral, or skills tests, or a combination of all three types, and will be sufficiently comprehensive to determine that the student has essentially the same knowledge and skills as those students who successfully complete the course. The grade received is entered on the student's permanent record. The grade may not be Credit/No Credit. The length of the examination will be consistent with the unit value of the course.

Arrangements to obtain course credit by exam may be made with the head of the department in which the course is taught. Units of credit received through this procedure do not apply toward the residence requirements for any of the degrees or credentials offered by the University. Detailed instruction for applying for credit by examination may be obtained from the Office of Academic Records.

## 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 remaining degree requirements may include senior project, Graduation Writing Requirement, and/or United States Cultural Pluralism requirement. 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.

## 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..... 180 units

For the Bachelor of Arts (BA), a minimum of 18 major units must be in upper division courses and 60 units overall must be upper division. For the Bachelor of Science (BS), a minimum of 27 major units must be in upper division courses and 60 units overall must be upper division. Individual baccalaureate degree programs may require more than 180 units. (Title 5, Sections 40500, 40501, 40505, 40507)

#### 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 61.

#### 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 56).

#### 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 will be the end of the quarter in which all requirements have been met.

Graduating students will receive a complimentary diploma. Additional diplomas may be ordered through El Corral Bookstore. The diploma will not be ordered until all degree requirements have been completed. The diploma will be mailed approximately three to four weeks after the degree has been awarded.

If a student breaks attendance 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/~wrtskils](http://www.calpoly.edu/~wrtskils).

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 must be fulfilled at Cal Poly, not at another campus.

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 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, or 381.

## 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 will be 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 will be 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 will be reproduced on microfiche or in an electronic format. A microfiche or electronic copy of the project will become part of the Library's archival collection where it will be available for public use.
2. After being copied on microfiche or electronically, the original project will be 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 will be permanently retained in the Library collection.

3. All projects submitted to the Library will 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 will be 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 will be noted on the student's transcript, but will not be shown on the diploma. In no case will a diploma be 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 will be awarded honors at graduation. 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 75 for additional information.

### Change of Major

An application for change of major will not be 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 will be 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 will be accepted.* At a minimum, a selection process will take place twice each year. Students should contact the target major department for specific information regarding change of major.

Admission to a new curriculum will depend on the availability of space within the limitations imposed by budget, faculty, and facilities. Once approved, students will automatically receive from the Office of Academic Records a new evaluation of completed requirements for the new major.

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 will be 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 will be acknowledged on the diploma. The student will be 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.

### Second Bachelor's Degree

A qualified student who holds a bachelor's degree from Cal Poly or from another accredited institution may be awarded a second bachelor's degree in a different major. Students must complete General Education requirements in accordance with the Chart 3 policies on the GE website under Second Baccalaureate (<http://ge.calpoly.edu>). All students must complete 12 units of GE in residence per CSU/Title 5 policy. A minimum of 45 units of coursework for Cal Poly graduates and 50 units for graduates from another accredited institution must be completed in residence after the requirements for the first degree have been fulfilled. A senior project is required for each bachelor's degree.

### Student Classification

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

## General Education

### Program Goals

Consistent with E.O. 595, 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 will 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 encouraged to complete lower division (foundational) courses as early as possible. This coursework in Areas A-D has been designed to give students the knowledge and skills to move to more complex materials.

### Technology Elective (Area F)

The elective is integrative in nature, requiring the application and generalization of basic scientific and mathematical knowledge along with the study of particular technologies with critical examination from multiple perspectives.

### Advising

Students should consult academic advisors and curriculum displays for specific courses that may be required in their degree program. GE courses may change quarterly; consult PASS for the latest information. Cal Poly's GE Program changed significantly with the 2001-03 catalog. If you are following a prior catalog, you should consult with your academic advisor and refer to Chart 1 or 2 at [ge.calpoly.edu](http://ge.calpoly.edu).

### Double-Counting

Courses from the student's Major department may not be used to fulfill upper-division electives in Area C4 or D5.

### GE Course Substitutions

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 will not be permitted except in extraordinary circumstances. Students requesting exceptions must follow petition procedures, outlined on the GE web site. This process may take several weeks.

### Transfer Credit

Transfer credit for GE courses will be 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. Many Cal Poly programs require specific GE courses in the Major and/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.

<b>GE Requirements</b> <b>2001-03 – 2007-09 Catalogs</b> <b><a href="http://www.ge.calpoly.edu/">www.ge.calpoly.edu/</a></b>			
<p><b>Most Majors</b>=Colleges of Agriculture, Food &amp; Environmental Sciences, Architecture &amp; Environmental Design, Business, Science &amp; Mathematics. <b>CLA</b>=College of Liberal Arts. <b>ENGR</b>=Engineering Programs.</p> <p>Some programs indicate specific GE courses to fulfill Major and Support course requirements.</p> <p>Courses from student's Major department may not be used to fulfill Areas C4 or D5.</p> <p>✓ non-unit requirement</p> <p>All GE courses are 4 units unless otherwise indicated.</p>			
	Most Majors	CLA only	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 students only)</b> CLA 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	0	0
<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	0
<b>AREA F TECHNOLOGY (upper-div)</b>	4	4	0
<b>TOTAL GE UNITS</b>	<b>72</b>	<b>72</b>	<b>72</b>

<b>General Education Courses</b>			
	Most Majors	CLA only	ENGR only
<b>AREA A: COMMUNICATION</b>	<b>12</b>	<b>12</b>	<b>12</b>
<b>A1 Expository Writing</b>	4	4	4
ENGL 133 Writing: Exposition for ESL Students ENGL 134 Writing: Exposition			
<b>A2 Oral Communication</b>	4	4	4
COMS 101 Public Speaking COMS 102 Principles of Speech Communication HNRS 101 Public Speaking			
<b>A3 Reasoning, Argumentation, and Writing</b>	4	4	4
COMS 126 Argument & 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 only	ENGR only
<b>AREA B: SCIENCE &amp; MATH</b>	<b>16</b>	<b>20</b>	<b>28</b>
<b>B1 Mathematics/Statistics</b>	8	8	8
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 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 & Regression Models			
<b>B2 Life Science (B2&amp;4=lab course)</b>	4	4	4
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 & 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 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 & Energy (B3&4) PSC 103 Physical Environment: Earth & Universe			
<b>B4 One lab taken with B2 or B3 course</b>	✓	✓	✓
<b>CLA students: (Select one from B1-B5)</b>	<b>0</b>	<b>4</b>	<b>0</b>
<b>B5 elective (GE option for College of Liberal Arts students only)</b>	--	--	--
BIO 112 Conservation Biology & Environmental Science BIO 302 Human Genetics BIO 305 Biology of Cancer BOT 311 Plants, People and Civilization FNR 319 Natural Resource Ecology, Theories & Applications FSN 210 Nutrition GEOL 203 Fossils and History of Life <a href="#">HNRS 319 Natural Resource Ecology, Theories &amp; Applications</a> MATH 326 Mathematics and Visual Art 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 & Statistics for Engineers and Scientists STAT 350 Probability & 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 only</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 18th Century - Present ENGL 240 American Tradition in Literature ENGL 251 Great Books I: Ancient & 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 & Classical World SPAN 233 Introduction to Hispanic Readings			
<b>C2 Philosophy</b>	<b>4</b>	<b>4</b>	<b>4</b>
<a href="#">HNRS 230 Philosophical Classics: Metaphysics &amp; Epistemology</a> HNRS 231 Philosophical Classics: Social & Political Philosophy PHIL 230 Philosophical Classics: Metaphysics & Epistemology PHIL 231 Philosophical Classics: Social & 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 & 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 will not receive C4 credit</i> ARCH 320 Topics in Architectural History ARCH 326 Native American Architecture & Place (USCP) ART 314 History of Photography ART 318 Asian Art: National, Religion & Intel Movements 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 20th Century (USCP)  
 ENGL 346 Ethnic American Lit (USCP)  
 ENGL 347 African American Literature (USCP)  
 ENGL 349 Gender in 20th-Century Literature (USCP)  
 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 20th-Century American Lit (USCP)  
 ENGL 386 Creative Nonfiction  
 ENGL 387 Fiction Writing  
 ENGL 388 Poetry Writing  
 ES 300 Chicano/a Non-Fiction Literature (USCP)  
 ES 326 Native American Architecture & Place (USCP)  
 ES 360 Ethnicity & Land (USCP)  
 FNR 360 Ethnicity & Land (USCP)  
 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 380 Literary Themes  
 HUM 303 Values and Technology  
 HUM 310 World Cultures  
 HUM 312 Chicano/a Culture (USCP)  
 HUM 320 Values, Media, Culture  
 HUM 361 Modernism  
 MU 324 Music and Society  
 MU 328 Women in Music  
 PHIL 311 Greek Philosophy  
 PHIL 312 Medieval Philosophy  
 PHIL 313 Continental Philosophy: Descartes to Leibniz  
 PHIL 314 British Philosophy: Bacon to Mill  
 PHIL 315 German Philosophy: Kant to Nietzsche  
 PHIL 316 Contemporary European Philosophy  
 PHIL 317 Contemporary British & American 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 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  
 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  
 WS 370 Religion, Gender and Society (USCP)

<b>Area C Elective</b> (one course from C1-C4)	<b>4</b>	<b>0</b>	<b>0</b>
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	Most Majors	CLA only	ENGR only
<b>AREA D/E: SOCIETY &amp; INDIVIDUAL</b>	<b>20</b>	<b>20</b>	<b>16</b>
<b>D1 The American Experience</b> (40404)	<b>4</b>	<b>4</b>	<b>4</b>

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

<b>D2 Political Economy</b>	<b>4</b>	<b>4</b>	<b>4</b>
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ECON 201 Survey of Economics  
 ECON 222 Macroeconomics  
 HIST 213 Modern Political Economy  
 HIST 214 Political Economy of Latin America & Middle East  
 HNRS 201 Survey of Economics  
 SOC 218 International Political Economy

<b>D3 Comparative Social Institutions</b>	<b>4</b>	<b>4</b>	<b>4</b>
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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 215 World History II  
 HNRS 212 Global Origins of U.S. Cultures (USCP)  
 HNRS 215 Comparative World History  
 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 & Culture (USCP) KINE 250 Healthy Living KINE 255 Personal Health: Multi-cultural Approach (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 will not receive D5 credit</i>			
ANT 325 Precolumbian Mesoamerica ANT 330 Indigenous South Americans ANT 344 Sex, Death & Human Nature <a href="#">ANT 345 Human Behavioral Ecology</a> ANT 360 Human Cultural Adaptations BUS 311 Managing Technology International Legal Environ CRP 334 Cities in Globalizing 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 <a href="#">ES 310 Hip-Hop, Poetics and Politics (USCP)</a> ES 320 African 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) <a href="#">ES 381 The Social Construction of Whiteness (USCP)</a> FNR 308 Fire and Society FNR 323 Human Dimensions Natural Resource Management 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 HIST 307 European Thought, 1800-2000 HIST 308 Trans-Atlantic Slave Trade HIST 309 Cultures of West Africa & African Diaspora HIST 310 East Asian Culture & Civilization HIST 316 Modern East Asia HIST 319 Modern South and Southeast Asia HIST 320 Colonial & 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) HUM 316 London: From Roman Colony to World Capitol KINE 323 Sport and Gender (USCP) KINE 324 Sport, Media & American Popular Culture (USCP) POLS 325 Global Political Issues POLS 338 Critical Issues American Politics POLS 339 Comparative Political Regimes PSY 311 Environmental Psychology PSY 318 Psychology of Aging PSY 352 Conflict Resolution: Violent & Nonviolent SOC 315 Global Race and Ethnic Relations SOC 326 Sociology of the Life Cycle SOC 377 Sociology of Religion			

WS 301 Introduction to Women's Studies (USCP) WS 311 Women in Cross Cultural Perspectives WS 340 Sexuality Studies			
	<b>Most Majors</b>	<b>CLA only</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 & Society AG 350 The Global Environment AG 360 Holistic Management BIO 307 World Aquaculture: Applies, Methods & Trends BIO 317 Introduction to the World of Spatial Information 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 & Society CSC 310 Computers for Poets EDES 350 The Global Environment ENGR 302 Transportation & 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) FNR 312 Technology of Wildland Fire Management FNR 317 Introduction to the World of Spatial Information FNR 321 Water Systems Technology, Issues and Impacts FSN 319 Food Technology/Customer GEOG 317 Introduction to the World of Spatial Information 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 <a href="#">HNRS 311 Computers for Poets</a> HUM 302 Human Values in Agriculture HUM 330 Cal Poly Land: Nature, Technology & Society HUM 350 The Global Environment IME 320 Human Factors & Technology IT 336 Textile Technology IT 341 Plastics Processes & Applications LA 317 Introduction to the World of Spatial Information MATE 359 Living in the Material World ME 320 Consumer Energy Guide ME 321 Solar Energy POLS 333 World Food Systems PSC 307 Nuclear Weapons in Post 9/11 World PSC 320 Energy and the Environment SCM 320 Technology in London SCM 325 Genetic Engineering Technology SCM 330 Ocean Discovery through Technology SCM 350 The Global Environment UNIV 330 Cal Poly Land: Nature, Technology & Society UNIV 333 World Food Systems UNIV 350 The Global Environment WS 350 Gender, Race, Science and Technology (USCP)			
<b>Total GE Units</b>	<b>72</b>	<b>72</b>	<b>72</b>

## U.S. Cultural Pluralism Requirement

**United States Cultural Pluralism (USCP)** courses fulfill the following criteria:

1. Emphasis on one or more of these four U.S. cultures: Asian American, African American, Hispanic American, American Indian;
2. Attention to general issues of gender, diversity, equity, ethnocentricity, and ethnicity; and the relationships to problems facing contemporary society, especially those resulting from racism, discrimination and cultural conflict;
3. Application of rigorous pedagogical, scholarly methods and standards as evidenced in substantive exams, reports, papers, and projects; and
4. Attention to critical thinking skills which will allow students to address cultural, racial, and gender issues in a sensitive and responsible manner and to evaluate their own attitudes and those of others.

Students are required to complete *one* USCP course. This course will also fulfill a requirement for Major, Support, General Education, or Free Elective category.

The following courses fulfill the United States Cultural Pluralism requirement. Consult the Schedule of Classes (PASS) or your academic advisor for an up-to-date list.

\* = *Course also satisfies a General Education requirement*

AGB 401 Managing Cultural Diversity in Agricultural Labor Relations (4)  
 ANT 415 Native American Cultures (4)  
 ARCH 326 Native American Architecture & Place (4) C4\*  
 COMS 416 Intercultural Communication (4)  
 CRP 215 Planning for and with Multiple Publics (4)  
 DANC 321 Cultural Influences/Dance in America (4) C4\*  
 ECON 303 Econ Poverty/Discrim/Immigration (4) D5\*  
 ENGL 345 Women Writers (4) C4\*  
 ENGL 346 Ethnic American Literature (4) C4\*  
 ENGL 347 African American Literature (4) C4\*  
 ENGL 349 Gender in 20<sup>th</sup> Century Literature (4) C4\*  
 ENGL 381 Diversity in 20<sup>th</sup> Century Amer. Lit. (4) (C4)\*  
 ES 112 Race, Culture, and Politics--United States (4) D1\*  
 ES 114 Race in American Culture (4)  
 ES 212 Global Origins of U.S. Cultures (4) D3\*  
 ES 215 Planning for and with Multiple Publics (4)  
 ES 240 Latino Metropolis (4)  
 ES 241 Survey of Indigenous Studies (4) D3\*  
 ES 242 Survey of Africana Studies (4) D3\*  
 ES 243 Survey of Latino/a Studies (4) D3\*  
 ES 244 Survey of Asian American Studies (4) D3\*  
 ES 300 Chicano/a Non-Fiction Literature (4) C4\*  
 ES 310 Hip-Hop, Poetics and Politics (4) D5\*  
 ES 320 African American Cultural Images (4) D5\*  
 ES 321 Native American Cultural Images (4)  
 ES 322 Asian American Cultural Images (4) D5\*  
 ES 323 Mexican American Cultural Images (4) D5\*

ES 325 Sex & Gender in African Amer. Communities (4)  
 ES 326 Native American Architecture & Place (4) C4\*  
 ES 330 Chinese American Experience (4) D5\*  
 ES 335 The Filipina/o American Experience (4) D5\*  
 ES 350 Gender, Race, Science and Technology (4) **Area F\***  
 ES 360 Ethnicity and the Land (4) C4\*  
 ES 380 Critical Race Theory (4)  
 ES 381 The Social Construction of Whiteness (4) D5\*  
 FNR 360 Ethnicity and the Land (4) C4\*  
 FSN 250 Food and Nutrition: Customs/Culture (4) D4\*  
 HIST 206 American Cultures (4) D1\*  
 HIST 207 Freedom & Equality American History (4) D1\*  
 HIST 333 African American History from 1865 (4)  
 HIST 435 American Women's History since 1870 (4)  
 HNRS 112 Race, Culture, and Politics—U. S. (4) D1\*  
 HNRS 212 Global Origins of U.S. Cultures (4) D3\*  
 HNRS 303 Econ Poverty/Discrim/Immigration (4) D5\*  
 HUM 312 Chicano/a Culture (4) C4\*  
 KINE 255 Personal Health: Multicultural Approach (4) D4\*  
 KINE 323 Sport and Gender (4) D5\*  
 KINE 324 Sport/Media/American Popular Culture (4) D5\*  
 MU 221 Jazz Styles (4) C3\*  
 MU 229 Music of the 60s: War and Peace (4) C3\*  
 MU 325 America's Music (4)  
 PHIL 335 Social Ethics (4) C4\*  
 PHIL 336 Ethics, Gender and Society (4) C4\*  
 POLS 310 Politics of Ethnicity and Gender (4)  
 POLS 343 Civil Rights in America (4)  
 PSY 472 Multicultural Psychology (4)  
 RELS **370 336** Religion, Gender and Society (4) C4\*  
 SOC 316 American Ethnic Minorities (4)  
 SPAN 111 Elementary Hispanic Language & Culture (4)  
 SPAN 123 Spanish for Heritage Speakers (4)  
 SPAN 340 Chicano/a Authors (4) C4\*  
 SPAN 351 Latino/a Writers in the U. S. (4) C4\*  
 TH 320 Black Theatre (4) C4\*  
 WS 301 Introduction to Women's Studies (4)  
 WS **370 336** Religion, Gender and Society (4) C4\*  
 WS 350 Gender, Race, Science and Technology (4) **Area F\***  
 WS 435 American Women's History since 1870 (4)  
 WS 450 Feminist Theory (4)

## Registration

Students are required to enroll in courses by using the web registration system (CPRreg). The courses selected should meet the requirements specified for each student's major course of study.

Credit for coursework completed is given only when the student is properly registered. A student is not properly registered until fee requirements have been met and enrollment in classes through the CPRreg system has been confirmed. **Students are strongly advised to print copies of their schedule for their records.** Individuals are not permitted to attend courses unless they are officially registered as regular students, as approved extension students, or as enrolled auditors (see Audit).

Information concerning registration for classes is available at [www.ess.calpoly.edu/records/registration](http://www.ess.calpoly.edu/records/registration). Information concerning payment of fees is available at [www.fees.calpoly.edu](http://www.fees.calpoly.edu).

### ENROLLMENT POLICY

State funding is allocated to the University based on student enrollment each term. Any attendance/participation in classes where the student is not officially enrolled during the term of participation (and where appropriate registration fees have not been paid) is against campus policy. This includes enrollment in Internship courses and acceptance of a position through the Cooperative Education program. All registration should be completed by the end of the Add Period, the 8<sup>th</sup> day of the term.

Official term enrollment requires the awarding of grades for classes attempted.

### CLASS ATTENDANCE

Students are expected to attend regularly to keep the quality and quantity of work high. Absence from classes is regarded as serious, and work missed is not excused.

An excused absence can be allowed only by the instructor in charge of the class upon consideration of the evidence justifying the absence presented by the student. An excused absence merely gives the individual who missed the class an opportunity to make up the work and is not an excuse from the work required.

### HOLDING OF RECORDS

Student records may be placed on a "Hold" status because of financial or other obligations to the University. The Hold authorizes the University to deny registration, prevent the release of transcripts, and to withhold other services normally provided to the student. A student's records will be held until the obligation is cleared to the satisfaction of the office or department placing the Hold.

### ENROLLMENT STATUS

*Full-time undergraduate students* are those enrolled in 12 or more units of coursework in any regular quarter. *Half-time undergraduate students* are those enrolled in 6 to 11 units, and part-time undergraduate students are those enrolled for 5 or less units. Verification of enrolled units is based on enrollment status at the time of the verification request. Full-time status for graduate students is defined in the "Graduate Studies" section of this catalog.

### MAXIMUM UNIT LOAD

The maximum load for all students is 22 quarter units including audited courses and concurrent work at other colleges. Exceptions may be made with the advance approval of the student's major department head or graduate advisor. Increase in maximum unit load is not available to students on academic probation. Maximum load requirements may be waived only on presentation of evidence of ability to carry successfully such a group of

courses. A petition to carry an excess load is available from the Office of Academic Records.

### ADD/DROP

All changes to individual class registration or enrollments are the **responsibility of the student**. The add/drop period continues through CPReg initial registration cycles until the end of the 8<sup>th</sup> day of instruction of each term. During this period, the student has the opportunity to add or drop classes. See specific dates for completing these transactions at [www.ess.calpoly.edu/records/Calendars\\_Deadlines](http://www.ess.calpoly.edu/records/Calendars_Deadlines). Students are responsible for knowing and adhering to these published timelines and for their enrollments.

