UPDATES TO 2003-05 CATALOG
for
Courses and Curricula
Last Update: 3/15/05

The online 2003-05 Catalog in PDF format is an archival document and does not reflect changes that may take place during the period between publication dates. Updates are listed here for courses and curricular corrections or revisions. Any changes made since publication of the Catalog have been indicated, and the affected PDF pages have been provided with a red arrow (➡) and a link, via adjacent blue text, to a PDF version of this list.

Experimental Courses (blue text links to file of course descriptions) provide academic credit and are made available before new courses and programs can be reviewed for inclusion in the next University Catalog.

For updates to other information in the Catalog, please see the appropriate web sites (e.g., Admissions, Academic Records, Financial Aid, Housing, etc.).

Effective as of: Spring 2005

Item	Page	Corrections/Revisions
ARCH 207	329	Mode change from 2 lectures, 2 laboratories ***to*** 2 lectures, 2 activities.
ART 487	336	Add to course description: "Total credit limited to 6 units."
Experimental Courses		BRAE X152, CE X452, CHEM X220, CHEM X240, GSB X526, GSB X536, IME X507, JOUR X415, KINE X324 (GE D5, USCP), MATE X130, MATH X326 (GE B5), ME X565, ME X579, PE X181, SOC X450, UNIV X333, UNIV X350, UNIV X361
HNRC 200	424	Approved and added 9/8/04 (Honors Contract course, for Honors Program).
MATE 430, 435	443	Unit changes for Spring 2005 **only**: MATE 430: From 3 lectures ***to*** 4 lectures MATE 435: From 2 laboratories ***to*** 1 laboratory

Effective as of: Winter 2005

Item	Page	Corrections/Revisions
ARCH 231	329	Mode change from 3 laboratories ***to*** 1 lecture, 2 activities.
ARCH 307	330	Mode change from 2 lectures, 2 laboratories ***to*** 2 lectures, 2 activities.
ARCH 441	331	Mode change from 1 lecture, 2 activities ***to*** 3 lectures.
ARCH 442	331	Mode change from 1 lecture, 2 activities ***to*** 3 lectures.
DSCI 422	378	Mode change from 3 lectures, 1 laboratory ***to*** 4 lectures.
Experimental Courses		AERO X446, AERO X465, AERO X527, AERO X572, AGED X481, AGED X482, ARCE X212, ASCI X112 (GE B2), ASCI X211, ASCI X503, CE X486, CE X503, DSCI X412, GSB X527, GSB X535, HNRS X412, JOUR X219, ME X506, ME X554, SCM X330 (GE Area F), WVIT X463
HNRC 400	424	Approved and added 8/17/04 (Honors Contract course, for Honors Program).
MATE 120	442	Mode change from 1 activity ***to*** 1 laboratory; title and description change.

Effective as of: Fall 2004

Item	Page	Corrections/Revisions

AG 581	320	Unit change from 1-3 hours seminar ***to*** 1 hour seminar. Total credit limit changed from 9 units ***to*** 3 units.
ARCH 341, 342	330	Mode change from 2 lectures, 2 laboratories ***to*** 2 lectures, 2 activities.
ARCH 407	330	Mode change from 2 lectures, 2 laboratories ***to*** 4 lectures.
Art and Design, BFA	237-9	BS Art and Design changed ***to*** BFA Art and Design (Bachelor of Fine Arts)
BUS 214	348	Unit change from (5) 5 lectures ***to*** (4) 4 lectures
Child Development, BS	264	GE B3: Corrected to read "B3 Physical Science" (delete "with lab").
Experimental Courses		ARCH X105, ASCI X285, ASCI X461, ASCI X463, BRAE X133, CE X240, CE X456, EDUC X430, ENVE X240, FSN X540, FSN X541, FSN X542, GEOL X395, GSB X537, HIST X316 (GE D5), HIST X324 (GE D5), HNRS X134 (GE B3), HNRS X244, HNRS X411, MATE X402, MATE X483 (revised), MATE X484 (revised), PHYS X141 (GE B3)
IME 596	431	Change from (4) (6) ***to*** (1-10) units (supervised).
KINE 422	437	Mode change from 1 lecture, 1 activity ***to*** 1 lecture, 1 laboratory
LA 114	439	Mode change from 4 laboratories ***to*** 2 lectures, 2 laboratories.
MATE 110	442	Mode change from 1 lecture ***to*** 1 laboratory; title and description change.
MCRO 221	449	Change from 2 lectures, 2 laboratories ***to*** 3 lectures, 1 laboratory.
MCRO 433	449	Change from (5) 3 lectures, 2 laboratories ***to*** (3) 3 lectures.
PSC 102	466	Mode change from 3 lectures, 1 activity ***to*** 3 lectures, 1 laboratory.
WS 350	485	USCP credit approved, effective Fall 2004.

Effective as of: Summer 2004		
Item	**Page**	**Corrections/Revisions**
CM 485	363	Unit Change from 6 units (supervised) ***to*** 3-6 units (supervised).
Experimental Courses		AG X451, AGED X422, EDUC X527
GRC 331	415	Change from 3 lectures, 1 laboratory ***to*** 3 lectures, 1 activity.
Prerequisite Strings	15	Information regarding prerequisites has been revised: "Some **prerequisites** have their own prerequisites, forming a string of courses that must all be taken. The catalog course description shows the last course in the prerequisite string of courses. For example, ME 212 Engineering Dynamics has prerequisites of MATH 241 and ME 211. MATH 241 requires MATH 143, which requires MATH 142, which requires MATH 141. ME 211 requires ME 241 and PHYS 131. To enroll in ME 212, students must have successfully completed MATH 241, 143, 142, 141 and ME 211 and PHYS 131."