#### Adding

*Closed classes:* If a class is full, students may use a permission number, issued by the instructor, during the first 8 days of instruction. See [www.ess.calpoly.edu/records/registration](http://www.ess.calpoly.edu/records/registration) for details.

*Time conflict:* Students may not enroll in two classes that meet at the same time.

*Eligibility:* Students must meet prerequisite and Schedule of Classes footnote requirements and be in attendance at the first class meeting to remain enrolled in the class.

*Late registration:* Students registering late have until the end of the add/drop period to pay late registration fees and to register for classes through CPReg with a permission number issued by the instructor of the class.

#### Dropping

Students have until the end of the 8<sup>th</sup> day of instruction to drop a class through CPReg. No entry will be made on their academic records. At the end of the regular add/drop period the instructor must assume that any student who has not dropped voluntarily remains officially enrolled in the class. For information on withdrawing after the end of the regular add/drop period see Withdrawals from Courses.

*First class meeting:* An instructor **may** drop a student from a class for failure to attend the first class meeting.

*Footnote requirement:* An instructor **may** drop a student from a class if the footnote requirements, as stated in the Schedule of Classes, are not met.

*Prerequisite missing:* An instructor **may** drop a student from a class if the prerequisite requirements, as stated in the catalog course description, have not been completed.

*Canceled classes:* If a class is canceled, students will be automatically dropped and have no reporting responsibilities.

### LEAVES OF ABSENCE

Students are permitted to take a Planned Educational Leave or a Medical Leave with a written request and approval by campus officials.

**Eligibility for All Leaves**

1. A student on Educational or Medical Leave will be considered to be in continuous attendance with the purpose of returning to the same curriculum that was in effect when the leave began.
2. A student on Educational or Medical Leave will not be required to apply for readmission or pay an application fee provided that the student returns to the same major and within the time period agreed upon when the application was approved.
3. No more than two leaves will be available to each student (totaling a maximum of 8 terms).
4. A student on leave may return and enroll for any term prior to the term when the leave is scheduled to end. NO leave will be extended beyond the two-year limitation for any reason.
5. Any student on leave who fails to return and enroll within the time limits specified by the leave agreement will be required to reapply for admission, pay the reapplication fee, and may be held to any new curriculum requirements which may be in effect.

**Educational Leaves:**

1. A Planned Educational Leave must be for a purpose that contributes to the student's educational objective and is approved by the student's major department head or chair.
2. To be considered for an Educational Leave, the student must be eligible to enroll for the term in which the leave begins and not be on academic probation.
3. The application for Educational Leave must be initiated and approved before the leave begins and will not be granted retroactively.
4. Application forms and information concerning Leaves of Absence may be obtained from the Office of Academic Records.

**Medical Leaves:**

1. A Medical Leave provides time for the student to receive treatment or to recover from a disabling injury or other medical condition and is approved by a medical doctor.
2. The Medical Leave begins the term following the student's last term in attendance and may be granted retroactively based on the student's personal situation.
3. A written letter together with medical documentation is required. Information concerning Leaves of Absence may be obtained from the Office of Academic Records.

**RETURNING STUDENTS**

Matriculated students who have not registered for two consecutive quarters and who have not been on an approved leave of absence must file an application for readmission. The application fee must accompany the application for readmission. See the Admissions section for application deadlines for returning students.

Summer Quarter is a regular quarter and is counted in determining the length of absence.

**INTRASYSTEM AND INTERSYSTEM ENROLLMENT PROGRAMS**

Students enrolled at any CSU campus will have access to courses at other CSU campuses on a space available basis unless those campuses or programs are impacted. This access is offered without students being required to be admitted formally to the host campus and sometimes without paying additional fees. Although courses taken on any CSU campus will transfer to the student's home CSU campus as elective credit, students should consult their home campus academic advisors to determine how such courses may apply to their degree programs before enrolling at the host campus.

There are two programs for enrollment within the CSU and one for enrollment between CSU and the University of California or California community colleges. Additional information about these programs is available from the Office of Academic Records, Admin. 222.

**CSU Concurrent Enrollment** – matriculated students in good standing may enroll at both their home CSU campus and a host CSU campus during the same term. Credit earned at the host campus is reported to the home campus to be included on the student's transcript at the home campus. This counts as residential credit towards the degree but will be shown as transfer credit.

**CSU Visitor Enrollment** – matriculated students in good standing enrolled at one CSU campus may enroll at another CSU campus for one term. Credit earned at the host campus is reported to the home campus to be included on the student's transcript at the home campus as transfer credit.

**Intersystem Cross Enrollment** – matriculated CSU, UC, or community college students may enroll on a "space available" basis for one course per term at another CSU, UC, or community college and request that a transcript of record be sent to the home campus and will be recorded as transfer credit.

**HEALTH SCREENING**

Entering CSU students are required to present proof of the following immunizations to the CSU campus they will be attending before the beginning of their first term of enrollment. **Measles and Rubella:** All new and readmitted students born after January 1, 1957 must provide proof of full immunization (two MMRs) against measles and rubella prior to enrollment. **Hepatitis B:** All new students who will be 18 years of age or younger at the start of their first term at a CSU campus must provide proof of full immunization against Hepatitis B before enrolling. Full immunization against Hepatitis B consists of three timed doses of vaccine over a minimum 4 to 6 months period. Each incoming freshman who will be residing in on-campus housing will be required to return a form indicating that they have received

information about meningococcal disease and the availability of the vaccine to prevent contracting the disease and indicating whether or not the student has chosen to receive the vaccination. These are *not* admission requirements, but are required of students as conditions of enrollment in CSU. Proof of measles and rubella immunizations shall also be required for certain groups of enrolled students who have increased exposure to these diseases. These groups include:

- Students who live in campus residence halls;
- Students who obtained primary or secondary schooling outside the United States;
- Students enrolled in dietetics, medical technology, student teaching, or field work in a health care setting or involving preschool-age children; and
- Intercollegiate Athletes.

Registration will not be permitted until these requirements have been satisfied. Contact Health Services for further information concerning clearances or special circumstances.

## 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 will be 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	–

### Administrative Grading Symbols

AU	Audit	–
I	Incomplete (authorized)	–
RD	Report Delayed	–
RP	Report in Progress	–
W	Withdrawn	–
WU	Withdrawal Unauthorized	0

\* Certain sequenced courses may have a C– prerequisite for advancement.

\*\* If a grade of D+ 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.

### 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 will be given a grade of CR for accomplishment equivalent to a grade of C– or better. No credit (NC) will be given for D+ or lower grades. Graduate students will 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 will submit conventional letter grades to the Registrar's Office where they will be converted to Credit/No Credit grades. **NOTE: Some post-baccalaureate programs penalize students for a grade of CR.**

- c. 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.
- d. No more than two courses may be selected for Credit/ No Credit grading in any term.
- e. Units earned in courses for which the grade was CR will count toward satisfaction of all degree requirements.
- f. 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.
- g. Credit/No Credit grading will be removed for courses not meeting the above guidelines.
- h. 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 will determine the means by which the remaining course requirements will be 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 will be counted as an F (or NC) and the re-enrollment will be processed as a repeated course.

The instructor will designate terms of the contract and length of time allowed to complete work, not to exceed one year. Failure to complete the assigned work will result in the I being counted as equivalent to an F (or NC) for grade point average computation. All remaining grades of I will be 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".

A student may petition to have one grade of WU changed to a Withdrawal, with appropriate approvals, within one year of enrollment of the course. For details, contact the Office of Academic Records.

### 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 will be converted to an F. Grades of RP for graduate degree theses will convert to a grade of No Credit (NC) if a final grade has not been assigned within three years. All remaining RP grade symbols will be changed to F or NC at the time the student's degree is awarded.

### Repeating a Course

Undergraduate students may repeat a maximum of 20 units at Cal Poly for purposes of improving GPA. A course taken at Cal Poly or at another university or college in which a grade of D+ or less was received may be repeated at Cal Poly with the new grade recorded along with the prior

grade. If the second grade is equal to or higher than the first, then the grade earned by repeating the course will replace the quality points, quality hours and earned hours which were previously earned. The original grade is "forgiven" from GPA computation, but both grades appear on the student's permanent record (transcript). Effective Summer 2007, any course is eligible for grade forgiveness one time only. Repeated attempts will be averaged in the student's 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. If a course is re-taken with credit/no credit grading, the original grade will not be excluded from the GPA.

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 Extended Education

Repeat petitions for the situations listed above must be turned in to the Office of Academic Records by the end of the seventh week of the quarter in which the course is repeated.

If the student repeats a course in which a C- or higher grade was earned, both grades will be calculated in the grade point average, but the duplicate earned hours will not be counted toward the degree.

## 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 Academic Records. The petition will be 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 evalua-

tion 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 will be subject to failing grades (WU, F, or NC).

### 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 will not be 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 Academic Records, 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 will be 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 will remain 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 Academic Records.

### 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, will be 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. Terms taken at any institution may be disregarded.
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, due to extenuating circumstances.

For additional information about Academic Renewal contact the Office of Academic Records.

## 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

will 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.

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 will not be readmitted until presentation of satisfactory evidence that they have improved their chances of academic success. The request for readmission will be 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. This includes, but is 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.



## Academic Probation and Disqualification

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 will be 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 school 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 Academic Programs and Undergraduate Education or his/her designee. The right to an appeal is not guaranteed and an appeal will only be 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 17 for more detail on the functions of this Board)

**Student or Student Club Misconduct** – Office of Student Rights and Responsibilities, 756-2794 (See page 33 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 will 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.

# BS GENERAL ENGINEERING

## 2007-09 Cal Poly Catalog

Biomedical and General Engineering Department  
**Engineering Bldg. (13), Room 260**  
**(805) 756-6400**

- 60 units upper division       GWR
- 2.0 GPA                               USCP

\* = Satisfies General Education requirement

### 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 <i>and</i>	
MATE 215 Materials Laboratory I.....	3,1
ME 211 Engineering Statics.....	3
ME 212 Engineering Dynamics .....	3
ME 302 Thermodynamics .....	3
ME 341 Fluid Mechanics I.....	3
ME 343 Heat Transfer.....	4
ENGR 481, 482 Sr. Project Design Lab I, II <i>or</i>	
Sr. Project-appropriate engineering discipline .....	2,2
<sup>2</sup> Concentration or individual course of study.....	46
	<b>91</b>

### SUPPORT COURSES

BIO 213 <i>and</i> ENGR/BRAE 213 (B2)*.....	2,2
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 (10-30-07).....	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 units are in Support.  
 →See page 56 for complete GE course listing.  
 →Minimum of 8 units required at the 300-400 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**

<b>ELECTIVES.....</b>	<b>0</b>
	<b>191</b>

### CONCENTRATIONS OR INDIVIDUALIZED COURSE OF STUDY (select one)

#### Bioengineering Concentration

CSC 341 Numerical Engineering Analysis .....	4
ENGR 450 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 431, 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
	46

#### Biomedical Engineering Concentration

CHEM 312 Survey of Organic Chemistry .....	4
CHEM 313 Survey of Biochemistry and Biotechnology	5
ENGR 450 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 431, 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
	46

#### Individualized Course of Study .....

➡ Technical electives. A minimum of ~~34~~ 35 units must be at 300-400 level.

<sup>1</sup> ENGR 270 may be substituted for ENGR 112.

➡ <sup>2</sup> A minimum of ~~34~~ 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. *Corrected effective Summer 2007.*

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [Social Sciences Department](#)

### GEOG–GEOGRAPHY


#### **GEOG 150 Introduction to Cultural Geography (4) GE D3**

The interplay of cultures, places, and environments, with emphasis on the diversity, interrelationships, and spatial features of global cultures. Topics include characteristics and patterns of population, ethnicity, agriculture, geopolitics, language, religion, urbanization, industry, and folk and popular culture. 4 lectures.

#### **GEOG 250 Physical Geography (4) (Also listed as ERSC 250)**

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.

#### **GEOG 300 Geography of the United States (4) GE D5**

The population (including origin, ethnicity, migration, and distribution), land utilization, and economic development viewed against the background of the physical environment. Topically and regionally organized. Pervading themes include landscape evolution and alteration, regional cultural distinctiveness, and current problems. 4 lectures. Prerequisite: Completion of GE Areas A, D1 and D3. Social Sciences majors will not receive GE Area D5 credit. 

#### **GEOG 301 Geography of Resource Utilization (4) GE D5**

A multicultural, world view of the interconnections of the following resource systems: food, energy, water, and non-fuel minerals. A pervading theme is the sustainability of these systems. 4 lectures. Prerequisite: Completion of GE Areas A, D2 and D3. Social Sciences majors will not receive GE Area D5 credit.

#### **GEOG 308 Global Geography (4) GE D5**

Examination of the major world regions such as Europe, the Middle East, Africa, Asia and Latin America. Focus on the origins and content of contemporary cultural landscapes and on their utility for understanding international differences, interactions, and current events. Particular attention to the relationship between humans and the environment. 4 lectures. Prerequisite: Completion of GE Area A and two courses from Areas D1, D2, D3, D4. Social Sciences majors will not receive GE Area D5 credit.

#### **GEOG 317 The World of Spatial Data and Geographic Information Technology (4) GE Area F (Also listed as BIO/FNR/LA 317)**

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: A course in computer science, completion of Area B, and junior standing.

#### **GEOG 318 Applications in GIS (4)**

ArcGIS Desktop Geographic Information System (GIS) computer software to explore environmental, natural resource, social and economic issues using spatial data. Principles of cartography and map interpretation. Development of data base and software management competencies. 2 lectures, 2 laboratories. Prerequisite: Junior standing and computer literacy, or consent of instructor.

#### **GEOG 325 Climate and Humanity (4) (Also listed as ERSC 325)**

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.

#### **GEOG 328 Applications in Remote Sensing (4)**

Introduction to the use of satellite imagery to analyze natural and human features on the earth. Applications in geology, water, climate, vegetation, agriculture, and urban land use. Fundamentals of processing digital satellite images. Emphasis on bridging the earth and social sciences. 3 lectures, 1 activity. Prerequisite: GEOG 250 or consent of instructor.

#### **GEOG 333 Human Impact on the Earth (4) (Also listed as ERSC 333)**

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.

#### **GEOG 340 Geography of California (4)**

Geographic analysis of the land and people of California. Patterns of physical environment, natural resources, history, settlement, ethnicity, economy, politics, and urban growth. Current issues in a national and global context. 4 lectures. Prerequisite: Junior standing.

#### **GEOG 360 Geography of Europe (4)**

The population, land utilization, and economic development viewed against the background of the physical environment. Topically and regionally organized. Pervading themes include landscape evolution and alteration, regional cultural distinctiveness, and current problems. Emphasis on Western Europe. 4 lectures. Prerequisite: Junior standing.

#### **GEOG 370 Geography of Latin America (4) GE D5**

Geographic analysis of Mexico, Central America, and South America. The patterns of physical environment, culture, economy, and development. The issues (local, regional, and global) that shape Latin America. 4 lectures. Prerequisite: Completion of GE Area A and two courses from GE Areas D1, D2, D3, D4. Social Sciences majors will not receive GE Area D5 credit. *Change effective Fall 2007.*

#### **GEOG 414 Global and Regional Climatology (4) (Also listed as ERSC 414)**

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.

#### **GEOG 415 Applied Meteorology and Climatology (4) (Also listed as ERSC 415)**

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.

#### **GEOG 440 Geo-Social Applications in GIS (4)**

Applications in Geographic Information Systems (GIS) emphasizing research, methodologies, and career fields to geography, earth sciences, and the social sciences. 2 lectures, 2 laboratories. Prerequisite: GEOG/FNR/LA 318 or consent of instructor.

#### **GEOG 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 topic selected. Total credit limited to 12 units. 1–4 lectures. Prerequisite: Consent of instructor.

## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [Graphic Communication Department](#)

### GRC–GRAPHIC COMMUNICATION

#### GRC 101 Introduction to Graphic Communication (3)

Graphic communication history, theory, processes, applications, and practices. New technologies impacting day-to-day communication including traditional and digital printing and publishing, and non-print imaging including Internet applications. Overview of design technology, electronic publishing and imaging, printing and imaging management, packaging graphics, industry segments. 3 lectures.

#### GRC 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.

#### GRC 201 Electronic Publishing Systems (3)

Significance, terminology, and components of electronic publishing systems. Current hardware and software options in the graphic communication industry. Overview of PostScript, PDF, HTML and XML. 2 lectures, 1 laboratory.

#### GRC 202 Image Capture and Manipulation (3)

Conventional and digital methods of image capture and manipulation for print and electronic media. Digital photography, scanning, photo-retouching, and color proofing. Photographic materials and equipment for graphic communication. Densitometry, light sources, exposure control, and color management systems. 2 lectures, 1 laboratory. Prerequisite: GRC 101 and either GRC 201 or GRC 377.

#### GRC 203 Electronic Prepress (3)

Terminology, materials, equipment, facilities and methods used in electronic prepress. File formats, fonts, imposition, trapping, screen angling, PostScript, and PDF. Preflight, workflow options, automation, proofing, and CTP. 2 lectures, 1 laboratory. Prerequisite: GRC 202 or ART 184.

#### GRC 204 Introduction to Contemporary Print Management and Manufacturing (4)

Analysis and comparison of print and digital media manufacturing methods to current world-class techniques practiced in industry. Principles and concepts of lean manufacturing applied to print for improved profitability. 4 lectures. Prerequisite: GRC 101.

#### GRC 211 Substrates, Inks and Toners (4)

Technical aspects of paper, other substrates, inks and toners used in the printing industry. Manufacture, application and interaction of these materials are examined in relation to particular processes and end use requirements. Hands-on use of computerized densitometers, spectrophotometers and performance testing equipment. 3 lectures, 1 laboratory. Prerequisite: GRC 101.

#### GRC 212 Substrates, Inks and Toners: Theory (3)

Technical aspects of paper, other substrates, inks and toners used in the printing industry. Manufacture, application, and interaction of these materials are examined in relation to particular processes and end use requirements. Credit not allowed for GRC majors. 3 lectures. Prerequisite: GRC 101.

#### GRC 218 Digital Typography (4)

History, development and application of typography in relation to electronic file preparation for cross media publishing. In-depth study of communication principles and visual organization utilizing page layout

software. Font technology and management for the creative, print and publishing industries. 3 lectures, 1 laboratory. Prerequisite: GRC 203 or GRC 377.

#### GRC 260 Introduction to Research Methods in Graphic Communication (3)

Introduction to research methods for preparing scholarly and defensible papers and projects, and in conducting qualitative and quantitative evaluations, testing and research in graphic communication. Methods covered include the Scientific Method, historical and descriptive research, questionnaires, Elite and Specialized Interviewing, content analysis, and sampling. Design of research projects for each method taught. 2 lectures, 1 activity. Prerequisite: GRC 101

#### GRC 316 Flexographic Printing Technology (3)

Analysis of flexographic printing technology for flexible packaging, label printing, folding and corrugated cartons. Applications of computers to the management and technical function of flexographic printing technology. 2 lectures, 1 laboratory. Prerequisite: GRC 211.

#### GRC 320 Managing Quality in the Graphic Arts (4)

Theory and practices of quality systems in the graphic arts industry. Emphasis on Deming Systems Thinking, Lean Manufacturing, Six Sigma, ISO, and Malcolm Baldrige. Quantifying customer expectations, specifications, standard operating procedures, SPC tools, and employee empowerment in the graphic arts. 3 lectures, 1 laboratory. Prerequisite: GRC 315 or GRC 328, and STAT 217.

#### GRC 322 Advanced Digital Typography (3)

Advanced typographic principles relating to print and electronic media. Page layout and font management with consideration for multiple media. Applied problems focusing on typographic structure and file preparation. 2 lectures, 1 laboratory. Prerequisite: GRC 218 and GRC 338.

#### GRC 324 Binding, Finishing, and Distribution Processes (3)

Imposition techniques, cutting, and folding. Stitch, case and perfect binding techniques and applications. Operational and aesthetic uses of die cutting, scoring, creasing, foil stamping and embossing techniques. Fulfillment and mailing operations. Applications of computers to the management and technical function of binding; finishing and distribution. 2 lectures, 1 laboratory. Prerequisite: GRC 101.

#### GRC 325 Binding and Finishing Processes: Theory (2)

Imposition techniques, cutting, folding, book and publication binding. Stitch, case and adhesive binding techniques and applications. Technology and aesthetic uses of die cutting, scoring, creasing, foil stamping and embossing. Fulfillment and mailing operations. Applications of computers to the management and technical function of binding; finishing and distribution. Credit not allowed for GRC majors. 2 lectures. Prerequisite: GRC 101.

#### GRC 328 Sheetfed Printing Technology (4)

Theory, practice and application of sheetfed printing and plate technology for commercial, book, advertising, catalog, packaging and reprographic segments of the printing industry. Press configurations, materials, computerized press controls, workflow, pressroom management, coating and quality control. Plate types, quality and new technologies for sheetfed printing. 3 lectures, 1 laboratory. Prerequisite: GRC 211.

#### GRC 329 Web Offset and Gravure Printing Technologies (3)

Introduction to web offset and gravure printing for newspapers, packaging, magazines, books, catalogs and commercial products. Application of technology to the management and production of web offset and gravure printing. Preparation and use of gravure cylinders. 2 lectures, 1 laboratory. Prerequisite: GRC 328.

#### GRC 331 Color Management and Quality Analysis (4)

Color management, perception, psychology, and measurement for print and digital media. Application of systems engineering concepts to color workflow to maximize overall quality in the digital imaging and printing industry. Development of print quality assessment skills. 3 lectures, 1 activity. Prerequisite: GRC 202 and PSC 101.

**GRC 337 Consumer Packaging (3)**

Problem-solving strategies for package printing that integrate concepts from marketing, design and technology. Package manufacturing, function, quality, visual appeal, and economics are addressed. 2 lectures, 1 laboratory. Prerequisite: Junior standing or consent of instructor.

**GRC 338 Digital Content Management and Variable Data Printing (4)**

Advanced application of type arrangement, digital illustration, image capture and page layout. Digital content management strategies for print and electronic media including file management, database principles, archiving, document formats, variable data publishing, workflow analysis and repurposing. Technical and creative problem-solving for content production and management in print and web publishing. 3 lectures, 1 laboratory. Prerequisite: GRC 218. *Corrected effective Summer 2007.*

**GRC 339 Digital Design and Production for Multiple Media (4)**

In-depth understanding of design and production as it relates to print and on-line digital media. Advanced production techniques in image editing and multimedia applications. Preparation and evaluation of computer-generated images. 3 lectures, 1 laboratory. Prerequisite: GRC 338.

**GRC 357 Specialty Printing Technologies (3)**

Specialty printing technologies used in garment decorating, signage, point of purchase displays, decals, security printing and various forms of packaging. Digital file preparation and printing using special processes including screen printing, pad printing, sublimation printing and wide-format printing. 2 lectures, 1 laboratory. Prerequisite: GRC 201 or GRC 377.

**GRC 361 Marketing and Sales Management for Print and Digital Media (4)**

Identification and development of target markets for products and services in the graphic communication industry. Deployment of strategies in pricing, promotion and distribution management. Application of customer relationship management techniques for personal selling, forecasting and planning. 3 lectures, 1 laboratory. Prerequisite: GRC 101.

**GRC 377 Web and Print Publishing (4)**

Web and print publishing technology and its impact on society. The technologies of scanning, typography, graphics, layout, and design for print and web publishing including decision-making considerations. The application of scientific and mathematical principles to web and print publishing technologies. 3 lectures, 1 laboratory. Prerequisite: Completion of Area B and junior standing. Graphic Communication majors will not receive GE Area F credit.

**GE Area F****GRC 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.

**GRC 402 Digital Printing and Emerging Technologies in Graphic Communication (3)**

Application of digital printing including the study of marking engines, RIPs, and related technologies. Emerging graphic communication technologies that are impacting the methods and procedures of producing and distributing print media. Technological transitions and how to manage technological change. 2 lectures, 1 activity. Prerequisite: GRC 338. *Corrected effective Summer 2007.*

**GRC 403 Estimating for Print and Digital Media (4)**

Estimating the cost of various kinds of print and digital products and services. Development of budgeted hour costs and production standards. Cost estimating methods for Print on Demand, VDP, sheetfed lithography, web site development, and wide-format output. Analysis of material, labor and other cost factors. 3 lectures, 1 laboratory. Prerequisite: GRC 315 or GRC 328.

**GRC 411 Strategic Trends and Costing Issues in Print and Digital Media (4)**

Graphic communication industry market trends. Strategies for profitably positioning graphic communication companies. Costing methodology and

practices for graphic communication companies. Company profitability using ratio analysis. Innovative management practices in the graphic communication industry. 3 lectures, 1 activity. Prerequisite: GRC 403.

**GRC 421 Production Management for Print and Digital Media (4)**

Management principles and production control methodologies for print and digitally-imaged products. Organization analysis, decision-making, equipment and inventory planning, resource optimization, and the application of contemporary quality management initiatives. 3 lectures, 1 activity. Prerequisite: GRC 315 or GRC 328, and MATH 117, MATH 118, or MATH 120.

**GRC 422 Human Resource Management Issues for Print and Digital Media (4)**

Human resource management integrated into the success of graphic communication companies. A comprehensive management approach is utilized emphasizing policy development, training, safety, motivation, facilitation skills, team building and empowerment, ethical and legal issues in the printing industry. 3 lectures, 1 laboratory. Prerequisite: GRC 421.

**GRC 429 Digital Media (3)**

Current digital media including audio, video, animation, and multimedia. File formats and their role in workflow and electronic document delivery. Publishing options for digital media. Digital media standards, legal and ethical issues. 2 lectures, 1 laboratory. Prerequisite: GRC 338.

**GRC 431 Printing Plant Layout Analysis (3)**

Elements of printing plant site selections, equipment planning, inventory planning, and workflow optimization. Design and layout of printing plants for effective space utilization. Organization of plant services. 2 lectures, 1 activity. Prerequisite: GRC 421.

**GRC 432 Imaging Systems Management (4)**

Management issues associated with the introduction and use of computerized electronic prepress systems. Strategic, technical, marketing, financial, production, operational, and personnel aspects of color prepress work in a capital-intensive environment. 4 lectures. Prerequisite: GRC 338.

**GRC 439 Book Design Technology (4)**

Advanced creative problem-solving strategies associated with the technologies used in book design and production. Advanced techniques in page layout, design, typography, type specification and image manipulation as they relate to output technology. Content, format and distribution of print and electronic books. 3 lectures, 1 laboratory. Prerequisite: Senior standing, GRC 218 and GRC 338.

**GRC 440 Magazine and Newspaper Design Technology (4)**

Concept development of magazine and newspaper design technology. Design and technical considerations as they relate to output and rendering technology. Application of organizational structures such as grids, formatting and sequential design. Advanced techniques in digital information and image manipulation. Content, format and distribution of print and electronic magazines and newspapers. 3 lectures, 1 laboratory. Prerequisite: Senior standing, GRC 218 and GRC 338.

**GRC 451 Management Topics in Graphic Communication (3)**

Current trends and practices in select graphic communication management topics. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 12 units. Prerequisite: GRC 101 and GRC 201.

**GRC 452 Emerging Digital Topics in Graphic Communication (3)**

Current trends and practices in select graphic communication emerging digital topics. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 3 lectures. Prerequisite: GRC 101 and GRC 201.

**GRC 453 Design Reproduction Topics in Graphic Communication (3)**

Current trends and practices in select graphic communication design reproduction topics. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 3 lectures. Prerequisite: GRC 101 and GRC 201.

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**GRC 460 Research Methods in Graphic Communication (2)**

Research methods for preparing scholarly and defensible papers and senior projects, and in conducting qualitative and quantitative evaluations, testing, and research in graphic communication. Methods covered include statistical, historical, descriptive, questionnaires, interviewing, and sampling. 1 lecture, 1 activity. Prerequisite: Senior standing and STAT 217.

**GRC 461 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 formal report. Minimum 90 hours total time. Prerequisite: GRC 460.

**GRC 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 topic selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

**GRC 472 Applied Graphic Communication Practices (2)**

Application of theories and practices to University Graphic Systems as they apply to commercial printing, publication printing, digital media and newspaper industries. Major credit limited to 4 units; total credit limited to 18 units. 2 lectures. Prerequisite: GRC 101.

**GRC 473 Applied Graphic Communication Management Practices (2)**

Management theories and practices in the graphic communication industry. Application of theories and practices to University Graphic Systems as they apply to commercial printing, publication printing, digital media and newspaper industries. Major credit limited to 6 units; total credit limited to 18 units. 2 lectures. Prerequisite: GRC 472 and consent of instructor.

**GRC 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 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**GRC 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 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**GRC 500 Special Problems in Document Systems Management for Graduate Students (2)**

Investigation, research, studies of problems in document systems management. Repeated course over four quarters working with University Graphic Systems, the Graphic Communication Institute at Cal Poly, and with individual faculty. Total credit limited to 8 units. Prerequisite: Second year MBA student, GRC 101 and GRC 201 or advisor approval.

**GRC 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 and consent of instructor.

## 2007-2007 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

[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. *Changes 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, leases, pensions and post-retirement plans, income taxes, dollar value LIFO inventories. 4 seminars. Prerequisite: BUS 321 and BUS 322 or consent of instructor.

### 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.

### 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.

### 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.

### 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.



## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [History Department](#)

#### HIST–HISTORY

##### **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 Twentieth Century (5)**

Development of western civilization from 1550 CE to 1900 CE. Comparison of liberal modernization of the West with the retarded, 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 in the West and authoritarian mass societies elsewhere. 5 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.

##### **HIST 207 Freedom and Equality in American History (4) GE D1 USCP** (Also listed as HNRS 207)

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. *Changed effective Fall 2008.*

##### **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. *USCP credit approved effective Spring 2009.*

##### **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 highlight economic, political, social, and intellectual developments of the major civilizations of earth. 4 lectures. Open to History or Liberal Studies majors only.

##### **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.

##### **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.

##### **HIST 215 World History II (4) GE D3** (Some sections also listed as HNRS 215)

Comparative history of Western and non-Western societies in global perspective. The history of cross-cultural exchange, interaction, and conflict in the making of the modern world, concentrating on the economic, political, and cultural transformations that facilitated and emerged from imperialism. 4 lectures.

##### **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: Completion of GE Area A and two courses from Areas D1, D2, D3, D4. History majors will not receive GE Area D5 credit.

##### **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: Completion of GE Area A and two courses from Areas D1, D2, D3, D4. History majors will not receive GE Area D5 credit.

##### **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: Completion of GE Area A and two courses from Areas D1, D2, D3. History majors will not receive GE Area D5 credit.

##### **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: Completion of GE Areas A, D1 and D3. History majors will not receive GE Area D5 credit.

##### **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: Completion of GE Area A and two courses from Areas D1, D2, D3, D4. History majors will not receive GE Area D5 credit.

##### **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: Completion of GE Area A. Completion of two courses in lower-division Area D (preferably D2 and D3), or consent of instructor. History majors will not receive GE Area D5 credit.

**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: Completion of GE Area A. Completion of two courses in lower-division Area D (preferably D2 and D3), or consent of instructor. History majors will not receive GE Area D5 credit.

**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: Completion of GE Area A, D1 and one course from D2, D3, or D4. History majors will not receive GE Area D5 credit.

**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: Completion of GE Area A, D1 and one course from D2, D3, or D4. History majors will not receive GE Area D5 credit.

**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: Completion of GE Area A, D1 and completion of Area D2, Area D3, or Area D4. History majors will not receive GE Area D5 credit. [Corrected effective Summer 2007.](#)

**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: Completion of GE Area A, D1 and one course from D2, D3, or D4; junior standing or consent of instructor. History majors will not receive GE Area D5 credit.

**HIST 324 The Historical Novel in the United States, 1960s to the Present (4) (Also listed as HNRS X324) 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: Completion of GE Area A, D1 and any other lower-division Area D course. History majors will not receive GE Area D5 credit. [Corrected effective Summer 2007.](#)

**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; completion of GE Area A; completion of two courses in lower-division Area D courses; junior

standing or permission of the instructor. History majors will not receive GE Area D5 credit.

**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: Completion of GE Area B and junior standing.

**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: Completion of GE Area B and junior standing.

**HIST 359 Living in a Material World (4) GE Area F (Also listed as MATE 359)**

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: Completion of GE Area B and junior standing.

**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) (formerly HIST 332)**

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)**  
(formerly HIST 333)

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.

**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)**  
(formerly HIST 387)

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)** (formerly HIST 390)

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 Modern 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.

**USCP**

**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 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)**

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.** 1 seminar. Prerequisite: HIST 424; concurrent: EDUC 469 or EDUC 479. [Changed effective Spring 2008.](#)

**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)** (formerly HIST 381)

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)** (formerly HIST 382)

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)**  
(Also listed as WS 434)

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.

**HIST 435 American Women's History from 1870 (4)**  
(Also listed as WS 435)

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.

**HIST 436 History of American Thought (4)** (formerly HIST 383)

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 + activity. Prerequisite: HIST 303; junior standing or consent of instructor. *Changed effective Fall 2008.*

**HIST 438 History of American Agriculture (4)** (formerly HIST 305)

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)** (formerly HIST 385)

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)** (formerly HIST 311)

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)** (formerly HIST 312)

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)**  
(formerly HIST 313)

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)** (formerly HIST 346)

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)**  
(formerly HIST 347)

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)** (formerly HIST 348)

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)**  
(formerly HIST 349)

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)** (formerly HIST 351)

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)**  
(formerly HIST 352)

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.

USCP

**HIST 457 Europe in the Age of Fascism (4) (formerly HIST 353)**

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. [Schedule of Classes will list topic area selected.](#) Take HIST 461 during a subsequent quarter. Prerequisite: HIST 303; HIST 304; senior standing or consent of instructor; and History major. [Changed effective Winter 2009](#)

**HIST 461 Senior Project II (2)**

Completion of paper or creative project begun in HIST 460 under faculty supervision. [Schedule of Classes will list topic area selected.](#) Prerequisite: HIST 303, HIST 304; HIST 460; senior standing or consent of instructor; and History major. [Changed effective Winter 2009](#)

**HIST 467 History Internship (6–12) (CR/NC) (formerly HIST 450)**

Supervised work experience using skills of the discipline of history in a public agency ranging from 18 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. 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) (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. [Corrected effective Summer 2007.](#)

**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 topic 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. Total credit limited to 16 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. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing 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 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.

**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.

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### 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) (Also listed as COMS 101) 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.

##### **HNRS 112 Race, Culture and Politics in the United States (4) (Also listed as ES 112) 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. 

##### **HNRS 131 General Physics I (4) GE B3 & B4** (Also listed as PHYS 131)

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.


##### **HNRS 132 General Physics II (4) GE B3 & B4** (Also listed as PHYS 132)

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.

##### **HNRS 134 General Physics IA (4) (Also listed as PHYS 141) 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.

##### **HNRS 141, 142, 143 Calculus I, II, III (4) (4) GE B1** (Also listed as MATH 141, 142, 143)

Limits, continuity, differentiation, integration. Techniques of integration, applications to physics, transcendental functions. Infinite sequences and series, vector algebra, curves. 141 prerequisite: ELM requirement and passing score on Mathematics Placement Examination, or MATH 118 and MATH 119 or equivalent; and consent of Honors Program. 142 prerequisite: HNRS/MATH 141 with a grade of C- or better or consent of instructor. 

##### **HNRS 145 Reasoning, Argumentation, and Writing (4) GE A3** (Also listed as ENGL/COMS 145)

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 and A2.

##### **HNRS 148 Reasoning, Argumentation and Professional Writing (4) GE A3** (Also listed as ENGL 148)

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.

##### **HNRS 149 Technical Writing for Engineers (4) GE A3** (Also listed as ENGL 149)

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.

##### **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** (Also listed as ECON 201)

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.

##### **HNRS 207 Freedom and Equality in American History (4) GE D1 USCP** (Also listed as HIST 207)

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. *New crosslisted course, effective Fall 2008.*

##### **HNRS 212 Global Origins of United States Cultures (4) GE D3 USCP** (Also listed as ES 212)

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.

##### **HNRS 215 World History II (4) (Also listed as HIST 215) GE D3**

Comparative history of Western and non-Western societies in global perspective. The history of cross-cultural exchange, interaction, and conflict in the making of the modern world, concentrating on the economic, political, and cultural transformations that facilitated and emerged from imperialism. 4 lectures.

##### **HNRS 230 Philosophical Classics: Metaphysics and Epistemology (4) (Also listed as PHIL 230) 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.

##### **HNRS 231 Philosophical Classics: Social and Political Philosophy (4) (Also listed as PHIL 231) GE C2**

Readings from primary philosophical texts, from the ancient and modern periods, with focus on the identification and evaluation of the central ethical and political themes and arguments presented in them. 4 lectures. Prerequisite: Completion of GE Area A.

##### **HNRS 232 Masterworks of British Literature from the Late 18<sup>th</sup> Century to the Present (4) (Also listed as ENGL 231) 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. *New course effective Spring 2009.*

**HNRS 241 Calculus IV (4) (Also listed as MATH 241)**

Partial derivatives, multiple integrals, introduction to vector analysis. 4 lectures. Prerequisite: MATH 143.

**HNRS 244 Linear Analysis I (4) (Also listed as MATH 244)**

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.

**HNRS 251 Great Books I: The Ancient and Classical World—From Myth to Reason (4) (Also listed as ENGL 251) 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.

**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) (Also listed as ECON 303) 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: 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.

**HNRS 304 Values and Technology (4) GE C4 (Also listed as HUM 303)**

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.

**HNRS 310 Air and Space (4) GE Area F (Also listed as AERO 310)**

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: Completion of GE Area B, junior standing.

**HNRS 311 Computers for Poets (4) GE Area F (Also listed as CSC 310)**

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. [New crosslisted course, effective Winter 2008.](#)

**HNRS 319 Natural Resource Ecology, Theories and Applications (4) (Also listed as FNR 319) 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.

**HNRS 320 Values, Media, and Culture (4) GE C4 (Also listed as HUM 320)**

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.

**HNRS 321 Undergraduate Research Methods and Practice (4) (Also listed as UNIV 321)**

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. [New course effective Winter 2009.](#)

**HNRS 375 Technology and the Environment: A Seminar on Contemporary Issues (4) (Also listed as CRP 375)**

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.

**HNRS 380 Literary Themes (4) GE C4 GWR (Also listed as ENGL 380)**

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: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

**HNRS 391 Appropriate Technology for Impoverished Communities: Development (4) (Also listed as UNIV 391) 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: Completion of GE Area A, two courses from GE D1-D4 and consent of instructor. [New course, effective Fall 2008.](#)

**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) (Also listed as ENGL 411)**

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.

**HNRS 412 New Media Arts II (4) (Also listed as ENGL 412)**

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.

**HNRS 475 Sustainable Forest and Environmental Practices (15) (Also listed as FNR 475)**

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.

**HNRS 490 President's Seminar: Science, Society and the University (4) (Also listed as HUM 490)**

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. 4 seminars. Prerequisite: Senior standing, GPA of at least 3.0, or consent of instructor.

**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.



## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [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 CAD and Modeling (2)

CAD/CAM on UNIX workstations using parameter-driven, surface-bounded solid modeling with total bi-directional associativity between design, drafting, and manufacturing tools. Introduction to Computer-Aided Engineering (CAE) as driven by the CAD solid model. 1 lecture, 1 laboratory. Prerequisite: IME 130 or high school drafting.

### 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)

CAD/CAM on Unix workstations using parameter-driven, surface-bounded solid modeling with integration between design, drafting, and manufacturing tools. Introduction to conventional machining processes on lathes and mills, computer numerical control, cutting tool design, machining parameters, quality control, production methods, and design for manufacturing. Open to all majors. 2 lectures, 2 laboratories. Prerequisite: IME 130 or high school drafting.

### 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 Work Design and Measurement (4)

Principles of work simplification and motion analysis. Recording of work flow and methods. Work measurement and standards, time study, synthetic data, predetermined time systems and work sampling. Allowances and performance rating, productivity measures. Work design improvement. 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 301 Operations Research I (4)

Introduction to operations research, matrix theory, linear programming formulation and solution. Simplex method, sensitivity analysis, transportation and assignment algorithms. Introduction to linear networks and goal programming. Existing computer programs utilized. 4 lectures. Prerequisite: MATH 244.

### IME 303 Project Organization and Management (4)

Design, analysis and implementation of a major industrial/business systems problem. Emphasis on situations requiring resolutions and management decisions by groups representing various elements of an enterprise. Resource leveling and management under constraints. 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 new and existing data communications technologies related to industrial and manufacturing engineering. Use of hardware, operating systems, networks and application software, covered in both theory and practice. 3 lectures, 1 laboratory. Prerequisite: IME 312.

### 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) GE Area F**

Analysis of cognitive, sensory and physical limitations and capabilities of operators and users of technology, both hardware and software, in working and 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.

**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. 2 lectures, 1 laboratory. Prerequisite: IME 144.

**IME 335 Computer-Aided Manufacturing I (4)**

Manufacturing systems overview; design dimensioning and tolerancing; numerical control (NC) programming; process planning and computer-aided process planning; use of CAD/CAM software; CAD/CAM data exchange format. 3 lectures, 1 laboratory. Prerequisite: IME 144, CSC 232, or consent of instructor.

**IME 336 Computer-Aided Manufacturing II (4)**

Automated production of parts: computerized part programming, post-processor generation and use, and CNC machining center operation. Introduction to flexible manufacturing systems and robotics. 3 lectures, 1 laboratory. Prerequisite: IME 335 or consent of instructor.

**IME 341 Tool Engineering (4)**

Design and engineering of tool for workholding cutting and forming. Material selection. Design projects. 3 lectures, 1 laboratory. Prerequisite: IME 241, CE 204, MATH 244, PHYS 133, MATE 210.

**IME 342 Manufacturing Systems Integration (3)**

Coverage of simulation, and production control, to provide engineering majors tools for the analysis and design of production control systems. 3 lectures. Prerequisite: IME 223, MATH 241. 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 (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limit to 4 units, with a maximum of 2 units per quarter. 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)**

Queuing models, dynamic programming and inventory models, Markovian processes, simulation modeling, computer programming in solution of problems. 3 lectures, 1 activity. Prerequisite: IME 301, STAT 321 or consent of instructor.