Effective as of: Spring 2004		
Item	**Page**	**Corrections/Revisions**
CRP 438	368	Change from 3 lectures, 1 activity ***to*** 4 lectures.
Experimental Courses		AG X330, ARCH X370 (GE C4, USCP), ART X488, BUS X439, BUS X453, CPE X439, EE X439, ENGL/PHIL X457, ENGR X510, ES X370 (GE C4, USCP),

		FNR X418, GRC X500, GRC X595, HNRS X241, HNRS X319, IT X456, MATE X330, MATE X335, MATE X481 (revised), MATE X482 (revised), MATH X350, MATH X459, PHIL X421, PM X325, PSY X325, REC X205, REC X230, RELS X311 (C4), SCOM X315, STAT X320, VS X340
Reduction of Units	 250-1 296	For students in the listed degree program below, who are following the 2003-05 Catalog, the following change became effective Spring 2004: **Department approved electives reduced and total units reduced to 180.** BS Journalism BS Mathematics
Wine and Viticulture, BS	---	New degree major in the College of Agriculture, approved after Catalog printed, effective Spring 2004

Effective as of: Winter 2004		
Item	**Page**	**Corrections/Revisions**
Experimental Courses		AG X400, CE X455, CPE X327, CPE X330, CPE X347, EE X424, ENGL X412, ERSC X144, HUM X450, RELS X310
EE 347	388	Title corrected: Digital Electronics and Integrated Circuits Laboratory (incorrect title: Semiconductor Device Electronics Laboratory)
Reduction of Units	 238 111 283 173 284 178 245 248 253 285-6 258 300 262 266 149-150 270 272 274	For students in the listed degree programs below, who are following the 2003-05 Catalog, the following changes became effective Winter 2004: **1) Total units reduced to 186. Free electives reduced and concentration units adjusted.** BS Art and Design **2) Total units reduced to 180. Free electives reduced.** BS Agricultural Business BS Biological Sciences BS Business Administration BS Ecology and Systematic Biology BS Economics BS Graphic Communication BA History BA Liberal Studies BS Microbiology BA Music BS Physics BA Political Science BS Psychology BS Recreation, Parks and Tourism BS Social Sciences BA Speech Communication BA Theatre

Effective as of: Fall 2003		
Item	**Page**	**Corrections/Revisions**
Educational Leadership, EdD	312	This Joint Doctoral program (UCTE and UCSB) has been approved, effective Fall 2003.
Experimental Courses		AGED X438, ARCE X211, ASTR X103, BIO X424, BUS X396, BUS X397, CHEM X443, CPE X215, CSC X215, CSC X303, EDUC X311, EDUC X412, EDUC X414, EDUC X416, EDUC X418, EDUC X420, EDUC X457, EDUC X471, EDUC X473, EDUC X474, EDUC X475, EDUC X476, EDUC X477, EE X122, EE X261, EE X238, HCS X120, HIST X323 (GE D5), KINE X424, MATE X481, MATE X482, MATE X483, MATE X484, MATE X540, MATE X545, MATH X192, MATH X318 (GE B6), MATH X422, MATH X491, ME X501, PSC X320 (GE Area F), PSC X424

Master of Public Policy (MPP)	---	New program in Political Science Department, approved after 2003-05 Catalog printed.

Effective as of: Summer 2003		
Item	**Page**	**Corrections/Revisions**
BIO 305	79	The Biology of Cancer course which offers GE B5 credit is BIO 305. BIO 300 is no longer offered (and was not a GE course).
Agricultural Business, BS	111	In Support Courses, 10th entry should read as follows: FRSC 230/231 *or* CRSC 230 *or* VGSC 230……4
Architectural Engineering, BS	156	For General Education requirements, this statement should read: "Minimum of 8 units required at the 300-400 level."
BioResource and Agricultural Engineering, BS	122	For General Education requirements, this statement should read: "Minimum of 8 units required at the 300-400 level."
Earth Sciences, BS	129	SS 110 is crosslisted as ERSC 110. SS 323 is crosslisted as ERSC 323.
ENGR 450	400	Change total credit limit from 8 units ***to*** 16 units.
ENGR 550	400	Add "Change total credit limited to 16 units." and "*Class Schedule* will list topic selected."
Environmental Management & Protection, BS	146-8	Program approved, effective Summer 2003.
ERSC 570	403	Approved and added 4/25/03.
Experimental Courses valid through Spring 2005		AERO X526, AGB X452, ARCE X448, ASCI X265, ASCI X425, BOT X449, BRAE X302, BUS X396, BUS X445, BUS X459, BUS X464, CE X423, CE X484, CE X527, CHEM X484, CPE X317, CPE X456, CPE X457, CRSC X120, CSC X235, CSC X236, CSC X237, CSC X238, CSC X456, CSC X457, CSC X491, CSC X492, CSC X581,

		EDES X435, EDUC X471, EDUC X472, EDUC X473, EDUC X474, EDUC X475, EDUC X476, EDUC X477, EDUC X481, EE X122, EE X238, EE X440, EE X441, EHS X120, EHS X334, EHS X335, ENGL X460, ENGL X461, ENGR X270, ENGR X410, ENGR X440, ENVE X455, ENVE X552, ES X335 (USCP), ES X380 (USCP), FRSC X415, GSB X541, GSB X560, GSB X564, HIST X336 (GE D5), HIST X439, HNRS X211, HNRS X231 (GE C2), HUM X318, HUM X450, IME X414, IME X577, LS X213, LS X214, LS X311, MATE X211, MATE X504, MATH X182, MATH X258, MATH X300, ME X347, ME X402, ME X404, ME X446, ME X465, ME X488, ME X518, PE X113, PE X177, PEM X195, PEW X195, PHYS X211, PHYS X455, PPSC X421, PPSC X521, REC X315, SCM X593 SCM X594, TH X410
Experimental Courses valid only through Summer 2003		The following courses are valid only through Summer 2003. See course descriptions from the 2001-03 catalog cycle: AERO X202, AERO X432, AGC X424, ASCI X212, ASCI X265, ASCI X415, BIO X300 (GE B5), BIO X347, BIO X420, BIO X451, BUS X301, BUS X385, BUS X397, BUS X398, BUS X408, BUS X420, BUS X421, BUS X432, BUS X464, BUS X495, BUS X496, CE X459, CE X468, CE X469, CHEM X544, CHEM X550, CHEM X551, CHEM X545, CHEM X547, CPE X104, CPE X105, CPE X107, CRSC X120, CRSC X570, CSC X104, CSC X105, CSC X107, CSC X491, CSC X492, CSC X564, CSC X581, DSCI X300, EDUC X310, EDUC X427, EDUC X441, EDUC X443, EDUC X460, EDUC X462, EDUC X463, EDUC X465, EDUC X467, EDUC X543, EDUC X544, EDUC X548, EDUC X593, EDUC X594, EDUC X595, EDUC X596, EDUC X597, EE X220, EE X221, EE X222, EE X463, EE X464, EHS X120, EHS X334, EHS X335, EHS X382, ENGL X103, ENGL X251, ENGL X460, ENGL X461, ENGR X481, ENVE X472, ENVE X534, ENVE X552, FRSC X120, FRSC X416, GRC X331, GRC X335, GRC X433, HIST X300, HIST X439, HNRS X132 (GE B3&4), HNRS X315, HNRS X375 (GE D5), HUM X315 (GE D5), HUM X335 (GE C4), IME X158, IME X312, IME X412, IME X417, IME X520, KINE X323, LS X213, LS X230, LS X231, LS X232, LS X233, LS X311, MATE X467, MATE X468, MATE X483, MATE X484, MATH X300, MATH X331, MCRO X320, ME X464, ME X506, ME X523, ME X541, MU X315, PE X113, PHYS X211, POLS X285, PPSC X110 (GE B2&4), PPSC X451, REC X414, REC X417, REC X420,

		SCM X320, SCM X321, SCM X322, SCM X323, SCM X324, SCM X325, SCM X326, SCM X327, SCM X328, TH X430, WS X450
Geology Minor	298	SS 223 is crosslisted as ERSC 223; SS 323 is crosslisted as ERSC 323.
MATE 467, 468	444	Title Correction: Senior Project Design Laboratory
MU 389	457	Add: Total credit limited to 6 units.
Physics, BS	301	For Concentrations in Electronics and in Electro-optics, course requirements have been corrected as a result of Electrical Engineering course changes: EE 301 (3 units) replaced by EE 228 (4 units) EE 341 changed to EE 368 EE 309 changed to EE 409 EE 349 changed to EE 449 EE 414 changed to EE 314 title changes for EE 302, 307, and 347: EE 302 Classical Control Systems EE 307 Digital Electronics and Integrated Circuits EE 347 Digital Electronics and Integrated Circuits Laboratory and total units for each concentration increased from 21 to 22 units.
SS 323	480	Crosslisted as ERSC 323
SS 570	481	Approved and added 4/25/03.

EXPERIMENTAL COURSES -- 2003-05

Updated 3/15/05

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 X446 Introduction to Space Systems (4)

Basic satellite types and their applications. Major subsystems of a satellite system. Space environment, propulsion system, power system, structural design, spacecraft dynamics and altitude control, orbit mechanics, thermal control, communications, and ground segments. Spacecraft integration and testing. 4 lectures. Prerequisite: ME 212; corequisite: AERO 320, EE 321.

AERO X465 Thermodynamic Models for Aircraft Turbine Engines (4)

Modeling of air breathing propulsion systems based on the Brayton Cycle with applications to design point and off design point performance estimation and optimization applied to subsonic and supersonic aircraft. 4 lectures. Prerequisite: Senior standing; concurrent: AERO 443.

AERO X526 Spacecraft Thermal/Fluid Control (4)

Satellite thermal/fluid control hardware. Governing equations for flow and heat transfer. Surface tension and liquid/vapor interface. Heat transfer by free convection, forced convection and radiation in low-gravity environment. Heat pipes. Capillary-pumped loops. Cryogenic systems. Fluid management in space. 4 seminars. Prerequisite: AERO 301, AERO 302, and AERO 303.

AERO X527 Transonic Flow Analysis (4)

Use of the Auto Grid and Paneling system program to create aircraft surface geometry and build networks of panels for input to the PANAIR and TRANAIR aerodynamic analysis codes. Use of TRANAIR to analyze transonic flow problems for various aircraft geometries. 4 lectures. Prerequisite: AERO 306, AERO 520.

AERO X572 Aircraft Manufacturing and Fabrication (1)

Selected topics for assembling aircraft and aircraft components, including empennage, wing, fuselage, engine, flight controls, avionics, finishing work, and flight testing. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 8 units. 1 laboratory. Prerequisite: Junior class standing and consent of instructor.