**IME 407 Operations Research III (4)**

Advanced linear programming as applied to problems in industrial systems. Integer and goal programming. Application of nonlinear, quadratic, dynamic programming concepts. Case studies of current topics in industrial engineering. 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 Inventory Control Systems (4)**

Inventory planning and control systems. Implementation of manufacturing resource planning (MRP II) including demand forecasting, production planning, master scheduling, bill-of-material, and inventory master file. Capacity requirements planning and shop floor control. JIT approach to inventory control through pull production system. 3 lectures, 1 laboratory. Prerequisite: IME 405 or IME 342, IME 312.

**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)**

Strategic engineering management of product design 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. Application of project management. Examination of relevant environmental and ethical problems. 3 lectures, 1 laboratory. Prerequisite: IME 341, IME 356 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 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: IME 314, PSY 201/PSY 202, or consent of instructor.

**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; performance measurements and monitoring. 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: IME 141, IME 334 or IME 335, and senior standing. Recommended: concurrent enrollment in IME 421.

**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)**

(Also listed as MATE 458)

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. [Changed effective Spring 2009.](#)

**IME 461, 462 Senior Project I, II (2) (3)**

Faculty supervised projects typical of problems which graduates encounter in their professions and which involve costs, planning, scheduling and research. Formal written report, suitable for reference library, discussing methods, results and conclusions. Minimum 150 hours total time. 461: 2 laboratories. 462: 3 laboratories. Prerequisite: Senior standing (within 3 quarters of graduation), IME 314, IME 443, or IME 418.

**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 topic 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 topic selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

**IME 481 Senior Project Design Laboratory I (2)**

Selection and completion of a project by individuals or team which is typical of problems which IE or MfgE graduates must solve in their fields of employment, which is representative of those encountered in professional practice. Project typically involves system design, modeling, analysis and testing. Project method includes costs, planning, scheduling, and appropriate research methodology. Formulation of project outline, literature review, project activity scheduling and regular progress reviews by instructor are required. 2 laboratories. Prerequisite: Senior standing in major and consent of instructor. Note: Although IME 481 substitutes for IME 461, students may not use as repeat credit.

**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 are presented in formal written reports suitable for reference library and formal oral reports. 3 laboratories. Prerequisite: IME 481. Note: Although IME 482 substitutes for IME 462, students may not use as repeat credit.

**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. 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. 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. 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) (Also listed as AERO 510)**

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.

**IME 511 Systems Engineering II (4) (Also listed as AERO 511)**

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.

**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 topic selected. 1-4 seminars. Prerequisite: Graduate standing and/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. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

**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.

**2007-09 Cal Poly Catalog**

**Chris Carr, Associate Dean of Graduate Programs and Faculty Development  
Business Bldg. (03), Room 409  
805 756-2637**

**General Characteristics**

The Master of Science in Industrial and Technical Studies (MS I&TS) program is designed to prepare students for critical "hands-on" positions in companies as operations-based facilitators. The program concentrates on developing graduates who will function successfully in technically focused industrial environments that are characterized by rapid and continual change.

The core of the program offers preparation in business-based decision tools, and technically-focused industrial processes and methods. Additional courses are taken to develop depth in a focus area that is designed to meet the student's career objectives.

**Prerequisites**

Students are required to possess a bachelor's degree, from an accredited program in industrial technology, engineering or similar technical degree or background.

**Admission Requirements**

Admission to the MSI&TS program is based upon:

- (a) Successful completion of an accredited undergraduate program of study;
- (b) Prior academic performance, with particular emphasis placed on performance in the last 90 quarter units (60 semester units);
- (c) Achievement on the General Test of the Graduate Record Examination (GRE) or the Graduate Management Admission Test (GMAT); and
- (d) Prior work experience (desirable).

**Program of Study**

The program requires 45 quarter-units with 29 units of core courses and 16 units of electives. These courses collectively provide students with background information and training to:

- utilize business decision tools
- deal successfully with the impact of science and technology on industrial processes and methods
- improve productivity through the use of technology
- commercialize changed and new technologies
- understand and implement the impact of technology on business strategies
- deal with the human and cultural issues that arise in technically focused industrial settings.

**Culminating Experience**

In order to satisfy the culminating experience requirement, students must satisfactorily complete a comprehensive project at the end of IT 598. Other courses and/or options may be available, but must be approved in advance by the Associate Dean of Graduate Programs.

**Required courses (29)**

IT 510 Impact of Science and Technology.....	4
IT 512 Improving Productivity through Technology	4
IT 514 Commercializing Tech. Developments.....	4
IT 520 Management of Technology .....	4
IT 527 Trends and Issues in Technology .....	4
IT 598 Industrial and Technical Studies Project <i>or</i> other approved culminating experience .....	<del>5</del> 3,3,3

<i>One course from the following</i> .....	4
GSB 512, 523, 525, 531, 534	

**Advisor approved electives..... ~~16~~ 12**

Selected from the following list of courses:  
IME 555, IME 575, IME 580; IT 521, IT 522, IT 523; GSB 514, GSB 526, GSB 527, GSB 533, GSB 569, GSB 571, GSB 574, GSB 577, GSB 578, GSB 587 (admission into GSB courses is subject to space availability; students in an MBA program receive priority)

## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [Cal Poly Continuing Education](#)

### IS–INTERDISCIPLINARY STUDIES

#### IS 101 Orientation to Interdisciplinary Studies and the University (3)

Introduction to collaborative interdisciplinary inquiry. Topics include: Scholarly knowledge production and bibliographic finding tools, University role in knowledge dissemination and creation, and information search and evaluation processes. “Learn-by-doing” disciplinary investigation and interdisciplinary analysis and synthesis. 3 lectures.

#### IS 301 Critical Issues Seminar (4)

Discussion-oriented seminar focusing on ethics and effective interdisciplinary decision-making in the contemporary world. Examination of ethical and other issues facing society through current public debates, as well as great intellectual traditions that have shaped the past. The Schedule of Classes will list topic selected. Total credit limited to ~~8~~ 12 units. 4 seminars. Prerequisite: Admission to the Adult Degree Program (Bachelor of Arts in Interdisciplinary Studies) prior to enrolling in this seminar.

[Change effective Fall 2007.](#)

#### IS 302 Analytical Skills Seminar (4)

Improvement of abilities to collect data, analyze information, frame questions, reach and defend logical conclusions. Emphasis on applying methods of data analysis to a variety of contemporary interdisciplinary issues. 4 seminars. Prerequisite: Admission to the Adult Degree Program (Bachelor of Arts in Interdisciplinary Studies) prior to enrolling in this class, IS 101 and IS 301 or consent of instructor. [Change effective Spring 2009.](#)

#### IS 352 Organizational Leadership (4)

An interdisciplinary study of the definitions, theories, skills, and styles of organizational leadership in contemporary society. Strategies for managing human capital and an understanding of the relationship between attributes of good leadership and organizational change. Emphasis on developing an understanding of leadership in diverse organizations. 4 lectures. Prerequisite: Completion of GE Area A, or junior standing or consent of instructor.

[New course, effective Spring 2009](#)

#### IS 450 Advanced Investigation Seminar (5)

In-depth interdisciplinary investigation into a narrowly defined issue of personal and/or professional interest. Identification of topic and examination from a variety of standpoints (e.g., cultural, environmental, religious, political, or economic). 5 seminars. Prerequisite: Admission to Adult Degree Program (bachelor of Arts in Interdisciplinary Studies), IS 301 and IS 302 with a minimum grade of C-. [Change effective Spring 2009.](#)

#### IS 453 Special Topics in Organizational Leadership (4)

Directed interdisciplinary analysis of selected contemporary issues or topics in organizational leadership. Topics may be examined from local, national or international perspectives. Total credit limited to 8 units. 4 seminars. Prerequisite: Completion of GE Area A, or junior standing, or consent of instructor. [New course, effective Spring 2009](#)

#### IS 460 Capstone Project (6)

Selection and completion of a summative project or report under the supervision of a faculty member. Topic must be approved by the seminar instructor and the ADP director. Investigation of the topic from an interdisciplinary approach. Prerequisite: Senior standing, IS 301, IS 302, IS 450.

## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

**Industrial Technology Area, [Orfalea College of Business](#)**

## IT—INDUSTRIAL TECHNOLOGY

### IT 137 Electrical/Electronic Systems (4)

Introduction to electrical and electronic circuit fundamentals. Essential information for technical managers regarding the universal law, theory, principles, application and troubleshooting of AC and DC circuits and devices. Familiarity with concepts used extensively in manufacturing/production and countless electronic products. Understanding of inductance, capacitance, resistance, integrated circuit components and the relationship they have with each other. Strategic decision and problem solving skills developed using electricity/electronics as the environment. 3 lectures, 1 laboratory.

### IT 150 Industrial Power Systems (4)

Introduction to systems that supply energy, convert energy to power, transmit energy and power, and use energy and power to drive industrial enterprises. Energy systems include fossil, atomic and prominent alternative resources. Power conversion systems include reactors, internal and external combustion, direct conversion, and alternative technologies. Power transmission and end-use systems include mechanical, thermal, fluid, and electrical. Industrial facilities management strategies including advantages and disadvantages of economics, safety, conservation, design and maintenance. 3 lectures, 1 laboratory. Prerequisite: IT 137.

### IT 233 Decision Making and Problem Solving Using CAD (4)

Fundamental theory and practice of technical design communication and management of information systems. The basic application of 2-D and 3-D computer-aided design (CAD) and fundamental skills in communication of product design and their impact on the industrial organization. 2 lectures, 2 laboratories.

### IT 260 Manufacturing Processes (4)

Manufacturing processes; emphasis on shaping metallic products. Precision measuring, technical drawings, safety and equipment use as they apply to metal machining, welding, casting and sheet metal fabrication. 2 lectures, 2 activities.

### IT 300 Symposium Organization (2) (CR/NC)

Managing the development of a technical information symposium from concept through symposium presentation. Organization of facilities, speakers, dinner meeting, professional meetings, industrial displays, food services, personnel, finances, and advertising. Credit/No Credit grading only. Total credit limited to 6 units. 2 seminars. Prerequisite: Completion of Area A or equivalent.

### IT 326 Product Evaluation (4)

Value engineering, product dissection and the study of reverse product engineering as they relate to product design for manufacturing; improved product quality; reduced usage of energy and materials; material recycling and reuse; product design and development, proving value to the customer and society. 3 lectures, 1 laboratory. Prerequisite: Completion of GE Area B3 via a college course in physics (PHYS), or PSC 101.

### IT 329 Industrial Materials (4)

Structure, properties, applications and limitations of select industrial materials to include ferrous and nonferrous metals, ceramics, glasses, composites, and organic materials. Materials testing and material selection. 3 lectures, 1 activity. Prerequisite: CHEM 110 or CHEM 111 or equivalent.

### IT 330 Issues of Packaging (4)

GE Area F

Overview of packaging. Historical development, functions, and materials. Processes and technology employed to protect goods through the supply chain. Container types, package design, development, research and testing. Economic and international importance and perspective as an industrial activity. Packaging and the environment, and laws affecting packaging. 2 lectures, 2 activities. Prerequisite: Completion of GE Area B3 via a course in physics (PHYS), Honors Contract physics (HNRS), or physical science (PSC). *Changed effective Spring 2009*

### IT 336 Textile Technology (4)

GE Area F

Physical and chemical characteristics of natural and manufactured fibers. Production of synthetic polymers. Technology of fabric production and finishes. Industrial and consumer applications. Textiles as a global industry. Legislation. Laboratory identification of fibers and evaluation of performance properties of fabrics. 3 lectures, 1 laboratory. Prerequisite: Junior standing, completion of Area A and one laboratory science course, or consent of instructor.

### IT 341 Plastic Processes and Applications (4)

GE Area F

Cultural, social and economic implications of plastics in a worldwide environment. Study of materials, costs, processes, resource management, recycling, safety, laws and regulations. Applied laboratory experiences with common industry processes, i.e., injection, blow, rotational and compression; molding with plastic casting and fabrication. Application of laboratory experiences to improve consumer conformance to specifications and economic analysis of raw material cost and availability. Evaluation of current materials and technologies to reduce waste and improve reuse and recycling plastics. 3 lectures, 1 laboratory. Prerequisite: Completion of GE Area B3 via Chemistry.

### IT 371 Decision Making in Supply Chain, Services, and Project Management (4)

Introduction to supply chain, services, and project management decision making using information technology tools. Application of flowchart, project management network and spreadsheet software to process improvement, project planning, forecasting, and inventory management planning and control in manufacturing and service industries. Understanding current practices for decision making in manufacturing and service operations and project management. 3 lectures, 1 activity. Prerequisite: A grade of C- or better in: MATH 141 or MATH 221, and STAT 211 or STAT 252.

### IT 381 Industrial Management (4)

Organization and functioning of management in industry. Planning, direction, and control of the business enterprise in terms of policy formation, organizational structure, finance, sales, procurement, plant location, facilities and production processes. 4 lectures. Prerequisite: Junior standing.

### IT 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.

### IT 402 Analyzing and Presenting the Operations Infrastructure for New Industrial Enterprises (4) (formerly IT 302)

Taking a new industrial enterprise from concept to successful launch. The planning and management of a successful product-based start-up to include the integration of: product development; manufacturability and costs of production; manufacturing/outsourcing decisions; market channel selection; supply chain and distribution alternatives; inventory investment and scheduling to meet estimated demand. Successful new enterprises and application to a class project case study. Special emphasis on skills associated with developing effective technical presentations. 2 lectures, 2 activities. Prerequisite: COMS 101 or COMS 102, BUS 346, IT 326.

### IT 403 Quality Systems Management (4)

Quality assurance as viewed from a systems perspective that includes cost, time, and process elements. Lean thinking applied as a problem solving approach to achieve continuous process improvement through the elimination of waste and the reduction of variability. 4 lectures. Prerequisite: IT 341 or IT 371 and STAT 217, or STAT 218, or STAT 251;



Business majors must have formally declared their concentration to enroll. [Changed effective Fall 2008.](#)

**IT 406 Industrial Sales (4)**

Development of the technical competencies required in industrial selling and purchasing through the application of value stream mapping techniques and the philosophies and tool sets encompassing the discipline of process management as it relates to sales, marketing and customer service in Indus-trial settings. Includes guests speakers and team-based projects with local business organizations, individual and team product presentations, with written proposals. 3 lectures, 1 activity. Prerequisite: BUS 346 and IT 341.

**IT 407 Applied Industrial Product Design, Fabrication, and Sales (4)**

An integrative experience replicating a manufacturer's business/production systems, including the design, fabrication, processing, quality-control, resource management, cost-control, marketing, sales and packaging functions. Focus of instruction methodology on the development of the student's comfort with ambiguity and change inherent in business/production systems. Builds upon the foundational concepts developed throughout the Industrial Technology curriculum. 2 lectures, 2 laboratories. Prerequisite: BUS 346 and IT 326.

**IT 408 Paper and Paperboard Packaging (4)**

Physical and chemical properties, manufacture, conversion and use of paper, paperboard, corrugated board and related components. Design, use and evaluation of packages made from these materials. Survey of tests and procedures for paper based packaging materials and packaging products following ASTM, TAPPI, and ISO standards. 2 lectures, 2 activities. Prerequisite: IT 330.

**IT 409 Machinery For Packaging (4)**

Analysis of major types of packaging machinery from a practical, operational and marketing viewpoint. Basic processes utilizing packaging machinery. Specialized operations, contract specifications, selection, operation and maintenance. Material handling and distribution equipment and systems, and storage and retrieval systems. Required field trips to packaging operations. 3 lectures, 1 activity. Prerequisite: IT 330, PHYS 104 or PHYS 121, or consent of instructor.

**IT 410 Operations Planning and Control (4)**

Linking supply chain operations to deliver value to the end customer. Contrasting of advanced manufacturing concepts, such as pull systems, sales and operations planning, mixed model manufacturing, level production, and theory of constraints to traditional materials requirements planning systems. 3 lectures, 1 activity. Prerequisite: IT 341 and BUS 391.

**IT 411 Industrial Safety and Quality Program Leadership (4)**

Effective program development and leadership required to implement safety and quality process improvement in industry. Application of industrial leadership, knowledge, skills and methods to develop and implement total safety and quality management programs. Class safety/quality process project includes the oral presentation. 3 lectures, 1 activity. Prerequisite: Senior standing.

**IT 419 Cooperative Education/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 16 units. Prerequisite: Approval of area chair, junior standing, and a CPSLO cumulative GPA of at least 2.5 without being on academic probation.

**IT 422 Computer Process Simulation of Operational Systems (4)**

Focus on management of business process flows, utilizing computer process simulation software. Transformation of inputs into outputs by means of capital and labor resources. Models, modeling tools, solution approaches and methodologies for process improvement, including product development within both service and manufacturing organiza-tions. 2 lectures, 2 laboratories. Prerequisite: IT 407.

**IT 428 Commercialization of New Technologies (4)**

Concepts, frameworks, and experiences necessary to understand the business potential of technology innovations and determine if one or more

sustainable market opportunities can be identified to exploit them. Hands-on exercises and real new inventions to illustrate concepts. 4 lectures. Prerequisite: IT 326 and BUS 212 or BUS 214.

**IT 435 Packaging Development (4)**

The development of industrial and consumer goods packaging from concept to marketplace. Interplay of package design for marketing, production and distribution. Development of the package function for optimal market and consumer performance. Case studies of domestic and international package/product successes and failures with critical examination of performance, economic and social factors. Class project for analysis and solution. 3 lectures, 1 activity. Prerequisite: IT 330.

**IT 445 Computer Numerical Control and Robotics (4)**

Automated manufacturing systems, including computer numerical control (CNC), flexible manufacturing systems, computer-integrated manufacturing and robotics. Laboratory work in manual/automatic programming and set-up of CNC machines and robots. 2 lectures, 2 laboratories. Prerequisite: IT 233, IT 260, or consent of instructor.

**IT 446 Textile Product Design and Development (4)**

Organization/structure of the textile and apparel industries. Creating and developing a textile product line; sourcing, pre-production, and production processes; costing. Markets, distribution channels, store and non-store retailing. Quick response. Quality assurance. Trade associations and professional organizations. 4 lectures. Prerequisite: IT 336.

**IT 451 Facility Equipment and Systems (4)**

Develop an understanding of how major mechanical equipment and systems are incorporated in the utility and production support systems of a modern industrial facility. Includes field trips to industrial/commercial facilities. 4 lectures. Prerequisite: IT 150 or consent of instructor.

**IT 454 Facilities Development (4)**

Construction and maintenance of physical facilities and equipment as related to plant layout/design, regulatory and environmental compliance, safety/security, energy conservation, and process improvement. 4 lectures. Prerequisite: IT 451 or consent of instructor.

**IT 461, 462 Senior Project I, II (2) (2)**

Selection and completion of a project under faculty supervision. Projects typical of problems graduates must solve in their field of employment. Project results presented in a formal report, and must be completed in two quarters. Minimum 120 hours total time. Prerequisite: Consent of instructor.

**IT 464 Applied Industrial Technology Senior Project Seminar (4)**

Selection and analysis of industrial and technological 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.

**IT 470 Selected Advanced Topics (1-4)**

Directed group study and seminars in selected topics in industrial technology. Open to undergraduate students. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**IT 475 Packaging Performance Testing (4) (formerly IT 375)**

Survey of tests and procedures for packaging materials and packaging products following ASTM and ISTA standards. The testing procedures include tests for shock, vibration, drop and impact as prescribed for shipment by truck, rail, sea, and air. Hands-on product/packaging testing for quality control. 2 lectures, 2 laboratories. Prerequisite: IT 330.

**IT 482 Advanced Operations Management (4)**

Advanced principles in operations management as applied to both manufacturing and service organizations. Product-service conversion systems, capacity planning and utilization, aggregate planning, scheduling and control, inventory management, and operations subsystem coordination with the organization's strategy. 4 lectures. Prerequisite: IT 371, and senior standing.

**IT 487 Seminar in Quality Management (4)**

Principles and techniques of quality and performance management as applied to organizations in the private and public sector. Emphasis on competitive implications. Integrations of fundamental management techniques, existing improvement efforts, technical tools, and new management technologies focused on continuous organizational improvement. 4 seminars. Prerequisite: Senior standing, IT 371.

**IT 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. Maximum of 6 units may be applied to degree requirements. Prerequisite: Graduate standing and formal petition with approval from the Associate Dean of OCOB Graduate Programs.

**IT 510 Impact of Science and Technology (4)**

Comprehensive study of innovation – ideas implemented successfully in practice. Theories, strategies, and information for directing cutting-edge technological trends in a variety of industries but not limited to: materials, telecommunications, biotechnology, environmental management, packaging, transportation, food technology, and facilities. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 512 Improving Productivity Through Technology (4)**

Study, from a management of technology perspective, of current and emerging automation technologies, from a technology perspective, and how they are used in manufacturing to provide firms with a competitive advantage; problems raised and opportunities made available by modern manufacturing automation technologies; issues concerning technology selection, justification, implementation, technology consistency, and restructuring. 4 lectures. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 514 Commercializing Technological Development (4)**

The process utilized in developing technologies for customers. Emphasis on new technology/product development process, including idea generation, concept development, industrial market niche, product research and development, manufacturing, product launch and evaluation. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 520 Management of Technology (4)**

The role and importance of technology in corporate production environments. Different approaches to manufacturing leadership, organization and planning, in terms of their impact on decision-making, product development and innovation. 4 lectures. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 521 Training in Industrial and Technical Systems (4)**

Developing and managing technological training in industry. The integration of people, technology, philosophy, corporate visions, missions, goals, objectives, resources, populations, facilities, budgets and evaluation in the development of industrial training curriculum and instruction. 4 lectures. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 522 Facilities Planning (4)**

Introduction of prospective managers to the methods and techniques used in the planning of the modern industrial facility, including but not limited to: site selection, layout, materials handling, utilities, color and lighting, sound, air, safety standards, and current trends. 4 lectures. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 523 Industrial Sales (4)**

Development and implementation of a base of competencies that support the sale of products whose intended application is in manufacturing. Refinement of technical knowledge and selling in an industrial setting. 4 lectures. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 527 Trends and Issues in Technology Management (4)**

Advanced study of key current trends and issues relative to technology management of industrial and technical systems. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 570 Selected Advanced Topics (1-4)**

Directed group study of selected topics for advanced students. Open to undergraduate students. The Schedule of Classes will list topic selected. Total credit limited to 16 units. 1-4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of Graduate Programs.