AG X330 Cal Poly Land: Nature, Technology and Society (4) Area F
(Also listed as HUM 330)

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 agricultural, 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.

AG X400 Advanced Special Problems in Competitive Rodeo (1-2)

Individual investigation, research, studies, or surveys of selected problems related to rodeo. Prerequisite: Enrollment in AG 243 and consent of instructor.

AG X451 Survey of Holistic Management (3)

Fundamental principles of holistic management, a value-based, goal driven process that produces decisions which lead to economic, social, and environmental sustainability. Understanding of ecosystem processes and the tools at our disposal to manage them. 3 lectures. Prerequisite: Enrollment in MS Agriculture program.

AGB X452 California Agricultural Policy (4)

Interactive seminars with legislative and public officials, agricultural business leaders and policymakers from Sacramento and elsewhere, developing agricultural policy. Field trip to Sacramento required. 4 seminars. Prerequisite: Junior standing.

AGED X422 Organizing and Teaching K-6 Standards and Awareness in the Context of Agriculture (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 the 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; graduate standing.

AGED X438 Preparation for Student Teaching in Agriculture (4)

Principles of specific agricultural teaching methods and developmentally appropriate pedagogy. Daily and unit lesson plans that adopt content, teching 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 or corequisite: AGED 330 and EDUC X412, EDUC X414, EDUC X416 and EDUC

418 or consent of instructor.

AGED X481 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. 1 lecture. Prerequisite: Admission to credential program.

AGED X482 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, implementing and assessing this curriculum. Organization and management and their relationship to educational effectiveness and productivity. 1 lecture. Prerequisite: Student teacher candidate.

ARCE X211 Structures I (3)

Introduction to the role of structures in the making of buildings. Introduction to statics and creation of simple three-dimensional structures. Development of skills to analyze structures composed of axial force (truss) members. 2 lectures, 1 activity. Prerequisite: PHYS 121 (ARCH), PHYS 131 (ARCE and CM), MATH 142 (ARCE), MATH 182 (ARCH), MATH 142 or MATH 182 (CM).

ARCE X212 Structures II (3)

Introduction to the role of structures in the making of buildings. Introduction to shear and moment diagrams using the principals of statics and the application of the diagrams to simple three-dimensional structures. Development of skills, particularly free body diagrams, to analyze structures composed of bending (beams) members. 2 lectures, 1 activity. Prerequisite: ARCE X211.

ARCE X448 Seismic Rehabilitation Laboratory (3)

Overview of the general rehabilitation process and philosophy. Evaluation and analysis of existing structures to determine expected performance due to seismic loads. Development of basic rehabilitations strategies for buildings. 3 laboratories. Prerequisite: ARCE 303, ARCE 304, ARCE 305, ARCE 412, ARCE 444.

ARCH X105 Architectural Materials Laboratory (1)

Shop safety, machine and tool operation and small scale construction. 1 laboratory. Co-requisite: ARCH 121 or ARCH 131.

ARCH X370 Native American Architecture and Place (4) GE C4 USCP
(Also listed as ES X370)

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 Area A, GE Area C3.

ART X488 Advanced Web Design (3)

Conceptual and technical objectives: the development of the theoretical skills necessary to design a successful web user interface, information architecture and visual identity for digital projects, and the development of technical skills necessary to design advanced interactivity with Macromedia Flash and JavaScript. 2 lectures, 1 laboratory. Prerequisite: Art and Design majors only, ART 181, ART 484, ART 487 and senior standing.

ASCI X112 Principles of Animal Science (4) GE B2

Comparative physiology of digestive, endocrine, and reproductive systems in animals. Principles of nutrition, genetics, growth and development, behavior, food processing/safety of animals. Current issues in animal agriculture including biosecurity, animal welfare, and governmental safeguards for animal and human health. 4 lectures.

ASCI X211 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. Credit not allowed for students having completed ASCI 209. 3 lectures, 1 laboratory.

ASCI X265 Equine Halter Training (3)

The training of weanling and yearling horses at halter. Selection of proper equipment. Application of safe, behavioral training techniques enabling the horse to accept handling, farrier and health care. Total credit limited to 6 units. 3 activities.

ASCI X285 Bull Reproductive Soundness Evaluation (2) (CR/NC)

Breeding soundness evaluation performed, of bulls consigned to the yearly Cal Poly Bull Test. Evaluation includes palpation of reproductive organs, collection of semen and determination of semen quality through utilization of various instruments. Credit/No Credit grading only. 2 laboratories. Prerequisite: VS 223 and consent of instructor.

ASCI X425 Meat Industry Study Tour (2)

Between-quarter 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. 2 activities. Prerequisite: ASCI/FSN 384 or consent of instructor.

ASCI X461 Senior Project Planning (1) (CR/NC)

Evaluation of project options and expectations. Selection of a project and an appropriate advisor. Projects selected in the student's expected field of employment. Outline and literature review will be presented as part of the ASCI 462 final report. Credit/No Credit grading only. 1 seminar. Prerequisite: Junior standing.

ASCI X463 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, SCOM 101/SCOM 102.

ASCI X503 Advanced Molecular Techniques in Animal Science (4)

Advanced molecular laboratory techniques in animal science. Topics include analyses of cellular and metabolic regulation, gene expression, gene activation and regulation, gene construct design, transgenesis, knockout animal models. 2 lectures, 2 laboratories. Prerequisite: ASCI 403 or consent of instructor.