**IT 571 Selected Advanced Topics Laboratory (1-4)**

Directed group laboratory study of selected topics for advanced students. The Schedule of Classes will list topics selected. Total credit limited to 16 units. 1-4 laboratories. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 598 Industrial and Technical Studies Project (3)**

Completion of a project involving individual research significant to the field of industrial and technical systems. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. Course satisfies culminating experience requirement through the completion of the project. Total credit limited to 9 units. Prerequisite: Graduate standing in the Master of Science in Industrial and Technical Studies program or approval from the Associate Dean of OCOB Graduate Programs. [Changed effective Fall 2007.](#)

**IT 599 Industrial and Technical Studies Thesis (3)**

Completion of a thesis involving individual research that is significant to the field of industrial and technical systems. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. Course satisfies culminating experience requirement through the completion of the comprehensive thesis. Total credit limited to 9 units. Prerequisite: OCOB graduate standing. [Changed effective Fall 2008.](#)

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### 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 Writing for the Media (4)

Introduction to the techniques of reporting and writing news from various media perspectives including print, online, broadcast and public relations. Intensive 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 Mass Media in a Multicultural Society (4) USCP

Challenges and triumphs of the mass media in a multicultural society. Survey of print, electronic and online media and how they serve and reflect the communication needs and aspirations of citizens in a multi-ethnic democracy. 4 lectures. [USCP credit approved effective Spring 2009.](#)

##### 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 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 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 (3)

Growth and development of public relations as a practice in business and industry, government, volunteer agencies and other public institutions. Communications and activities utilized to gain public interest and support. 3 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 203.

##### 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 203, JOUR 233 and 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, plus 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 385 Mass Media Criticism (4)

Examines mass media (especially broadcasting) from a rhetorical/critical perspective. Aims to expand students' understanding of media issues, media's role as critic, and the role of criticism. 4 lectures. Prerequisite: COMS 101 or COMS 102, and junior standing.

##### 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; junior standing.

##### 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 203 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. 3 lectures. Prerequisite: JOUR 203 and JOUR 312 and JOUR 342 or consent of instructor.

**JOUR 415 Advanced Public Relations Practice (4)**

Application of public relations tools and techniques required to create, manage, and implement a comprehensive, professional public relations campaign. Includes research, planning, writing goals and objectives; establishing themes, strategies, and plan evaluations. Public relations crisis management. 4 lectures. Prerequisite: JOUR 203, JOUR 312, JOUR 342 and 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 topic selected. Total credit limited to 8 units. 2-4 lectures. Prerequisite: Consent of instructor; junior standing.

# BS JOURNALISM

## 2007-09 Cal Poly Catalog

### Journalism Department

Graphic Arts Bldg. (26), Room 228  
805 756-2508

- 60 units upper division       GWR
- 2.0 GPA                               USCP

\* = Satisfies General Education requirement

#### MAJOR COURSES

JOUR 203 Writing for the Media.....	4
JOUR 219 Mass Media in a Multicultural Society	4
JOUR 302 Mass Media Law .....	4
JOUR 390 Visual Communication for Mass Media	4
JOUR 401 Global Communication .....	4
JOUR 402 Journalism Ethics .....	4
JOUR 444 Media Internship.....	3
JOUR 460 Senior Project .....	3
Follow one of the following tracks .....	18
Broadcast Track (18)	
JOUR 333, 346, 348 or 353	
News Editorial Track (18)	
JOUR 233, 304, 352, 407	
Public Relations Track (18)	
JOUR 312, 333 or 304, 342, 413, 415	
Journalism Dept. electives. 8 units must be 300-400 level. To be selected from:	
JOUR courses not used elsewhere in the major (5-24-07).....	12
	<hr/> 60

#### SUPPORT COURSES

Students are strongly encouraged to take foreign language courses as part of their non-journalism electives. These can be in any acceptable language discipline. No journalism or mass communication .....

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.	
	<hr/> 48

#### GENERAL EDUCATION (GE)

72 units required.  
→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 (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)

	4
	<hr/> 72
<b>ELECTIVES</b> .....	<b>0</b>
	<hr/> <b>180</b>

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [Kinesiology Department](#)

## KINE–KINESIOLOGY

(See also PE–Physical Education)

### PROFESSIONAL ACTIVITIES

Priority for enrollment given to those students pursuing a major in Kinesiology. Kinesiology majors may apply a maximum of 24 units of credit earned in PE 101-199 or KINE 208-239 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)
- KINE 210 Tennis (1)
- KINE 211 Softball-Baseball (1)
- KINE 212 Handball/Racquetball (1)
- KINE 213 Basketball (1)
- KINE 214 Volleyball (1)
- KINE 216 Wrestling (1)
- KINE 217 Flag Football/Football (1)
- KINE 218 Aquatics (2)
- KINE 219 Progressive Strength Training (1)
- KINE 220 Group Fitness Activities (2)
- KINE 221 Combatives/Self Defense (1)
- KINE 222 Archery (1)
- KINE 223 Cross Country and Track Events (1)
- KINE 224 Field Events (1)
- KINE 225 Team Handball (1)
- KINE 226 Soccer (1)
- KINE 227 Aerobic Dance Exercise (2)
- KINE 228 Cooperative Games and Activities (1)
- KINE 229 Badminton (1)

### 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.

#### **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.

#### **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 (2–6) (CR/NC)**

Practical experience through the actual coaching of a competitive sports team. 2–6 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: KINE 276 and consent of advisor.

#### **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 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. 1 lecture, 2 laboratories. Prerequisite: KINE 270 and STAT 217/STAT 218. Concurrent: KINE 300.

#### **KINE 307 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.

**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 in Elementary Physical Education (2)**

Movement as it relates to physical motor skill development, fitness, wellness, social development, cross-cultural understanding, and self-image. 1 lecture, 1 laboratory. 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: Completion of GE Areas A, D1 and either D3 or D4. Kinesiology majors will not receive GE Area D5 credit.

**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: Completion of GE Areas A, D1 and D3.

**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: 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 KINE 319 or consent of instructor.

**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 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. *Changed effective Fall 2008.*

**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. [Changed effective Fall 2008.](#)

**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 307, 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 Comprehensive School Health Education (4)**

Course content includes the health status of children K-12, and the recommendations of the California Health Framework. 4 lectures. Prerequisite: KINE 250 or KINE 255.

**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, KINE 434, 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 topic 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 topic 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. Total credit limited to 16 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. Total credit limited to 16 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 Current Studies (3)**

Analysis and evaluation of published studies 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. [Changed effective Fall 2008.](#)

**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. [New course effective Spring 2009.](#)

**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. [Changed effective Fall 2008.](#)

**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. [Corrected effective Summer 2007.](#)

**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) (formerly KINE 514)**

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. [Changed effective Fall 2008.](#)

**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. [Changed effective Fall 2008.](#)

**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, consent of graduate committee and supervising faculty member.

**BS KINESIOLOGY**  
**2007-09 Cal Poly Catalog**  
[Kinesiology Department](#)  
**Physical Education Bldg. (43), Room 453**  
**(805) 756-2545**

60 units upper division       GWR  
 2.0 GPA                               USCP  
 \* = Satisfies General Education requirement  
 Course sequencing: See flowcharts at  
[www.calpoly.edu/~cosamac](http://www.calpoly.edu/~cosamac)

**MAJOR COURSES**

<sup>1</sup> KINE 208–KINE 229 Professional Activity.....	6
KINE 250 Health Education (D4)* <i>or</i> KINE 255 Personal Health: A Multicultural Approach (D4)* (USCP) .....	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 307 Adapted Physical Activity.....	4
KINE 402 Motor Learning and Control .....	4
KINE 411 Psycho/Social Aspects of Physical Act	4
KINE 451 Nutrition for Fitness and Sport.....	5
KINE 461 Senior Project (1) <i>or</i> KINE 462 Honors Senior Project (2-4).....	1-4
MATH 118 Pre-Calculus Algebra (B1)* (MATH 116 and MATH 117 are equivalent) .....	4
PHYS 121 College Physics I (B3 & B4)* <i>or</i> <b>PHYS X118 Introductory College Physics (7-13-07)</b> .....	4
STAT 217 Intro to Statistical Concepts and Methods <i>or</i> STAT 218 Applied Statistics-Life Sciences (B1)* .....	4
ZOO 331, 332 Human Anatomy & Physiol I, II ( <i>transfer equivalent ZOO 231, 232</i> ) .....	5,5
Concentration courses (see below) (B2)* .....	48-59
	<b>112-126</b>

**GENERAL EDUCATION (GE)**

72 units required; 20 units are in Major/Support.  
 →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 (no add'l units req'd)**

B1 Mathematics/Statistics * 8 in Major .....	0
B2 Life Science * 4 in Major.....	0
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 (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 .....	4

**Area F Technology Elective (upper division) (4 units)**

**52**

**ELECTIVES..... 2-16**

**180**

**CONCENTRATIONS (select one)**

**<sup>1</sup> Exercise Science and Health Promotion Concentration**

**Required courses (27)**

KINE 218 Aquatics <i>or</i> KINE 384 Water Safety Instructor (11-29-07) .....	2-4
➔ KINE 219 Progressive 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 Promotion for Senior Adults.....	4
KINE 434 Planning Health Promotion Programs: Theory and Practice.....	4
KINE 463 Clinical and Worksite Health Promotion Field Work.....	3
BIO 111/BIO 115/BIO 161 (B2/B4)* .....	4

**Students select one of the following tracks..... 26-32**

<sup>2</sup> <i>Clinical Exercise Science Track (26-27)</i> KINE 445, 446, 452; CHEM 111 or 127, 312, 313	
<i>Worksite Commercial Health and Fitness Track (28)</i> KINE 354, 445, 450, 452; BUS 387; CHEM 110; COMS 301; JOUR 312	

*Health Education Specialist Track (30-32)*

KINE 305, 354, 405, 443, 450; FSN 210, FSN 310 <i>or</i> FSN 315 <i>or</i> PSY 205; MCRO 221; CHEM 110 <i>or</i> 111	
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➔ **54-53-59**

**Teaching Concentration**

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.....	3
KINE 384 Water Safety Instructor .....	4
KINE 396 Outdoor Education .....	3
KINE 419 Physical Education Program Content in Elementary School.....	3

<sup>1</sup> Students following the Exercise Science and Health Promotion Concentration ~~should be to~~ take **KINE 211, KINE 212, KINE 219, KINE 220, KINE 227 and KINE 228, and one additional unit from KINE 208-229.**

<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.

*BS Kinesiology, Teaching Concentration, continued*

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 Comprehensive School Health Ed .....	4
BIO 111 General Biology (B2)* .....	4
CHEM 110 World of Chemistry .....	4
DANC 381 Methods of Teaching Dance .....	4
	<hr/>
	59

**Individualized Course of Study**

KINE 218 Aquatics <i>or</i> KINE 384 Water Safety Instructor (11-29-07) .....	2-4
BIO 111 General Biology <i>or</i> BIO 161 Intro to Cell and Molecular Biology (B2)* .....	4
CHEM 110 <i>or</i> CHEM 111 <i>or</i> CHEM 127.....	4/5
Advisor approved electives .....	38
	<hr/>
	48-49

**2007-2009 Cal Poly Catalog**  
**Liberal Arts and Engineering Studies,**  
***an Interdisciplinary Program***

**LAES–LIBERAL ARTS and ENGINEERING STUDIES**

**NEW COURSES Approved after printing of the 2007-09 Catalog**

First posted 12/13/07; updated 5/13/08

**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 2 lectures, 2 activities.~~ Prerequisite: MATH 241; PHYS 133, PHYS 132; GE Area A; completion of 4 engineering fundamentals courses. [Changed effective Fall 2008.](#)

**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 1 seminar, 3 activities.~~ Prerequisite: LAES 301, senior standing. [Changed effective Winter 2009.](#)

**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. ~~2 seminars, 2 activities.~~ Supervision. Prerequisite: LAES 461. [Changed effective Fall 2008.](#)

**BACHELOR OF LANDSCAPE ARCHITECTURE**  
**2007-09 Cal Poly Catalog**

[Landscape Architecture Department](#)  
**Dexter Bldg.(34), Room 213**  
**(805) 756-1319**

- 60 units upper division       GWR
- 2.0 GPA                               USCP

\* = Satisfies General Education requirement

**MAJOR COURSES**

LA 101 Introduction to Landscape Architecture.....	4
LA 130 Landscape Interpretation.....	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 221 California Plants and Plant Communities..	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 Envmts Design Focus Studio .....	4
LA 404 Cultural Envmts 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 five (5) courses from the following</i>	
<i>Integrated Learning Courses (ILC).....</i>	20
LA 431 CAD & Digital Media Communications (ILC) (4)	
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 Commun. (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. <b>May be LA courses, including additional ILCs and Focus Studios, or CAED interdisciplinary studios.</b>	

**SUPPORT COURSES**

ARCH 217/218/219 History of Architecture (C3)*	4
BOT 121 General Botany (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 two courses from the following.....	8
BIO 227 Wildlife Conservation Biology (4)	
BRAE 337 Landscape Irrigation (3) plus one unit of free elective	
SS 121 Introductory Soil Science (4)	
STAT 217 Intro to Stat Concepts and Methods (4) or 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; any minor in the College of Architecture and Environmental Design.	

**46**

**GENERAL EDUCATION (GE)**

72 units required; 16 units are in Support.  
 →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 (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**

**ELECTIVES .....**

**0**

**225**



# LATIN AMERICAN STUDIES MINOR

## 2007-09 Cal Poly Catalog

### Social Sciences Department

Faculty Office Bldg. (47), Room 13-C  
(805) 756-2260

Latin America is a region of critical importance to the United States, and California in particular. The minor provides students with a broad understanding of Latin America, as well as its cultural, political, and economic connection to California and the United States. This knowledge is increasingly important for careers in education, healthcare, social services, agriculture, law enforcement, business, and tourism. The minor has a strong interdisciplinary and international focus. It 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 Fundamentals of Spanish .....	4
<i>Select two:</i> .....	8
ANT 325 Pre-Columbian Mesoamerica (D5) <i>or</i> ANT 330 Indigenous South Americans (D5) (4)	
➡ <del>D3</del> <a href="#">GEOG 150 Intro to Cultural Geography (4)</a> <i>(D3) Correction effective Summer 2007</i>	
HIST 340 History of Modern Latin America (4)	
HUM 310 Humanities in World Cultures (subtitles: Culture of Latin America <i>or</i> of 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.	

## 2007-09 Cal Poly Catalog

### Liberal Arts and Engineering Studies, *an Interdisciplinary Program*

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David D. Gillette, Co-director (805) 756-2331

Lizabeth T. Schlemer, Co-director (805) 756-2183

#### **ACADEMIC PROGRAM**

##### **BA Liberal Arts and Engineering Studies**

The BA in Liberal Arts and Engineering Studies provides an educational vehicle for the person who does not want a career in engineering, but seeks a career in which a background in the liberal arts and engineering will further interaction with those with design knowledge and in technological settings or to translate technological information to those with less technological knowledge. This degree will *not* produce more practicing engineers, but it will produce more technologically literate students who understand the principles of engineering and who will apply them to the profession they choose to pursue as citizens of a deeply technological society.

Modern society is technologically driven and technology centered. Thus, an understanding of technology, a technological literacy, is a critical prerequisite for full participation as a citizen in the 21st Century world. Indeed, government rarely characterizes the key public challenges as questions of technology, they are assumed to be socioeconomic- political problems, areas of study traditionally allied with the liberal arts. In addition, the intersection of technology with the humanities and the performing and fine arts reframes age-old questions about aesthetics, audience, and affective impact.

In its connection to human affairs, technology now defines our culture in much the same way religion or philosophy has in times past. It profoundly changes lifestyles, and can reinforce or collide with our most strongly held values. It modulates the most celebrated passages of our human existence with artificial interventions during birth and on the deathbed. Unseen and often unnoticed, technology plays a significant role in our futures. The program offers a four-year curriculum leading to a BA degree, which prepares students for careers interfacing with engineering, at the cusp of new interdisciplinary activities or for further education in graduate school.

This curriculum allows the BA in liberal arts and engineering studies graduate, in partnership with members of other colleges at the university, to participate in the interdisciplinary teams required for realization of continuous innovation.

The goal of the proposed program is to provide its graduates with a solid engineering and scientific appreciation that will underpin them in careers other than engineering. To support these goals, the overarching learning objectives for students participating in the program:

- Have a working knowledge of mathematics, science, and basic engineering.
- Have a working knowledge of the essential philosophical, ethical, aesthetic and expressive aspects of our culture and their historical development.
- Have the ability to communicate effectively through a variety of media in diverse, multicultural contexts.
- Have the ability to understand a technical system, component or process.
- Can function effectively as a member of an interdisciplinary and international team.
- Have the ability to identify technical problems and use a multidisciplinary perspective to help formulate effective solutions.
- Have a solid understanding of the ethical and professional responsibilities associated with the creation, use and integration of new and existing technology.
- Have an understanding of the social, political and historical impact of technical solutions to complex modern problems.
- Have the ability 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.

## 2007-09 Cal Poly Catalog

### BA LIBERAL ARTS and ENGINEERING STUDIES

- ☐ 60 units upper division      ☐ GWR  
 ☐ 2.0 GPA                              ☐ USCP

\* = Satisfies General Education requirement

#### 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 Collaborative Global Partnerships in LAES .....	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 or advisor approved elective.....	4
PHYS 141 General Physics IA.....	4
PHYS 132, 133 General Physics II, III.....	4,4
Engineering concentration (minimum 8 units at 300-400 level).....	34-35
Liberal Arts concentration (minimum 12 units at 300-400 level).....	24
STAT 312/321/350.....	4
Study Abroad or Global Perspectives courses (300-400 level).....	4,4
	<b>126-127</b>

#### GENERAL EDUCATION (GE)

72 units required; 20-32 units in Major, depending on concentration.

→See page 56 for complete GE course listing.

→Minimum of 12 units required at the 300-400 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 (requirement for Liberal Arts students only) * 4 units in Major .....	0

#### Area C Arts and Humanities (16 units)

C1 Literature .....	4
C2 Philosophy .....	4
C3 Fine/Performing Arts * in concentration .....	0-4
C4 Upper-division elective * in 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
<b>Area F Technology Elective (upper division) *in conc</b>	<b>0-4</b>
	<b>40-52</b>
<b>ELECTIVES.....</b>	<b>14-1</b>
	<b>180</b>

#### 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 Work Design and Measurement .....	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 – Engineering.....

Courses to be selected with program advisor. A minimum of 8 units must be at the 300-400 level.

34



**LIBERAL ARTS CONCENTRATIONS (select one)****Culture, Society and Technology Concentration**

ES/WS 350 Gender, Race, Science & Technology (Area F)* (USCP).....	4
HUM 303/PHIL 341/PHIL 337 (C4)* .....	4
POLS 451 Technology & Public Policy .....	4
<i>Advisor approved electives. Select 12 units from:</i>	
ANT 360, COMS 317, GEOG 318, GEOG 333, HIST 354, HIST 359, JOUR 331, JOUR 470, PHIL 322, PHIL 340, POLS 347, PSY 311, PSY 494.....	<u>12</u>
	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>Advisor approved electives. Select 12 units from:</i>	
ENGL 210, ENGL 370, ENGL 372, ENGL 412, ENGL 416, ENGL 419, COMS 311, COMS 385, COMS 419 .....	<u>12</u>
	24

**Interactive Communication – Theatre Concentration**

TH 210 Introduction to Theatre (C3)* .....	4
TH 227/228 Theater History .....	4
ENGL 411 New Media Arts I .....	4
<i>Advisor approved electives. Select 12 units from:</i>	
ENGL 210, ENGL 412, TH 220, TH 230/330, TH 310/320/360/390, TH 430, TH 434, HUM 320.....	<u>12</u>
	24

**Technical Communication Concentration**

ENGL 317 Technical Editing.....	4
ENGL 319 Information Design & Production .....	4
COMS 317 Technology & Human Comm.....	4
<i>Advisor approved electives. Select 12 units from:</i>	
ENGL 210, ENGL 310, ENGL 418/420, HUM 303, PHIL 337/341, COMS 213, COMS 301 .....	<u>12</u>
	24

**Publishing Technology Concentration**

GRC 101 Intro to Graphic Communication .....	3
GRC 201 Electronic Publishing Systems.....	3
GRC 211 Substrates, Inks and Toners .....	4
HUM 303/PHIL 341/PHIL 337 (C4)* .....	4
<i>Advisor approved electives. Select 10 units from:</i>	
COMS 317, GRC 316, GRC 328, GRC 329, GRC 402, PSY 494 .....	<u>10</u>
	24

**Individualized Course of Study – Liberal Arts ..... 24**

Courses or a minor to be selected from College of Liberal Arts with program advisor approval. A minimum of 12 units must be at the 300-400 level.

# BA LIBERAL STUDIES

## 2007-09 Cal Poly Catalog

### Liberal Studies Program

Science North (Bldg. 53), Room 211  
805 756-2935

- 60 units upper division       GWR
- 2.0 GPA                               USCP

\* = Satisfies General Education requirement

### MAJOR COURSES

(Courses in parentheses are recommended for Multiple Subjects Credential)

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 270 Intro to Visual and Performing Arts Standards in the Elementary Classroom .....	4
LS 310 Storytelling: The Oral Tradition <i>or</i> LS X477 Myth and Folklore in Art for Elementary Classrooms (2/14/08).....	4
LS 311 Visual Arts in the Elementary Classroom <i>or</i> LS X475 Teaching Standards Based Art in the Elementary Classroom: A Distance Learning Course (4) (2/14/08) .....	4
LS 461 Senior Project Seminar .....	4
BIO 113 Animal Diversity & Ecology (B2&B4)* (or transfer of any GE B2 life science course).....	4
BIO 114 Plant Diversity & Ecology (B2&B4)* (or transfer of any GE B2 life science course)*....	4
BIO 115 Animal/Human Structure & Function (or transfer of any anatomy course).....	4
CD/EDUC 207 The Learner's Development, Culture and Identity in Ed Settings.....	4
ENGL 391 Topics in Applied Linguistics.....	4
HIST 208 Survey of California History .....	4
HIST 210 World History (D3)* .....	4
KINE 310 Concepts in Elementary Physical Ed. ....	2
MATH 118 Pre-Calculus Algebra (B1)*.....	4
MATH 327 Math for Elementary Teaching I.....	4
MATH 328 Math for Elementary Teaching II .....	4
MATH 329 Math for Elementary Teaching III.....	4
STAT 130 Intro to Statistical Reasoning <i>or</i> STAT 217 Intro to Statistical Concepts and Methods (B1)*.....	4
PSC 101 The Physical Environment: Matter and Energy (B3&B4)* (or transfer of any GE B3 PHYS course) .....	4
PSC 102 Physical Environ: Atoms & Molecules (or transfer of any chemistry course).....	4
PSC 103 Physical Environ: Earth & Universe (or transfer of any GEOL or ASTR course).....	4
PSY 201/202 General Psychology (D4)* .....	4
Select 16 units from one of the following approved emphasis areas. 8 units must be 300-400 level .....	16

Art, Art Education, Child Development, Language Arts, Life Science, Mathematics, Music, Performing Arts, Kinesiology, Special Education, Physical Science, Social Science, Spanish

107

### SUPPORT COURSES

EDUC 310 Effective Teaching & Classroom Mgt: Multicultural Perspective in K-3 & 4-8 Setting ...	4
EDUC 440 Educating Individuals with Exceptional Needs .....	4
EDUC 480 Computer Based Curriculum .....	3
ENGL 360 Literature for Adolescents.....	4
KINE 250 Healthy Living .....	4
LS 312 Adv. Visual Arts in the Elem. Classroom ...	4
PSY 456/PSY 458/PSY 460 .....	4
<b>27</b>	

### GENERAL EDUCATION (GE)

72 units required; 28 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 (no additional units reqd)

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 * 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 **see note below.....	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 units in Major .....	0
D4 Self Development (CSU Area E) * 4 units in Major .....	0
D5 Upper-division elective (GEOG 308 recommended) .....	4

<b>Area F Technology Elective (upper division) .....</b>	<b>4</b>
<b>44</b>	

<b>ELECTIVES .....</b>	<b>2</b>
<b>180</b>	

\*\* Note: Some ENGL classes in this category meet the GWR requirement for students with junior standing . Students must complete appropriate paperwork with course instructor to receive GWR credit. Otherwise a test is available quarterly that students may take. ENGL 345-347, 349, 381 meet the USCP requirement.

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [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 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. 30 hours of fieldwork required. 1 lecture, 1 activity.

### LS 250 Field Experience 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, 30 hours of fieldwork required. 1 lecture, 1 activity.

### LS 260 Children's Literature (4)

(Also listed as ENGL 260)

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. [New course, effective Spring 2009.](#)

### 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 aesthetic perception, creative expression, historical/cultural context, aesthetic valuing and application to the elementary classroom. 4 lectures.

### LS 310 Storytelling: The Oral Tradition (4)

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.

### LS 311 Visual Arts in the Elementary Classroom (4)

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.

### LS 312 Advanced Visual Arts in the Elementary Classroom (4)

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.

### 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.

**MASTER OF PUBLIC POLICY**  
**2007-09 Cal Poly Catalog**

[Political Science Department](#)  
**Faculty Office Bldg. (47), Room 14-A**  
**(805) 756-2984**

**General Characteristics**

The Master of Public Policy degree program (MPP) is professionally oriented, and open to students who wish to pursue analytic careers in government and nonprofit organizations or in organizations related to public policy regulations. The program is structured to prepare graduates with competence to function in a general context of policy, as well as in analysis. The core courses cover statistics, public policy, public policy analysis, quantitative methods, public finance, policy internship, and graduate seminar.

The MPP program is designed to meet the needs of those who have earned baccalaureate degrees in a variety of disciplines, including, but not limited to, economics, history, political science, social sciences, psychology, city and regional planning, business administration, education, environmental studies, and natural resource management.

The program is two years in duration for students taking 8 or more units per term. It consists of 55 approved units (not including courses necessary to compensate for deficiencies). Because of the sequencing of courses, students admitted to the program are expected to begin study in the fall quarter. The degree culminates in the second year with a two-term seminar (POLS 590) where analytical projects are undertaken. Both group reports and individual papers are developed, presented, and discussed. [After the completion of POLS 590, students are required to pass a comprehensive exam.](#) The program offers students opportunities to develop close working relationships with faculty. Self-directed study, tailored to student interest and needs, is encouraged.

**Prerequisites**

Students entering the program are expected to bring with them backgrounds in certain basic subject areas or to make up deficiencies in these areas after admission. These include the following Cal Poly course or its equivalent: STAT 221 Introduction to Probability and Statistics.

**Admission Requirements**

1. Possession of a baccalaureate degree from an accredited college or university;
2. A grade point average of not less than 2.75 in all undergraduate coursework or not less than 3.00 in all upper division coursework;
3. Related undergraduate coursework or work experience;
4. The quality of previous educational and professional experiences measured by:
  - a. Biographical and career data (resumes, examples

of reports, letters of recommendation, etc.), and  
 b. Professional training in fields such as budgeting, management, and supervision in the public, health, or nonprofit sectors.

5. For applicants whose preparatory education is principally in a language other than English, a TOEFL score of 550 or higher (or 213 on the new conversation scale for the computer-based TOEFL exam).

**Program of Study**

Graduate students must file a formal study plan with their major professor, graduate committee, department, college and university graduate studies office no later than the end of the quarter in which the twelfth unit of approved courses is completed. The formal program of study must include a minimum of 55 units (at least 43 of which must be at the 500 level).

<b>Required Courses</b>	<i>Units</i>
POLS 510 Research Design <i>or</i>	
STAT 512 Statistical Methods.....	4
POLS 515 Public Policy .....	4
POLS 516 Public Finance.....	4
POLS 518 Public Policy Analysis .....	4
POLS 560 Quantitative Methods.....	5
POLS 586 Policy Internship .....	8
POLS 590 Graduate Seminar.....	8
<b>Electives</b> .....	18
Additional 400 and 500-level courses, to be selected with graduate advisor's approval. <i>At least 6 units must be at the 500 level.</i>	
	55



## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [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 on a project that benefits humanity. Issues of engineering ethics, technology and society, the environment and sustainability also studied. 1 laboratory.

### 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 ethnics, technology and society, the environment and sustainability. 1 laboratory. Prerequisite: MATE 120.

### 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, CHEM 124 or CHEM 127, MATH 141, PHYS 131. 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 data acquisition for materials processes. 1 laboratory. Prerequisite: MATE 210. Concurrent: MATE 222.

### MATE 232 Nanotechnology, Human Biology, Ethics and Society (4) (Also listed as BIO 232)

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.

### 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 232.

### 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. Concurrent: MATE 350.

### 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 210, MATE 350, CE 204 or consent of instructor. Concurrent: MATE 370.

### 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, EE 201, EE 251. Concurrent: MATE 360.

### 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 210, CE 204; MATE 310 should be taken concurrently.

### MATE 359 Living in a Material World (4) (Also listed as HIST 359)

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: Completion of GE Area B, and junior standing.

### 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: MATE 210, STAT 312. Concurrent: CHEM 305, MATE 340.

### 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 360. 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. Co-requisite: 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. Co-requisite: 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. *Materials analysis and characterization course or Special topics course.*

#### **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. *Materials processing course.*

#### **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. *Materials processing course.*

#### **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. *Materials processing course.*

#### **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 microstructures. Heterogeneous interfaces, adhesion, wetting. Relation between process selection, interface design, microstructure, and properties, weldability. 2 laboratories. Prerequisite: MATE 210. *Materials processing course.*

#### **MATE 446 Surface Chemistry of Materials (3)** (Also listed as CHEM 446)

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 306 or consent of instructor. *Special topics course.*

#### **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. *Materials analysis and characterization course.*

#### **MATE 458 Microelectronics and Electronics Packaging (4)** (Also listed as IME 458)

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. [New crosslisted course effective Spring 2009.](#)

#### **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, CE 204, or consent of instructor. *Special topics course.*

#### **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. [New course effective Spring 2009.](#)

#### **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. Co-requisite: MATE 482 for MATE majors.

#### **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. Co-requisite: MATE 481 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. 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. 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. 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. Course number changed effective Spring 2009.](#)

#### **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. *Materials analysis and characterization or Special topics course.*

#### **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. *Materials analysis and characterization or Special topics course.*

#### **MATE 530 Biomaterials (4) (Also listed as BMED 530)**

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.

#### **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. Co-requisite: 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) (Also listed as ME 555)**

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. *New course effective Spring 2009.*

#### **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 topics for selection. Total credit limited to 6 units. 3 lectures. Prerequisite: Graduate standing or permission of instructor. *Materials processing course.*

#### **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 topics for selection. Total credit limited to 6 units. 2 laboratories. Concurrent: MATE 560 or consent of instructor. *Materials processing course.*

#### **MATE 570 Advanced Engineering Materials (4)**

*Course number changed. See MATE 501. Effective Spring 2009.*

#### **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. *New course effective Spring 2009.*

#### **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. *New course effective Spring 2008.*

#### **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. *Special topics course.*

#### **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. *Materials processing or Special topics course.*

#### **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.

# BS MATERIALS ENGINEERING

## 2007-09 Cal Poly Catalog

[Materials Engineering Department](#)

**Air Conditioning Engrg Bldg. (12), Rm 107-H**

**(805) 756-2568 FAX: (805) 756-2299**

**email: [matedept@calpoly.edu](mailto:matedept@calpoly.edu)**

- 60 units upper division       GWR
- 2.0 GPA                               USCP

\* = Satisfies General Education requirement

### 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 <i>and</i> MATE 215 Materials Laboratory I.....	3,1
MATE 222 Materials Selection for the Life Cycle <i>and</i> MATE 225 Materials Laboratory II.....	4,1
MATE 232 Nanotechnology, Human Biology, Ethics & Society <i>and</i> MATE 235 Matls Lab III	4,1
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
MATE 481 Corporate Culture.....	1
MATE 482, 483, 484 Senior Project I, II, III.....	1,2,2
Select at least 3 courses from the following: .....	12
MATE 401, 406, 425, 430, 435, 440, 445, 446, 450, 460, 504, 510, 520, 522, 525, 540, 545, 550, 555, 560, 565, 570, 580, 590	
BMED 530	
Technical breadth electives .....	8
See listing of approved courses on department website, <a href="http://mate.calpoly.edu">http://mate.calpoly.edu</a>	
Science elective <b>to be selected from any 200-500 level course in BIO, BOT, CHEM, MCRO, PHYS, ASTR, GEOL, ZOO or any course in College of Engineering (6-28-07)</b> .....	4
	<hr/>
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### SUPPORT COURSES

CE 204 Mechanics of Materials I.....	3
CHEM 127 General Chemistry (B3/B4)* .....	4
CHEM 128 General Chemistry .....	4
CHEM 305 Physical Chemistry .....	4
CPE/CSC 101 Fundamentals of Computer Sci. I <i>or</i> CSC 234 (3) & Tech Breadth Elective (1) <i>or</i> CSC 231 (2) & Tech Breadth Elec (2) (10-30-07).....	4
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 <i>or</i> ME 302 Thermodyn. ....	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>1</sup> Engineering Drawing and Manufacturing elective..	4
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### GENERAL EDUCATION (GE)

72 units required; 28 units are in Support.

→See page 56 for complete GE course listing.

→Minimum of 8 units required at the 300-400 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 (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
	<hr/>
	44

<b>ELECTIVES</b> .....	<b>0</b>
	<hr/>
	191

<sup>1</sup> Choose either IME 144 or a combination of ME 151 and one of IME 141, 142, 143, or IT 341.



## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [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 48.

### **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 Laboratory (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.

### **MATH 114 Intermediate Algebra Laboratory (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)**

**For MATH 116 and 117: 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.

### **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.

### **MATH 126, 127 Pre-Calculus Algebra Laboratory 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 Laboratory (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 Laboratory (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) (4) GE B1** (Also listed as HNRS 141, 142, 143)

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 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.

### **MATH 151, 152, 153 Calculus Laboratories 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.

### **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.

### **MATH 192 Calculus for Architecture and Construction Management Laboratory (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.

**MATH 231 Calculus for Business and Economics Laboratory (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) (Also listed as HNRS 241)**

Partial derivatives, multiple integrals, introduction to vector analysis. 4 lectures. Prerequisite: MATH 143.

**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) (Also listed as HNRS 244)**

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.

**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 Laboratory (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 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.

**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 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.

**MATH 327, 328, 329 Mathematics for Elementary Teaching I, II, III (4) (4) (4)**

Introduction to set theory, number theory, real numbers, probability, statistics, and geometry. Computer applications. 2 lectures, 2 activities. **MATH 327** prerequisite: Completion of ELM requirement, and passing score on appropriate Mathematics Placement Examination, or MATH 118 or equivalent. **MATH 328** prerequisite: MATH 327 with a grade of C- or better or consent of instructor. **MATH 329** prerequisite: MATH 328.

**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: Junior standing or consent of instructor.

**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: Junior standing or consent of instructor.

**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.

**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 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 417 Discrete Dynamical Systems (4)**

Discrete dynamical systems: iteration, stability of fixed points and periodic points, bifurcations, conjugacy, symbolic dynamics, transitivity, limit sets, attractors, chaos, sensitive dependence, Lyapunov exponents, Stable Manifold Theorem, geometric horseshoe, Markov partitions, fractals. 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 Laboratory (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 431, 432 Mathematical Optimization I, II (4) (4)**

Classical optimization. Maximum/minimum of functions, linear and nonlinear optimization problems, duality, constrained optimization. Model building and applications to various fields. 4 lectures. **MATH 431** prerequisite: MATH 206 or MATH 244, and MATH 241, or consent of instructor. **MATH 432** prerequisite: MATH 431.

**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)** (formerly MATH 333)

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)** (formerly MATH 433)

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 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 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. **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 topic 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. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**MATH 491 Abstract Algebra I Laboratory (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. Total credit limited to 16 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. *Change effective Winter 2007.*

**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 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, 531 Discrete Mathematics with Applications I, II (4) (4)**

Advanced mathematical methods of discrete mathematics with applications. Topics will include probability theory with generating functions, difference equations and number theory. Additional topics to be drawn from the theory of algorithms, coding theory, set theory, and the relation of discrete mathematics to complex analysis. 4 lectures. **MATH 530** prerequisite: MATH 481, MATH 306 and graduate standing, or consent of instructor. **MATH 531** prerequisite: MATH 530.

**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 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 596 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.

**MATHEMATICS MINOR**  
**2007-2009 Cal Poly Catalog**  
Mathematics Department  
**Faculty Offices East Bldg. (25), Room 208**  
**(805) 756-2206**

Students may earn a minor in mathematics by completing a coordinated course of study. The program consists of a core of required courses, followed by two tracks of advanced work, to be chosen in concert with a student's career objectives. Interested students should contact the Mathematics Department for individual advisement.

- I. Required courses** ..... 8  
 MATH 206 Linear Algebra I (4) *or* MATH 244  
 Linear Analysis I (4)  
 MATH 248 Methods of Proof in Mathematics (4)

**II. Complete two tracks** ..... 16

▶ A track consists of two courses from one of the groups A–L. Completion of all four courses in either group K or L is considered two tracks. Some tracks have additional mathematics prerequisites. *Corrected effective Summer 2007.*

- A. MATH 304 Vector Analysis (4)  
 MATH 404 Intro to Differential Geometry (4)
- B. MATH 306 Linear Algebra II (4)  
 MATH 406 Linear Algebra III (4)
- C. MATH 335 Graph Theory (4)  
 MATH 336 Combinatorial Mathematics (4)  
 MATH 437 Game Theory (4)
- D. MATH 408 Complex Analysis I (4)  
 MATH 409 Complex Analysis II (4)
- E. MATH 412 Introduction to Analysis I (4)  
 MATH 413 Introduction to Analysis II (4)
- F. MATH 416 Differential Equations II (4)  
 MATH 417 Discrete Dynamical Systems (4)
- G. MATH 431 Mathematical Optimization I (4)  
 MATH 432 Mathematical Optimization II (4)
- H. MATH 440 Topology I (4)  
 MATH 441 Topology II (4)
- I. MATH 442 Euclidean Geometry (4)  
 MATH 443 Modern Geometries (4)
- J. MATH 451 Numerical Analysis I (4)  
 MATH 452 Numerical Analysis II (4)
- K. MATH 341 Theory of Numbers (4)  
 MATH 419 Intro. To History of Math (4)  
 MATH 481 Abstract Algebra I (4)  
 MATH 482 Abstract Algebra II (4)

- L. MATH 304 Vector Analysis (4)  
 MATH 344 Linear Analysis II (4)  
 MATH 416 Differential Equations II (4)  
 MATH 418 Partial Differential Equations (4)

**III. Mathematics electives** ..... 6  
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## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [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 153 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.

#### 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.

#### 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 302 Thermodynamics (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.

#### ME 303 Thermal Engineering (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: Completion of GE Areas A and B, and junior standing.

#### 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: PHYS 131 or PHYS 123, completion of GE Area B and junior standing.

#### 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. Prerequisite: MATH 242 (or concurrent), ME 212, CSC 231 or CSC 234.

#### 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: ECON 201, 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 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. Use of commercial finite element code(s). 3 lectures, 1 laboratory. Prerequisite: ME 329.

**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, ME 329.

**ME 406 Mechatronics Design (4)**

Application of micro-controllers and programmable logic controllers in the design of mechatronic products and automation systems. Digital feedback motion and process control. Modern industrial mechatronics applications. 3 lectures, 1 laboratory. Prerequisite: ME 329 and ME 405 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 330 or ME 328.

**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 Project Design (3)**

Component and system design from global integration point of view of various design parameters, using real life problems. Techniques of brainstorming, decision making, and feasibility studies. Industrial participation design program. 1 lecture, 2 laboratories. Prerequisite: ME 329, ME 343, ME 347, ENGL 149.

**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)**

Handling qualities of two-wheeled vehicles, and the application to vehicle design. Modeling of single-track vehicles begins with the complete free body diagram of the steerable section and the dynamics of the vehicle. Laboratory demonstrations of geometry changes to the control spring and control authority. Determination of vehicle geometry values of cg position, longitudinal radius of gyration, headtube angle, etc. as their effect on handling qualities. 3 lectures, 1 laboratory. Prerequisite: ME 318, ME 326, ME 422 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 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 System Design (3)**

Team project work in designing heating, ventilating and air-conditioning (HVAC) systems. Industry projects and collaborative work with other disciplines. 1 lecture, 2 laboratories. Prerequisite: ME 456, ME 458.

**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 463 Undergraduate Seminar (1)**

New developments, policies, practices, and procedures discussed through seminar mode. Codes of ethics and case studies interpretations through panel discussions by students. 1 seminar. 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 topic 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 topic selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

**ME 481 Senior Project Laboratory (2)**

Completion of a project begun in senior design class ME 428 or ME 459. Design verified through prototyping and testing. 2 laboratories. Prerequisite: ME 428 or ME 459.

**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 342, 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. 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. 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. 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 equations for isotropic and anisotropic solids and viscous fluids. Applications in mechanical engineering including design of beams and pressure vessels, stress concentrations, fiber-reinforced composites, and non-homogeneous biological materials. 4 lectures. Prerequisite: ME 401 or consent of instructor.

**ME 502 Finite Element Analysis (4)**

Approximate methods of stress analysis with emphasis on the theory of the Finite Element Method. Rayleigh-Ritz approximate energy minimizations and methods of weighted residuals applied to one- and two-dimensional



stress fields. 3 lectures, 1 laboratory. Prerequisite: ME 501, or consent of instructor.

**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.

**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 program-ming 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 seminars, 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 seminars, 1 laboratory. Prerequisite: ME 343, ME 347, MATH 418, graduate standing or consent of instructor.

**ME 555 Micro Systems Laboratory (2) (Also listed as MATE 555)**

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. [New course effective Spring 2009.](#)

**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 topic 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 topic 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) (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.