ASTR X103 Introduction to Stars and Galaxies (4)

Descriptive astronomical properties of the sun, stars, galaxies and interstellar material. Exploration of cosmological models of an expanding universe. Laboratory exercises will include real and virtual astronomical viewing and experiments. Not open to students who have completed or are taking ASTR 102, ASTR 301, ASTR 302, or PHYS 132. ASTR 101 is not a prerequisite. 3 lectures, 1 activity.

BIO X424 Organizing and Teaching of Physical Sciences (4)

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

BOT X449 Plant Biotechnology Techniques (2)

Current plant biotechnology applications. The culture of callus, meristems, nodal segments, protoplasts, and suspensions. Bacterial and plant cell transformation, PCR, Southern blots, macroarrays, DNA sequencing, and marker-assisted selection. Miscellaneous course fee may be required – see *Class Schedule*. 2 laboratories. Prerequisite: BIO 435 or BIO 351, or consent of instructor.

BRAE X133 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 X152 3D Solids Modeling (1)

3-dimensional solid modeling software using Solidworks software. Model generation and modification of associative properties, assembly modeling, extrusions and revolutions. 1 laboratory. Prerequisite: BRAE 133, BRAE 151.

BRAE X302 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: PHYS 121 and BRAE 234 or BRAE 301.

BUS X396 Business Systems Developer's Guide to Network Implementation (4)

Overview and details for business systems developers on network concepts, LAN and WAN components. Electronics and media related to network connectivity. Local Area Networks (LANs) and Wide Area Networks (WANs). Router and switch components and configuration, IP addressing, routing and routed protocols. 3 lectures, 1 activity. Prerequisite: BUS 391 or consent of instructor.

BUS X397 Business Systems Developer's Guide to Network Design (4)

Interrelationships between business processes and network design. Internetworking technologies. Analysis of small to medium size business networks. Identifying customer needs and goals; designing the network structure; building a prototype for the network. 3 lectures, 1 activity. Prerequisite: BUS 396 or consent of instructor.

BUS X439 Fixed Income Instruments (4)

Tools for a basic understanding of the fixed income market, both on a theoretical and institutional level. Fairly straightforward mathematics. The use of bonds for passive and active portfolio management. 4 seminars. Prerequisite: BUS 431.

BUS X445 Ethics and Behavioral Finance (4)

Contemporary theoretical and empirical issues in finance including agency/signaling theory, reputation models, game theory applications, and financial ethics. 4 lectures. Prerequisite: BUS 342.

BUS X453 Customer Relationship Management and Data Mining (4)

Comprehensive overview of the complex subject of customer relationship management, comprising of the modules – relationship management concepts, IT tools and data mining techniques, in a non-technical manner, in order to equip future managers to face emerging business realities. 4 lectures. Prerequisite: BUS 347.

BUS X459 High-Tech Marketing (4)

Interface between marketing and technology. Frameworks for systematic decision-making about marketing in high-tech environments. How marketing tools and techniques may be adapted and modified for the adoption of high-technology products and services. The utility of new media technologies as marketing tools. 4 lectures. Prerequisite: BUS 346.

BUS X464 Applied Project Seminar (4)

Selection and analysis of business problems and opportunities in a project-based setting. Problems are typical of those which graduates could encounter in their fields of employment. Formal report required. 4 seminars. Prerequisite: Senior standing.

CE X240 Additional Engineering Laboratory (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. 2 laboratories.

CE X423 Intelligent Transportation Systems (4)

Specification and operation of Intelligent Transportation systems (ITS). Traffic surveillance and control systems including freeway management, traffic signal, dynamic message signs, video surveillance, data

communications, weather sensing, vehicle detection, and transit management. Standards including the National Architecture for ITS. 3 lectures, 1 laboratory. Prerequisite: CE 221, graduate standing, or consent of instructor.

CE X452 Advanced Reinforced Concrete Design (4)

A second course in design of reinforced concrete structures with emphasis placed on reinforced concrete behavior and design applications. Topics include deflection calculations, inelastic behavior of reinforced concrete components and systems, strut-and-tie modeling, seismic detailing, and two-way slabs. 4 lectures. Prerequisite: CE 355.

CE X455 Design of Temporary Structures (4)

Analysis and design of temporary structures and false work constructed from timber. 3 lectures, 1 laboratory. Prerequisite: CE 351.

CE X456 Seismic Principles for Civil and Environmental Engineers (4)

Basic principles in seismic analysis and design of civil and environmental systems. Seismological aspects of earthquakes. Simple concepts in structural dynamics. Simplified code-based analysis and design. 4 lectures. Prerequisite: CE 205. Cannot be counted towards graduation if CE 557 is also taken..

CE X484 Introduction to Geological Engineering (4)

Identification and characterization of consolidated geologic materials for the purpose of civil analysis and design; interpretation of geologic maps, cross-sections, and reports; interpretation of aerial photographs; assessment of stability in response to common civil-type development activities. 4 lectures. Prerequisite: CE 381, CE 382, GEOL 201.

CE X486 Geological Engineering (4)

Evaluation of the engineering properties of rocks. Rock core description. Slope stability analyses in rock. Discontinuity analysis. Rockfall hazard assessment and mitigation. Design of shallow foundations in rock. 4 lectures. Prerequisite: CE X484.

CE X503 Nonlinear Analysis and Structural Modeling (4)

Introduction into nonlinear structural analysis of structural systems from fundamental principles to use of available software to solve problems. Topics include nonlinear geometric and material effects, distributed

plasticity line elements both in the stiffness and flexibility domain, lumped plasticity models, and second order stability analysis. 4 lectures. Prerequisite: CE 501.

CE X527 Sustainable Mobility (4)

Collaboration of interdisciplinary faculty and guest speakers. Introduction and analysis of concepts and designs for sustainable mobility from a global-to-local perspective including pedestrians, bicyclists and public transportation. Address economy, environment and equity (social issues) through lectures and panels as well as through excursions and a planning/design project in San Luis Obispo County. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

CHEM X220 Introduction to Chemical Oceanography (1) (CR/NC)

Chemical composition of seawater, especially the mechanisms that control the concentration of each element. Interrelationships of chemical, biological, geological, and physical oceanography integrated into each topic . Credit/No Credit grading only. 1 lecture. Available to students aboard *The Golden Bear* on the Cal Poly at Sea Cruise.

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.

CHEM X443 Introduction to the Organic Chemistry of Polymers (1)

Introduction to the organic chemistry of polymers and basic methods of polymer analysis. Designed for students with little or no chemistry background. Not open to Chemistry or Biochemistry students. 1 activity. Prerequisite: CHEM 129 or CHEM 125. Concurrent: CHEM 444.

CHEM X484 Inorganic Chemistry Laboratory (2)

Laboratory techniques in inorganic chemistry. Enhances student repertoire of synthetic and analytic techniques as applied to inorganic and organometallic chemistry. 2 laboratories. Prerequisite: CHEM 481.

CPE X215 Computer Architecture I (4) (Also listed as CSC X215)

Assembly level computer organization. Basic machine representation of numeric and non-numeric data. Assembly level instruction sets, address modes and the underlying computer architecture. Intended for CPE

and CSC majors. 3 lectures, 1 laboratory. Prerequisite: CPE 219 and CSC 102.

CPE X317 Systems Programming I (4)

C programming language from a system programming perspective. Standard C language components (operators, standard I/O functions, strings, pointers, arrays, structs, etc.), with a focus on system functions (exec, fork, inline ASM, signal handling). Unix also covered: shell commands, shell scripting, file system. 3 lectures, 1 laboratory. Prerequisite: CSC/CPE 103, CPE 215.

CPE X327 Computer Design/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. CPE students only. 3 lectures. Prerequisite: EE 129/169. Concurrent: CPE X347.

CPE X330 Continuous-Time Signals and Systems (4) (Also listed as EE 228)

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. CPE students only. 4 lectures. Prerequisite: EE 214/254 (or EE 212/242). Suggested: MATH 241.

CPE X347 Computer Design/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. CPE students only. 1 laboratory. Prerequisite: EE 129/169. Concurrent: CPE X327.

CPE X439 Computer Peripheral Interfacing (4) (Also listed as EE X439)

Design of the more common computer peripherals with emphasis on controller and interfacing aspects. Use of microprocessors and/or LSI controller chips in the design of intelligent peripherals. 3 lectures, 1 laboratory. Prerequisite: CPE/EE 329.

CPE X456 Computer Systems and Network Security (3) (Also listed as CSC X456)

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. Prerequisite: CPE/CSC 453 or consent of instructor.

CPE X457 Computer Systems and Network Security Laboratory (1) (Also listed as CSC X457)

Use of security tools and programming secure systems. Simulation of computer system and network attacks and defenses. Sample projects involving scanning, fingerprinting. Trojan horse attacks, denial of service, remote control and back door attacks, log doctoring, web hacking, Internet security. 1 laboratory. Prerequisite: CPE/CSC 453 or consent of instructor.

CRSC X120 Introduction to Horticulture and Crop Science (4) (Also listed as EHS/FRSC X120)

Plant parts and processes, climate, and the interaction of plants and their environment. Managing the plant's environment, including water, soil and media, mineral nutrition. 3 lectures, 1 laboratory.

CSC X215 Computer Architecture I (4) (Also listed as CPE X215)

Assembly level computer organization. Basic machine representation of numeric and non-numeric data. Assembly level instruction sets, address modes and the underlying computer architecture. Intended for CPE and CSC majors. 3 lectures, 1 laboratory. Prerequisite: CPE 219 and CSC 102.

CSC X235 Fundamentals of Computer Science for Scientists and Engineers I (4)

Introduction to the fundamentals of computer programming with an emphasis on mathematical, scientific and engineering applications: principles of algorithmic problem solving and procedural programming using a modern programming language (currently C++), 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 with a grade of C- or better, or consent of instructor.

CSC X236 Fundamentals of Computer Science for Scientists and Engineers II (4)

Further study of computer program development with an emphasis on mathematical, scientific and engineering applications. Introduction to more complicated data types and structures. Practice of more complicated techniques of procedural programming. Introduction to the principles of object-oriented programming using a modern programming language (currently C++). 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 X235 with a grade of C- or better, or consent of instructor.

CSC X237 Introduction to Computer Science Using Java I (4)

Introduction to the fundamentals of computer science using the modern object-oriented Java 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 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 X238 Introduction to Computer Science Using Java II (4)

Continuation of CSC X237. Intermediate study of computer program development using the modern object-oriented (OO) Java 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 for CSC/CPE majors or minors. 3 lectures, 1 laboratory. Prerequisite: CSC X237 with a grade of C- or better.