## BS MECHANICAL ENGINEERING

### 2007-09 Cal Poly Catalog

#### Mechanical Engineering Department

**Engineering Bldg. (13), Room 254**

**(805) 756-1334**

- ☐ 60 units upper division      ☐ GWR  
 ☐ 2.0 GPA                              ☐ USCP

\* = Satisfies General Education requirement

#### MAJOR COURSES

ME 134 Introduction to Mechanical Engineering ...	1
ME 151 Engineering Design Communication I.....	2
ME 152 Engineering Design Communication II.....	2
ME 153 Intermediate Solid Modeling .....	1
ME 211 Engineering Statics.....	3
ME 212 Engineering Dynamics .....	3
ME 234 Philosophy of Design .....	3
ME 236 Thermal Measurements .....	3
ME 302 Thermodynamics .....	3
ME 303 Thermal Engineering .....	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
ME 463 Undergraduate Seminar .....	1
ME 481 Senior Project Laboratory.....	2
Concentration (see below).....	19
	<hr/>
	82

#### SUPPORT COURSES

BIO 213 Life Science for Engineers <i>and</i> 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 Programming for Engineering Students <i>or</i> CSC 234 C and Unix .....	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 <i>and</i> 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)	

## GENERAL EDUCATION (GE)

72 units required; 32 units are in Support.

→See page 56 for complete GE course listing.

→Minimum of 8 units required at the 300-400 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 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
	<hr/>
	40

ELECTIVES .....	0
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	199

#### CONCENTRATIONS (select one)

##### General Concentration

ME 428 Senior Project Design .....	3
EE 255, 295 Energy Conversion Electromagnetics and Lab <i>or</i> ME upper division technical elective (4) (5-4-07).....	3,1
Technical electives selected from emphasis area....	12
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	19

##### 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 HVAC System Design .....	3
	<hr/>
	19

##### Mechatronics Concentration

ME 305 Introduction to Mechatronics .....	4
ME 405 Mechatronics .....	4
ME 423 Robotics: Fundamentals and Applications	4
ME 428 Senior Project Design.....	3
<sup>1</sup> CPE 336/IME 356/ME 506 .....	4
	<hr/>
	19

<sup>1</sup> Elective based on interests of students.

## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for original descriptions.

#### Kinesiology Department

### PE–PHYSICAL EDUCATION

(See also 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 (PE 100–176) are evaluated on a Credit/No Credit basis. A miscellaneous course fee may be required—see the Schedule of Classes.

PE 100 Adaptive Activity  
 PE 101 Gymnastics  
 PE 102 Tumbling and Vaulting  
 PE 103 Archery  
 PE 104 Badminton, Beg.  
 PE 105 Badminton, Int.–Adv.  
 PE 107 Billiards  
 PE 108 Basketball  
 PE 109 Bowling  
 PE 110 Cycling  
 PE 111 Fencing  
 PE 112 Bowling, Int.  
 PE 113 Intermediate Billiards  
 PE 116 Aerobic Exercise  
 PE 121 Golf, Beg.  
 PE 122 Golf, Int.–Adv.  
 PE 125 Jogging  
 PE 126 Judo  
 PE 129 Stretch, Flex and Relax  
 PE 131 Physical Conditioning  
 PE 132 Racquetball, Beg.  
 PE 133 Racquetball, Int.–Adv.  
 PE 135 Skin Diving  
 PE 136 Scuba Diving  
 PE 137 Self-Defense  
 PE 138 Karate

PE 139 Soccer  
 PE 140 Ultimate Disc  
 PE 142 Softball  
 PE 143 Swimming for Non-Swimmers  
 PE 144 Swimming, Advanced Beginner  
 PE 145 Swimming, Int.  
 PE 146 Swimming, Adv.  
 PE 147 Swim Conditioning  
 PE 148 Tennis, Beg.  
 PE 149 Tennis, Int.–Adv.  
 PE 151 Volleyball, Beg.  
 PE 152 Volleyball, Int.–Adv.  
 PE 154 Weight Training  
 PE 156 Aqua-Aerobics  
 PE 159 Wrestling  
 PE 174 Intramurals  
 PE 176 Fitness Walking

#### COMPETITIVE ATHLETICS

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

##### Men

PEM 182 Baseball	PEM 282 Baseball
PEM 183 Basketball	PEM 283 Basketball
PEM 184 Cross Country	PEM 284 Cross Country
PEM 185 Football	PEM 285 Football
PEM 189 Soccer	PEM 289 Soccer
PEM 191 Swimming	PEM 291 Swimming
PEM 192 Tennis	PEM 292 Tennis
PEM 193 Track and Field	PEM 293 Track and Field
PEM 195 Golf	PEM 296 Wrestling
PEM 196 Wrestling	

##### Women

PEW 183 Basketball	PEW 283 Basketball
PEW 184 Cross Country	PEW 284 Cross Country
PEW 189 Soccer	PEW 289 Soccer
PEW 190 Softball	PEW 290 Softball
PEW 191 Swimming	PEW 291 Swimming
PEW 192 Tennis	PEW 292 Tennis
PEW 193 Track and Field	PEW 293 Track and Field
PEW 194 Volleyball	PEW 294 Volleyball
PEW 195 Golf	

PROFESSIONAL ACTIVITIES – See KINE–Kinesiology

ACADEMIC COURSES – See KINE–Kinesiology

<sup>1</sup> PE 138 meets 3 hours per week.

## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for original descriptions.

#### Kinesiology Department

### PE–PHYSICAL EDUCATION

(See also KINE–Kinesiology)

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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.

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All basic instructional courses (PE 100–176) are evaluated on a Credit/No Credit basis. A miscellaneous course fee may be required—see the Schedule of Classes.

PE 100 Adaptive Activity  
 PE 101 Gymnastics  
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 PE 108 Basketball  
 PE 109 Bowling  
 PE 110 Cycling  
 PE 111 Fencing  
 PE 112 Bowling, Int.  
 PE 113 Intermediate Billiards  
 PE 116 Aerobic Exercise  
 PE 121 Golf, Beg.  
 PE 122 Golf, Int.–Adv.  
 PE 125 Jogging  
 PE 126 Judo  
 PE 129 Stretch, Flex and Relax  
 PE 131 Physical Conditioning  
 PE 132 Racquetball, Beg.  
 PE 133 Racquetball, Int.–Adv.  
 PE 135 Skin Diving  
 PE 136 Scuba Diving  
 PE 137 Self-Defense  
 PE 138 Karate

PE 139 Soccer  
 PE 140 Ultimate Disc  
 PE 142 Softball  
 PE 143 Swimming for Non-Swimmers  
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 PE 145 Swimming, Int.  
 PE 146 Swimming, Adv.  
 PE 147 Swim Conditioning  
 PE 148 Tennis, Beg.  
 PE 149 Tennis, Int.–Adv.  
 PE 151 Volleyball, Beg.  
 PE 152 Volleyball, Int.–Adv.  
 PE 154 Weight Training  
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 PE 176 Fitness Walking

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PEM 183 Basketball	PEM 283 Basketball
PEM 184 Cross Country	PEM 284 Cross Country
PEM 185 Football	PEM 285 Football
PEM 189 Soccer	PEM 289 Soccer
PEM 191 Swimming	PEM 291 Swimming
PEM 192 Tennis	PEM 292 Tennis
PEM 193 Track and Field	PEM 293 Track and Field
PEM 195 Golf	PEM 296 Wrestling
PEM 196 Wrestling	

##### Women

PEW 183 Basketball	PEW 283 Basketball
PEW 184 Cross Country	PEW 284 Cross Country
PEW 189 Soccer	PEW 289 Soccer
PEW 190 Softball	PEW 290 Softball
PEW 191 Swimming	PEW 291 Swimming
PEW 192 Tennis	PEW 292 Tennis
PEW 193 Track and Field	PEW 293 Track and Field
PEW 194 Volleyball	PEW 294 Volleyball
PEW 195 Golf	

PROFESSIONAL ACTIVITIES – See KINE–Kinesiology

ACADEMIC COURSES – See KINE–Kinesiology

<sup>1</sup> PE 138 meets 3 hours per week.

## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [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.

#### 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.

#### 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.

#### 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. 3 lectures, 1 laboratory. Prerequisite: MATH 118 and high school trigonometry, or MATH 119.

#### 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 121 or PHYS 141.

#### 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 121. Recommended: PHYS 122.

#### PHYS 131 General Physics I (4) GE B3 & B4 (Also listed as HNRS 131)

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.

#### PHYS 132 General Physics II (4) GE B3 & B4 (Also listed as HNRS 132)

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.

#### 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, MATH 142.

#### PHYS 141 General Physics IA (4) (Also listed as HNRS 134) 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.

#### 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 computer algebra system for solving problems in physics: differential equations, matrix manipulations, simulations and numerical techniques, nonlinear dynamics. 4 lectures. Prerequisite: PHYS 133, 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, computer literacy, 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 301 Thermal Physics I (3)

Thermodynamics and statistical mechanics. Entropy, temperature, chemical potential, free energy. Selected applications including paramagnetism, ideal gas, Fermi-Dirac distribution. 3 lectures. 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. Atmospheric optics and cloud physics. 3 lectures. Prerequisite: PHYS 132 or PHYS 122 and MATH 241.

**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 323 Optics (5)**

Geometric optics, lens systems, aberration, physical optics and polarization. 4 lectures, 1 laboratory. Prerequisite: PHYS 133, MATH 241.

**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 (1) (2)**

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: 1 laboratory; PHYS 342: 2 laboratories. 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. Schroedinger'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, 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, 409 Electromagnetic Fields and Waves I, II (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 equations, plane electromagnetic waves. Dipole radiation, radiation from an accelerated charge. 4 lectures, 3 lectures. Prerequisite: MATH 304, PHYS 206 or consent of instructor.

**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.

**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, or consent of instructor.

**PHYS 422 Polymer Electronics Laboratory (1) (Also listed as EE 422)**

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. [New crosslisted course, effective Fall 2008.](#)

**PHYS 423 Advanced Optics (4)**

Lens aberrations, interference and diffraction, Fourier optics, quantum optics, image formation and 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.

**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.

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**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 topic 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 topic 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 16 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 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.



## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [Natural Resources Management Department](#)

### REC–RECREATION, PARKS, and TOURISM ADMINISTRATION

#### REC 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.

#### REC 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.

#### REC 127 Leisure Behavior (4)

Sociological, psychological, and cultural aspects of leisure behavior. Needs, motivations, constraints, values and benefits explored. 4 lectures. Prerequisite: Majors only.

#### REC 203 Resource Law Enforcement (3) (Also listed as FNR 203)

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.

#### REC 205 Leadership in Recreation, Parks, and Tourism (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: REC 101 or REC 127, sophomore standing or consent of instructor.

#### REC 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: REC 101, REC 127, sophomore standing or consent of instructor.

#### REC 252 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: REC 127, sophomore standing or consent of instructor.

#### REC 260 Recreational Sport Programming (4)

Philosophy, foundations, policy and techniques underlying recreational sport programs in schools, 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: REC 101, REC 127, sophomore standing or consent of instructor. [Changed effective Fall 2008.](#)

#### REC 270 Experiential Education Leadership and Facilitation (4)

Examination of skills and models used in challenge course leadership, experiential education, corporate training and team building, and facilitation. Emphasis on the development of practical skills, facilitation

models, safety guidelines, and best practices in the field. 3 lectures, 1 laboratory. Prerequisite: Sophomore standing or consent of instructor.

#### REC 300 Computer Applications in Resource Management (2) (Also listed as FNR 300)

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.

#### REC 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: REC 210 with C– or better, junior standing or consent of instructor.

#### REC 311 Environmental Interpretation (4) (Also listed as FNR 311)

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.

#### REC 313 Sustainable Tourism (4)

Investigation of tourism industry from a sustainable tourism perspective. Examination of 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: REC 210 with C– or better, junior standing or consent of instructor.

#### REC 314 Travel and Tourism Planning (4)

The history and development of tourism. Emphasis on the economic impact of tourism activities on communities. Consideration of the effects of tourism on individual cultures and the natural environment. Travel motivations, travel research and planning models. Field visits required. 4 lectures. Prerequisite: REC 210 with C– or better, junior standing or consent of instructor.

#### REC 317 Conventions and Meeting Management (3)

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. Prerequisite: REC 210 with C– or better, junior standing or consent of instructor.

#### REC 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: REC 210, junior standing or consent of instructor.

#### REC 321 Visitor Services in Recreation, Parks, and Tourism (2-4)

Management issues in meeting the needs of recreation, parks, and tourism organizations. The Schedule of Classes will list topics selected. Topics to include customer satisfaction, service quality, visitor management, customer service skills and procedures, and creating a customer focused organization. Total credit limited to 12 units. 2-4 seminars. Prerequisite: REC 210, junior standing or consent of instructor.

#### REC 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: REC 205, junior standing or consent of instructor.

#### REC 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: REC 210 with C– or better and consent of instructor.

➔ **REC 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: REC 210 or REC 260 with C– or better, junior standing or consent of instructor. [Changed effective Fall 2008.](#)

**REC 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: REC 210 with C– or better, junior standing or consent of instructor.

**REC 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: REC 210 with C– or better, STAT 217, junior standing. Recommended: CSC 110/113/AG 250.

**REC 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.

**REC 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.

**REC 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: REC 205, REC 210, senior standing or consent of instructor.

**REC 410 Resource Recreation Management (4)  
(Also listed as FNR 410)**

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: FNR 112 or consent of instructor.

**REC 412 Tourism and Outdoor Applications Seminar (2-4)**

Selected topics on aspects of the tourism field. The Schedule of Classes will list topics selected. Field visits may be required. Total credit limited to 12 units. 2-4 seminars. Prerequisite: REC 210, REC 313, REC 314 or REC 325, or consent of instructor.

**REC 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. 4 lectures. Prerequisite: REC 313 or REC 314 or consent of instructor.

**REC 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, REC 210 with C– or better and senior standing.

**REC 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: REC 210 or consent of instructor.

**REC 417 Resource Recreation Planning (3) (Also listed as FNR 417)**

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: FNR 112 or consent of instructor.

**REC 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: REC 320, BUS 346, junior standing, or consent of instructor.

**REC 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, CSC elective, REC 360 with C– or better, ENGL 310, senior standing.

**REC 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.

**REC 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, REC 360 with C– or better, ENGL 310, senior standing.

**REC 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 REC 460 with C– or better or consent of instructor.

**REC 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 REC 465. Credit/No Credit grading only. 1 seminar. Prerequisite: Senior standing.

**REC 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.

**REC 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 topic selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

**REC 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 topic selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Consent of instructor.

**REC 472 Leadership Practice (1) (Also listed as FNR 472)**

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.

**REC 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 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**REC 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 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

**REC 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.

**REC 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.

**REC 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 topics 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.

**REC 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.

**REC 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 topic selected. Total credit limited to 12 units. 1–4 seminars. Prerequisite: Graduate standing or consent of instructor.

**REC 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 topic selected. Total credit limited to 12 units. 1–4 laboratories. Prerequisite: Graduate standing and consent of instructor.

**REC 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 ~~3~~ 4 units. 1 seminar. Prerequisite: Graduate standing. *Changed effective Fall 2007.*

**REC 599 Thesis in Recreation, Parks and Tourism (3)**

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.

# BS Recreation, Parks, and Tourism Administration

## 2007-09 Cal Poly Catalog

**Natural Resources Management Department**  
**Agricultural Sciences Bldg. (11), Room 217**  
**(805) 756-2702**

- ☐ 60 units upper division      ☐ GWR
- ☐ 2.0 GPA                              ☐ USCP

\* = Satisfies General Education requirement

### MAJOR COURSES

REC 101 Intro. to Recreation, Parks and Tourism...	4
REC 110 Career Planning in Rec, Parks & Tourism	1
REC 127 Leisure Behavior .....	4
REC 205 Leadership in Rec., Parks, and Tourism or REC 270 Experiential Education Leadership and Facilitation .....	4
REC 210 Introduction to Program Design .....	4
REC 252 Recreation and Special Populations .....	4
REC 342 Legal Aspects of Rec, Parks, & Tourism	4
REC 350 Recreation Areas and Facilities Mgt.....	4
REC 360 Assessment/Eval of Rec Parks & Tourism	4
REC 405 Recreation, Parks, and Tourism Mgt .....	4
➡ REC 413/FNR 410/EHS 337/LA 363 .....	4/3
REC 424 Financing Recreation, Parks, and Tourism Services .....	4
REC 460 Research in Recreation, Parks & Tourism	4
REC 461 Senior Project .....	3
REC 463 Pre-Internship Seminar .....	1
REC 465 Internship .....	6
Concentration courses (see below) or advisor approved electives .....	28
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	86/87

### SUPPORT COURSES

BUS 212 Financial Actg for Nonbusiness Majors ...	4
BUS 346 Principles of Marketing .....	4
ENGL 310 Corporate Communications .....	4
MATH 118 Pre-Calculus Algebra (B1)* or MATH 116 and 117 (B1)* .....	4
STAT 217 Intro to Statistical Concepts and Methods (B1)* .....	4
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	20

### GENERAL EDUCATION (GE)

72 units required; 8 units are in Support.  
 →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 (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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	64

➡ ELECTIVES .....	9-10
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	180

### CONCENTRATION OR ADVISOR APPROVED ELECTIVES

Select either a concentration or advisor approved electives.

#### Outdoor, Adventure, and Resource Recreation Concentration

REC 302 Environmental and Wilderness Education	4
REC 313 Sustainable Tourism .....	4
REC 314/REC 415/FNR/REC 417 .....	4/3
REC 325 Outdoor and Adventure Leadership or REC 311 Environmental Interpretation.....	4
Restricted electives .....	12/13
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	28

#### Tourism Planning and Management Concentration

REC 313 Sustainable Tourism .....	4
REC 314 Travel and Tourism Planning .....	4
REC 317 Convention and Meeting Management ....	3
REC 414 Commercial Recreation Enterprise.....	4
Restricted electives.....	13
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	28

Advisor Approved Electives .....	28
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## 2007-2009 Cal Poly Catalog


### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [Philosophy Department](#)

#### RELS–RELIGIOUS STUDIES

**RELS 201 Religion, Dialogue, and Society (4)** **GE D3**  
The way in which interactions between religious traditions shape society at various levels. Case studies drawn from eastern and western religious traditions during the ancient and modern periods. 4 lectures.

**RELS 301 Religions of Asia (4)** **GE C4**   
Comparative study of the religions of Asia, particularly Hinduism, Buddhism, and the religions of China. Topics include historical continuities/discontinuities, worldviews, sacred texts, practices, responses to modernity, the place of women across the traditions. 4 lectures. Prerequisite: Completion of GE Area A and PHIL 230 or PHIL 231.

**RELS 302 Monotheisms: Judaism, Christianity, and Islam (4)** **GE C4**  
(formerly *RELS 309*)  
The monotheistic traditions of Christianity and Islam, with focus on their origins from Judaism. Topics include: Jewish history, the Hebrew Bible, the Christian New Testament, formation of the Church, the Quran and Mohammad. 4 lectures. Prerequisite: Completion of GE Area A and C2.

**RELS 304 Judaism (4)** **GE C4**  
Origins, beliefs and practices of Judaism and central themes in the Hebrew Bible. The development of Judaism in the post-biblical and Talmudic period. Jewish philosophy, life, rituals and customs. The emergence of modern Judaism, Zionism and post-Holocaust philosophy. 4 lectures. Prerequisite: Completion of GE Area A, and PHIL 230 or PHIL 231.

**RELS 306 Hinduism (4)** **GE C4**  
Origins, beliefs and practices of Hinduism from the *Veda* and the *Upanishads* through the teachings of the *Bhagavad Gita* and the *Puranas*. Modern Hindu institutions, saints and sages, and social philosophy contrasted with the ancient. 4 lectures. Prerequisite: Completion of GE Area A, and PHIL 230 or PHIL 231.

**RELS 307 Buddhism (4)** **GE C4**  
Buddhist origins, viewpoints and practices will be seen in their development in India, Tibet, China, Japan, South Asia and America. The life of Buddha, Gautama, the rise of Theravada, Mahayana and Tantra. Encounters with Shinto and Confucianism. 4 lectures. Prerequisite: Completion of GE Area A, and PHIL 230 or PHIL 231.

**RELS 310 Christianity (4)** **GE C4**  
The development of the Christian religion from the story of Jesus, the New Testament, Church formation, the role of St. Paul, dissenting ideas, Protestant and Catholic views, and contemporary issues of conscience, such as the Social Gospel and liberation theologies. 4 lectures. Prerequisite: Completion of GE Area A and PHIL 230 or PHIL 231.

**RELS 311 Islam (4)** **GE C4**  
The development of Islamic civilization from the inspiration of the Qur'an and the Prophet Muhammad and the Sunni-Shi'i split to contemporary political and social issues. Emphasis of Sufi literature, art, architecture, and philosophies of Islam. 4 lectures. Prerequisite: Completion of GE Area A and PHIL 230 or PHIL 231.

**RELS 370 Religion, Gender and Society (4)** **GE C4 USCP**  
(Also listed as *WS 370*) (formerly *RELS 336*)  
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:

Completion of GE Area A, and PHIL 230 or PHIL 231; one Religious Studies course or consent of instructor.