CSC X303 Teaching Computer Science (2)

Practical coverage of educational techniques appropriate for teaching and tutoring in CSC/CPE undergraduate courses. Intended for CSC/CPE students interested in serving as tutors, TAs or graders, and for CSC/CPE students interested in teaching computer science. 1 lecture, 1 laboratory. Prerequisite: CPE 103 or equivalent.

CSC X456 Computer Systems and Network Security (3) (Also listed as CPE X456)

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. Prerequisite: CPE/CSC 453 or consent of instructor.

CSC X457 Computer Systems and Network Security Laboratory (1) (Also listed as CPE X457)

Use of security tools and programming secure systems. Simulation of computer system and network attacks and defenses. Sample projects involving scanning, fingerprinting. Trojan horse attacks, denial of service, remote control and back door attacks, log doctoring, web hacking, Internet security. 1 laboratory. Prerequisite: CPE/CSC 453 or consent of instructor.

CSC X491 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 206 and consent of instructor.

CSC X492 Senior Project Design Laboratory II (3)

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 schedule, literature review, and project delivery. 3 laboratories. Prerequisite: CSC 491 and consent of instructor.

CSC X581 Computer Support for Knowledge Management (4)

The methods and techniques that computer-based systems can provide to make the utilization and management of knowledge and information in digital form easier for the user. While such methods may rely on knowledge representation and reasoning techniques, the emphasis lies on support for knowledge-intensive activities performed by users. 3 lectures, 1 laboratory. Prerequisite: CPE/CSC 481.

DSCI X412 Dairy Farm Consultation (4)

Student consultation teams of three or four students visit dairies and/or attend management training seminars followed by presenting management recommendations to the dairy owners, consultants, and other industry leaders. 1 seminar, and supervised work Prerequisite: DSCI 121 or DSCI 230, DSCI 330, DSCI 333, junior standing.

EDES X435 Interdisciplinary Professional Practice (3)

High performance collaborative teams formed to undertake preliminary design of a new building in a professional practice setting. Interdisciplinary teams focus on each step of project development, including planning, building design, structure, M.E.P. systems, as well as Green building considerations, regulatory criteria and approvals, design and construction scheduling and costs. 3 activities. Prerequisite: 4th year standing or consent of instructor.

EDUC X311 Introduction to Teaching Profession: Multiple Subject (4)

Supervised observation and participation in cooperating schools. Discussion focuses on subject matter and instructional practice observed in assigned classrooms, and the social, cultural, and historical foundations of education in American society, and key California curriculum documents. 3 lectures, 1 activity. Prerequisite: Junior standing or consent of instructor.

EDUC X412 Schooling in a Democratic Society (4) (CR/NC)

First course in program sequence, introducing secondary credential candidates to the role and aims of public education in a culturally pluralistic democracy, and providing the foundation for successful teaching of linguistically and culturally diverse learners. Credit/No Credit grading only. 2 lectures, 2 activities. Prerequisite: Admission to the Single Subject Program or senior stsanding for Agricultural Education candidates. Corequisite: EDUC X414, EDUC X416 and content methods course (except Ag Ed).

EDUC X414 Curriculum and Organization in Secondary Schools (4) (CR/NC)

Principles, methods and practices of organizing and managing secondary schools and classrooms including multiple models of classroom discipline as related to adolescent development, classroom, routines, learning environments, introduction to legal requirements for educating ELL and special needs students, and backward design curriculum development and assessment. Site visits to local schools to allow analysis of routines and policies of local schools. Credit/No Credit grading only. 2 lectures, 2 activities. Prerequisite: Admission to the Single Subject Credential Program or senior standing for Agricultural Education candidates. Corequisite: EDUC X412 and EDUC X416.

EDUC X416 Literacy and Learning in Secondary Schools (4) (CR/NC)

First-quarter course, introducing teaching candidates to theories of literacy, learning, assessment and second language acquisition. Preservice teachers observe classrooms, tutor English language learners, and practice designing instructional lessons and assessments to address learners' needs across content areas. Teaching candidates develop theories of learning consistent with content teaching standards. Credit/No Credit grading only. 2 lectures, 2 activities. Prerequisite: Admission to the Single Subject Credential Program or senior standing for Agricultural Education candidates.

EDUC X418 Advanced Topics in Teaching and Learning (4) (CR/NC)

Second-quarter course in the program sequence, introducing secondary credential candidates to differentiated instruction. Further theoretical knowledge and skills needed for successful teaching of linguistically and culturally diverse learners. Credit/No Credit grading only. 2 lectures, 2 activities. Prerequisite: EDUC X414, EDUC X416 and content methods course. Corequisite: EDUC X420 and EDUC 469 (except Ag Ed).

EDUC X420 Professional Development and Collaboration (4) (CR/NC)

Second-quarter course in the program sequence, furthering secondary credential candidates' development in the areas of assessment and teaching special needs students, and providing knowledge and skills needed for successful collaboration with other education professionals. Credit/No Credit grading only. 2 lectures, 2 activities. Prerequisite: EDUC X414, EDUC X416 and content methods course. Corequisite: EDUC X418 and EDUC 469 (except Ag Ed).

EDUC X430 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: Must meet all requirements for admission into the Multiple Subject Credential Program and English 391, ENGL 390, or ENGL 290, and EDUC 310, EDUC/CD 207, and application for Multiple Subject Credential program.

EDUC X457 Multiple Subject Student Teaching Seminar II (3)

Issues related to teaching, moral responsibilities of the profession, 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. Coordination and evaluation of units of instruction, teaching performance assessments, and multiple subject program portfolio. 2 seminars, 1 activity. Prerequisite: Successful completion of EDUC 454 and EDUC 455, and EDUC 428, EDUC 429, EDUC 431 and EDUC 432. Concurrent: EDUC 456.