**RELS 372 Spiritual Extremism: Asceticism, Mysticism, and Madness (4)** **GE C4**  
Shaping influence of ascetics, mystics and the insane on global religious traditions. Topics may include the relationship between spiritual extremists and society, cultural construction of holiness and insanity, and literary depictions of spiritual extremists. 4 lectures. Prerequisite: Completion of GE Area A and PHIL 230 or PHIL 231.

**RELS 374 Religion and Violence (4)** **GE C4**  
Historical and contemporary case studies of how various religions have condoned, motivated and justified violence. The place of sacrifice, martyrdom, self-injury and forced conversion in religious doctrines. Representations of religious violence in the media. 4 lectures. Prerequisite: Completion of GE Area A and PHIL 230 or PHIL 231.

**RELS 378 Religion and Contemporary Values (4)** **GE C4**  
Descriptive analysis of how diverse religious traditions construct moral decisions about a variety of contemporary issues including sexuality, ecology, and justice. Challenges for religious value systems in secular and pluralistic societies. 4 lectures. Prerequisite: Completion of GE Areas A and C2. *New course – Effective Spring 2009; see Updates*

**RELS 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.

**RELS 470 Selected Advanced Topics (1–4)**  
Directed group study of selected topics for advanced students. The Schedule of Classes will list topics selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [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 units. 1 laboratory. Prerequisite: Concurrent enrollment in the designated section of the associated course.

#### 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 300 Early Field Experience, Science/Mathematics (2) (CR/NC)

A minimum of 20 hours of supervised observation of secondary school science or mathematics classes. These observations will be discussed and evaluated during weekly meetings. Credit/No Credit grading only.

#### 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: Completion of GE Area B, and junior standing. Concurrent enrollment in London Study Program.

#### 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. 4 lectures. Prerequisite: Completion of GE Area B, including a chemistry course, and junior standing.

#### 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: Completion of GE Area B and junior standing.

#### 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: Completion of GE Area B and junior standing. [New course effective Winter 2009.](#)

#### SCM 350 The Global Environment (4) GE Area F (Also listed as AG/BUS/EDES/ENGR/HUM/UNIV 350)

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: Completion of GE Areas A and B and junior standing.

#### 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) (Also listed as CHEM 401)

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. [New crosslisted course effective Summer 2008.](#)

#### 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 491 Science Student Teaching Seminar (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 seminar. Corequisite: EDUC 469 or EDUC 479.

#### 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.

# BS SOFTWARE ENGINEERING

## 2007-09 Cal Poly Catalog

### Computer Science Department

Computer Science Bldg. (14), Room 254  
(805) 756-2824

- ☐ 60 units upper division      ☐ GWR
- ☐ 2.0 GPA                              ☐ USCP

\* = Satisfies General Education requirement

#### MAJOR COURSES

CSC 101 Fundamentals Computer Science I .....	4
CSC 102 Fundamentals of Computer Science II or CSC 108 Accelerated Intro to Computer Science (9-25-07) .....	4
CSC 103 Fundamentals of Computer Science III ....	4
CSC 141 Discrete Structures I .....	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 353 Systems Programming for Software Engrs or CSC 225 Intro Computer Org (8-30-07).....	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
Advisor approved cooperative education experience via CSC 400 or technical elective equivalent .....	4
Advisor approved technical electives.....	20
Subject to Computer Science Department guide- lines; contact the College of Engineering Advising Center (www.ee.calpoly.edu/CENGAC) for additional information and agreement form. Technical electives must be approved in advance.	

**93**

#### SUPPORT COURSES

BIO 213 and ENGR/BRAE 213 (B2)* .....	2,2
ENGL 149 Technical Writing for Engineers (A3)*	4
IME 314 Engineering Economics .....	3
IME 430 Quality Engineering .....	4
note: prerequisite waived for SE students	
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, 333, 335, 336, 451 .....	4
Course number corrected effective Summer 2007	
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

**63**

#### GENERAL EDUCATION (GE)

72 units required; 36 units are in Major/Support.  
→See page 56 for complete GE course listing.  
→Minimum of 8 units required at the 300-400 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**

#### ELECTIVES.....

**0**

**192**

## BS SOIL SCIENCE

### 2007-09 Cal Poly Catalog

#### Earth and Soil Sciences Department

Science Bldg. (52), Room C-43

(805) 756-2261 FAX (805) 756-5412

- ☐ 60 units upper division      ☐ GWR  
 ☐ 2.0 GPA                              ☐ USCP

\* = Satisfies General Education requirement

#### MAJOR COURSES

SS 110 Orientation in Earth and Soil Sciences .....	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
SS 345 Soil Interpretations and Management.....	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 461 <i>or</i> ERSC 461 Senior Project I (10-30-07) ...	1
SS 462 <i>or</i> ERSC 462 Senior Project II (10-30-07) ..	3
SS 463 <i>or</i> ERSC 463 Undergraduate Seminar (10-30-07).....	2
Concentration courses (see below).....	28
	<b>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
FNR/LA 318 Applications of GIS .....	3
<sup>1</sup> MATH 118 Pre-Calculus Algebra or MATH 141 Calculus I (B1)* .....	4
<sup>1</sup> MATH 119 Pre-Calculus Trigonometry or 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 units are in Support.

→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 (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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**52**

**ELECTIVES**..... **0**

**180**

#### CONCENTRATIONS (select one):

##### Environmental Management Concentration

CHEM 312 Survey of Organic Chemistry ( <i>transfer equivalent CHEM 212</i> ).....	5
CRSC 411/STAT 313 .....	4
SS 433 Land Use Planning .....	3
Select from: FNR 202, 306, 311, 416, 425; PHIL 340, REC 302.....	8
Select from: CRP 404, 408, 420; FNR 408, 464; LA 451 .....	8
	<b>28</b>

##### Environmental Science and Technology Concentration

CHEM 316 ( <i>transfer equivalent CHEM 216</i> ), 317 ( <i>transfer equivalent CHEM 217</i> ) Organic Chemistry I, II .....	5,5
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 and Regression Models .....	4
	<b>28</b>

##### Land Resources Concentration

CHEM 312 Survey of Organic Chemistry ( <i>transfer equivalent CHEM 212</i> ).....	5
CRSC 411 Experimental Techniques and Analysis.	4
Additional courses selected from approved list. These units may be selected to apply toward an approved minor. ....	19
	<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.



## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [Modern Languages & Literatures Department](#)

### SPAN–SPANISH

#### SPAN 101, 102, 103 Elementary Spanish I, II, III (4) (4) (4)

For beginners. Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and basic conversation using the communicative approach. Laboratory drill required. Language taught in its cultural context. Credit not available for students who have completed SPAN 104 or SPAN 111. To be taken in numerical sequence. 3 lectures, 1 activity.

#### SPAN 104 Intensive Elementary Spanish (12)

Class practice in pronunciation, syntax, reading, writing, and conversation. Offered in summer only. Credit not available for students who have completed SPAN 101, SPAN 102, SPAN 103, SPAN 111, SPAN 112, or SPAN 113. Laboratory drill required. 9 lectures, 3 activities.

#### ▶ SPAN 111 Elementary Hispanic Language and Culture (4) USCP

Inductive Spanish grammar with special focus on vocabulary and culture from American agribusiness and the Hispanic cultures of the United States and Latin America. Open to students with no credit in college-level Spanish courses or Environmental Horticultural Science majors who have not completed SPAN 101 or SPAN 104. 3 lectures, 1 activity. [Changed effective Fall 2008.](#)

#### SPAN 121, 122 Fundamentals of Spanish I, II (4) (4)

Review of Spanish grammar and practice in writing and oral expression within a cultural context. To be taken in numerical sequence. Students with credit in SPAN 123 cannot take SPAN 122. 3 lectures, 1 activity. Prerequisite: SPAN 103, placement exam or equivalent.

#### SPAN 123 Spanish for Heritage Speakers (4) USCP

Focus on the grammatical, cultural and linguistic needs of Spanish speakers in the United States who have not had formal study of the language. Emphasis on morphological, lexical and cultural understanding of the Spanish language. Designed to prepare students for upper-division Spanish coursework in language and culture. Students with credit in SPAN 122 cannot take SPAN 123. 3 lectures, 1 activity. Prerequisite: SPAN 121, placement exam or consent of instructor.

#### SPAN 124 Composition in Spanish (4)

Practice of essay writing in Spanish with particular attention to the process of writing. Analysis of word usage, sentence development and structure, and review of grammar, spelling and accentuation. Practice in writing descriptions, narration, reports, opinions and expositions. 3 lectures, 1 activity. Prerequisite: SPAN 122 or SPAN 123.

#### SPAN 125 Intensive Fundamentals of Spanish (8)

Review of grammar and practice in written and oral expression based on social and cultural values. 6 lectures, 2 activities. Prerequisite: SPAN 103 or SPAN 104 or permission of instructor.

#### SPAN 205 Introduction to Spanish Linguistics (4)

Introduction to the scientific study of the Spanish language with an overview of theoretical and applied linguistics and special emphasis on Spanish phonetics and phonology. 3 lectures, 1 activity. Prerequisite: SPAN 124.

#### SPAN 233 Introduction to Hispanic Readings (4) GE C1

Selected readings from major Hispanic authors that show the Hispanic literary tradition from the Middle Ages to the present in Spain, Latin America, and of Latino(a) writers in the United States. 4 lectures. Prerequisite: Completion of GE Area A, and SPAN 124.

#### SPAN 301 Advanced Composition in Spanish (4)

Oral and written development of structural grammar, syntax, and complex components of Spanish. Vocabulary expansion and idiomatic construction. Written composition. Translations to examine linguistic and semantic differences. 4 lectures. Prerequisite: SPAN 124.

#### SPAN 302 Advanced Conversation and Composition in Spanish (4)

Formal discussion and writing of selected cultural ideas from the Spanish-speaking world. Focus on individual and group presentations and in-class writing and speaking assignments that assist students in acquiring enhanced vocabulary and ability to use critical thinking skills in Spanish. Taught in Spanish. 3 lectures, 1 activity. Prerequisite: SPAN 124.

#### SPAN 305 Significant Writers in Spanish (4) GE C4

Critical analysis and oral discussion of poetry, essays, novels and plays by selected Hispanic writers. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 lectures. Prerequisite: Completion of GE Area A, and SPAN 233. Modern Languages and Literatures majors will not receive GE C4 credit.

#### SPAN 340 Chicano/a Authors (4) GE C4 USCP

Introduction to Chicano/a literary accomplishments to facilitate appreciation of Chicano/a literary aesthetics and increase understanding of Chicano/a cultural values and lifestyles. 4 lectures. Prerequisite: Completion of GE Area A, one course in Area C, and SPAN 233. Modern Languages and Literatures majors will not receive GE C4 credit.

#### SPAN 350 Hispanic Literature in English Translation (4) GE C4

Selected works to be read by students in the original or in English translation. Critical analysis, interpretation, and comparison of individual works by outstanding Hispanic writers. Lecture in English. The Schedule of Classes will list topics selected. Total credit limited to 8 units. 4 lectures. Prerequisite: Completion of GE Area A, one course in Area C, and SPAN 233. Modern Languages and Literatures majors will not receive GE C4 credit.

#### SPAN 351 Latino/a Writers in the United States (4) GE C4 USCP

Analysis and exploration of the major themes of Latino(a) literature in the United States today. Emphasis on Chicano(a), Puerto Rican, Cuban American and other Caribbean writers. Focus on novel writers who are not as well known or read in traditional Latino(a) courses. All readings and discussions in English. 4 lectures. Prerequisite: Completion of GE Area A, one course in Area C. Modern Languages and Literatures majors will not receive GE C4 credit.

#### SPAN 402 Advanced Linguistics in Spanish (4)

The more relevant aspects of Spanish linguistics today. Topics may include morphology, semantics, syntax, phonetics, phonology, theoretical linguistics, history of the language, and teaching methodology and applied linguistics in Spanish. Conducted completely in Spanish. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 lectures. Prerequisite: SPAN 205.

#### SPAN 410 Advanced Literature in Spanish (4)

In-depth study of literature in Spanish. Specific genre, literary period, authorial group, or country. Chicano(a)/Latino(a) literature, Latin American literature, and Spanish literature. Conducted in Spanish. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 lectures. Prerequisite: SPAN 301 and SPAN 305.

#### SPAN 416 Don Quixote (4)

Intensive reading of Cervantes' novel, *Don Quixote* (Part 1, 1605 and Part 2, 1615) in the context of Cervantes' life and the history and social context of Spanish renaissance and baroque culture. Course taught in Spanish. 4 lectures. Prerequisite: SPAN 233 or equivalent, or consent of instructor.

#### SPAN 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 topic selected. Total credit limited to 8 units. 4 lectures. Prerequisite: Consent of instructor.

## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [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.

### 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 head.

### 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.

### 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.

### 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 or STAT 218. 5 lectures. Prerequisite: Passing score on the ELM examination, or an ELM exemption, or credit in MATH 104.

### 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.

### 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 251 with a minimum grade of C-.

### 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. Not open to students with credit in STAT 322. 4 lectures. Prerequisite or concurrent: MATH 142. *Changed effective Fall 2008.*

### 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 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.

### 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.

### 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.

### 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.

### STAT 322 Statistical Analysis for Engineers and Scientists (4)

Confidence intervals, hypothesis testing, one and two-factor analysis of variance, simple linear regression, nonlinear and multiple regression, chi-square tests, introduction to statistical quality control. Substantial use of statistical software. 4 lectures. Prerequisite: STAT 321.

### STAT 323 Design and Analysis of Experiments I (4)

Principles, construction and analysis of experimental designs. Includes 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 or STAT 322.

### 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 or STAT 322.

**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. 4 lectures. Prerequisite: MATH 206 and CSC/CPE 101 or CSC 232 or CSC/CPE 235. [Changed effective Spring 2009.](#)

**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)**

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.

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 301 or STAT 312 or STAT 322.

**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 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, STAT 322, 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 or STAT 322, 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. [New course effective Spring 2009.](#)

**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. [Changed effective Spring 2009.](#)

**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 topic 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. Total credit limited to 16 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. Total credit limited to 16 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.

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**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: One of the following: STAT 512, STAT 217, STAT 218, STAT 221, STAT 252, STAT 312, or equivalent.

 **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. [\*New course effective Winter 2009.\*](#)

 **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. [\*New course effective Spring 2009.\*](#)

**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. Use of computer to solve problems. 4 lectures. Not open to students with credit in STAT 312. Prerequisite: MATH 142 and graduate standing.

## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### 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.

#### TH 220 Acting Methods (4) (formerly TH 340)

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. 4 lectures. 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. 

#### 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.

#### 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 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 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: Completion of GE Area A; TH 210, TH 227, or TH 228. Theatre Arts majors will not receive GE C4 credit.

#### 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: Completion of GE Area A; TH 210, TH 227, or TH 228. Theatre Arts majors will not receive GE C4 credit.

#### 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 Acting Styles (4)

An intensive examination of various styles and forms of acting, with specific attention toward the comparison and development of historical performance techniques and/or theories. 4 lectures. Prerequisite: TH 210; TH 220 or consent of instructor. [Changed effective Fall 2008.](#)

#### 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: Completion of GE Area A; TH 210, TH 227 or TH 228. Theatre majors will not receive GE C4 credit.

#### 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. 2 lectures, 2 seminars. 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: Completion of GE Area A; TH 210, TH 227 or TH 228. Theatre majors will not receive GE C4 credit.

**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. Intensive rehearsals and performance of a one-act play (directed by each student) is expected outside of class hours. 4 lectures. Prerequisite: TH 210, TH 290 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 topic 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 topics 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.

## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

Administered by the [Academic Programs](#) Office

## UNIV–UNIVERSITY STUDIES

### UNIV 321 Undergraduate Research Methods and Practice (4) (Also listed as HNRS 321)

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. [New course effective Winter 2009](#).

### UNIV 330 Cal Poly Land: Nature, Technology and Society (4) (Also listed as AG/HUM 330) 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: Completion of GE Areas A and B and junior standing.

### UNIV 333 World Food Systems (4) GE Area F (Also listed as POLS 333)

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.

### 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: Completion of GE Area B and junior standing.

### UNIV 350 The Global Environment (4) GE Area F (Also listed as AG/BUS/EDES/HUM/SCM 350)

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: Completion of GE Areas A and B and junior standing.

### UNIV 361 Modernism (4) (Also listed as HUM 361) 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.

### UNIV 391 Appropriate Technology for Impoverished Communities: Development (4) (Also listed as HNRS 391) 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: Completion of GE Area A, two courses from GE D1-D4 and consent of instructor. [New course, effective Fall 2008](#).



### 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. [New course effective Spring 2009](#).



## 2007-2009 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

### [College of Agriculture](#)

## WVIT–WINE AND VITICULTURE

### WVIT 101 Orientation to Wine and Viticulture (1) (CR/NC)

Introduction to the wine and viticulture program. Emphasis on curriculum and career planning. Credit/No Credit grading only. 1 lecture.

### ➡ WVIT 102 Global Wine and Viticulture (4)

Introduction to wine grape growing, winemaking, and wine business. Brief history and overview of major global wine regions, including growing conditions, grape varieties, winemaking styles, and wine business practices. 4 lectures. [Changed effective Winter 2009.](#)

### ➡ WVIT 103 The Anatomy of a Wine (2)

The role and behavior of compounds in musts, wines, yeasts and oak and their contribution to the color, aromas, flavors, mouthfeel and structure of different wine styles. 2 lectures. [New course, effective Winter 2009.](#)

### ➡ WVIT 202 Fundamentals of Enology (4)

Introduction to the science of winemaking: development of wine components in grapes, grape maturation, harvesting, pre-fermentation wine-making methods, alcoholic fermentation, malolactic fermentation, wine maturation and post fermentation practices, wine spoilage, maintenance of wine integrity. 4 lectures. Prerequisite: WVIT 102, CHEM 111. [Changed effective Winter 2009.](#)

### ➡ WVIT 301 Wine Microbiology (4)

Wine yeasts, bacteria, and molds: morphology and methods of identification; successful alcoholic and malolactic fermentations; management and prevention of unwanted microbial growth; micro-organisms and flavor development. 3 lectures, 1 laboratory. Prerequisite: WVIT 202, MCRO 221 or MCRO 224, consent of instructor. [New course, effective Winter 2009.](#)

### WVIT 339 Internship in Wine and Viticulture (1-12) (CR/NC)

Time spent in an approved wine industry, engaged in wine production or related agribusiness and viticulture activities. 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. Prerequisite: WVIT 202, FRSC 231, junior standing, and consent of internship instructor.

### WVIT 342 Sensory Evaluation of Wine (4) (Also listed as FSN 342)

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.

### ➡ WVIT 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. [New course, effective Spring 2007.](#)

### ➡ WVIT 404 Winemaking I (4)

Planning, managing and implementing harvest in the pilot winery; sanitation practices; monitoring grape maturity; handling juices and musts; alcoholic and malolactic fermentation, general cellar practices; sensory and laboratory analyses. 3 lectures, 1 laboratory. Prerequisite: WVIT 202 and FSN 365. Students must be at least 21 years in age. [Changed effective Fall 2008.](#)



### WVIT 405 Winemaking II (4)

Planning, managing and implementing harvest in the pilot winery; sanitation practices; monitoring and maintaining wine integrity; planning for bottling; blending trials; general cellar practices; sensory and laboratory analyses. 3 lectures, 1 laboratory. Prerequisite: WVIT 404. Students must be at least 21 years in age. [New course, effective Winter 2009.](#)

### WVIT 406 Winemaking III (4)

Planning, managing and implementing the preparation of wine for bottling; blending; fining; filtration; bottling; conducting general cellar practices; sensory and laboratory analyses. 3 lectures, 1 laboratory. Prerequisite: WVIT 405. Students must be at least 21 years in age. [New course, effective Spring 2009.](#)



### WVIT 463 Issues, Trends and Careers in the Wine Industry (2)

Current issues and trends in viticulture, enology and wine business. Career opportunities and planning for WVIT majors nearing graduation. 2 seminars. Prerequisite: Senior standing. [Changed effective Winter 2009.](#)



## 2007-09 Cal Poly Catalog

### Updated Course Descriptions.

See catalog pages as printed for [original descriptions](#).

#### [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. [Changed effective Spring 2009.](#)

#### 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. [Changed effective Spring 2009.](#)

#### 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. [Changed effective Spring 2009.](#)

#### 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. [Changes effective Fall 2008.](#)

#### 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. [Change effective Fall 2008.](#)

#### 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 423 Fisheries Science and Resource Conservation (4)

Basic approaches in scientific investigation of marine and freshwater fisheries. Includes methodologies and quantitative strategies for study of finfish and invertebrates, user-group conflict issues, regional/global controversies in fisheries, species identification, lab/field protocols, general statistical procedures, and computer simulations. 3 lectures, 1 laboratory. Prerequisite: BIO 162. Recommended: ZOO 322.

#### 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 436 Comparative Invertebrate Physiology (4)

Comparative study of the functions of organ systems of the invertebrate groups of organisms. Emphasis on strategies utilized in accomplishing the function of the organ systems in adapting to different environmental demands. 2 lectures, 2 laboratories. Prerequisite: ZOO 336 or consent of instructor.

#### 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 530 Behavioral Ecology (3)

Function and evolution of behavioral phenomena as they relate to ecological phenomena. Topics include habitat selection, spacing mechanisms, reproductive strategies, feeding strategies, agonistic, parasitic, and altruistic behavior; migration, and comparative social systems. 3 seminars. Prerequisite: Graduate standing in Biological Sciences, BIO 263 or consent of instructor.