EDUC X471 Instructional Technology: The Internet for Educators (2)

Using the Internet to enhance student learning. Internet search techniques, access and safety issues, evaluating and citing Internet resources. Using the Internet for teacher-led instruction, student-directed learning, and project-based learning. Participants complete an Internet based lesson plan. 1 lecture, 1 seminar. Prerequisite: Basic computer skills, junior standing.

EDUC X472 Instructional Technology: Integrating Technology into the K-12 Classroom (2)

Overview and application of instructional technologies in the classroom. Technology resources and ethical/legal issues. Evaluation of lesson plans and educational software. Planning and creating technology enhanced lessons and units. 1 lecture, 1 seminar. Prerequisite: EDUC 471 or equivalent.

EDUC X473 Instructional Technology: Using Computers as Instructional and Student Learning Tools (2)

Word processing, desktop publishing, spreadsheets, and basic multimedia presentations as learning tools. Using computers to enhance instruction and student learning. Participants create a classroom presentation and a variety of instructional and productivity documents. 1 lecture, 1 seminar. Prerequisite: Basic computer skills, junior standing.

EDUC X474 Creating and Using Multi-Media Presentations and Projects in the Classroom (3)

The basics of a variety of multimedia applications and tools for creating a standards-based, multimedia project for the classroom. By researching exemplary multimedia lessons, activities, and resources available on the

Internet, as well as discussing pedagogical ideas, participants learn how to create meaningful and engaging multimedia projects. Culminating assignment to create a standards-based lesson, unit, or project that integrates multimedia. 1 lecture, 2 seminars. Prerequisite: Some experience using personal computers and familiarity with fundamental concepts, including operating systems, file management, basic software applications, basic Internet skills, and use of e-mail.

EDUC X475 Web Page Development for Teachers (2)

Fundamentals and tools of Web page creation and publishing: design, development and editing. Skill development and practice in using text, images and hypertext links. Culminating assignment to create a standards based sequence of lessons, unit, or project. 1 lecture, 1 seminar. Prerequisite: Basic computer skills, junior standing.

EDUC X476 Integrating Technology (1)

Application of instructional technology in teaching science. Internet sources for science teaching. Exploration of use of computers to simulate scientific phenomena and of graphing calculators to collect and analyze data. Construction of technology-enhanced lesson plan. 1 lecture. Prerequisite: Basic computer skills, junior standing.

EDUC X477 Troubleshooting the Technology (2)

Basic and advanced troubleshooting techniques commonly used in the classroom. Topics include an introduction and overview of hardware and software, computer maintenance and preventive measures, technology repair, and advanced techniques and resources. 2 seminars.

EDUC X481 Community Based Technology Integration (2)

Designed to meet the requirements for Level II technology, as defined by the CCTC, in a Community Based Learning environment. Materials created and procedures studied two hours per week in the technology lab, and technology applied in a K-12 classroom two hours per week, working with teachers and students. 1 seminar, 1 activity. Prerequisite: EDUC 480, or test equivalent.

EDUC X527 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. Synthesis of research in bilingualism and second language acquisition for teachers of second language learners. 3 lectures, 1 activity. Prerequisite: EDUC 423 or comparable BCLAD coursework.

EE X122 Basic Circuit Analysis Laboratory (1) (CR/NC)

Facilitated study and discussion of basic circuit analysis. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of EE 112.

EE X238 Continuous-Time Laboratory (1) (CR/NC)

Facilitated study and discussion of continuous-time systems analysis. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of EE 228.

EE X261 Intermediate Circuit Analysis Laboratory (1) (CR/NC)

Facilitated study and discussion of intermediate level circuit analysis. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of EE 211.

EE X424 Introduction to Remote Sensing (4)

Radiation characteristics, sensor platforms, satellite systems, system design tradeoffs, collection and transmission of radiometric data, active radar and microwave remote sensing, interpretation of data for various commercial and military applications. Case studies of representative applications. 3 lectures, 1 laboratory. Prerequisite: Senior or graduate standing in engineering or consent of instructor.

EE X439 Computer Peripheral Interfacing (4) (Also listed as CPE X439)

Design of the more common computer peripherals with emphasis on controller and interfacing aspects. Use of microprocessors and/or LSI controller chips in the design of intelligent peripherals. 3 lectures, 1 laboratory. Prerequisite: EE/CPE 329.

EE X440 RF Wireless Communications (3)

Antennas, propagation, transceiver and key components designs Design and analysis of the RF stages of modern wireless communication systems. 3 lectures. Prerequisite: EE 314, EE 402, or consent of instructor. Concurrent: EE X441.

EE X441 RF Wireless Communications Laboratory (1)

Experimental investigation of RF communication wireless systems. Experiments on mixers, low noise amplifiers, frequency synthesizers and transceiver system integration. 1 laboratory. Prerequisite: EE 442. Concurrent: EE X440.

EHS X120 Introduction to Horticulture and Crop Science (4) (Also listed as CRSC/FRSC X120)

Plant parts and processes, climate, and the interaction of plants and their environment. Managing the plant's environment, including water, soil and media, mineral nutrition. 3 lectures, 1 laboratory.

EHS X334 Turfgrass Communication Skills (1)

Directed group laboratory study emphasizing problem solving techniques and applied communication skills currently faced in turfgrass management. 1 laboratory. Prerequisite: EHS 243, SS 221.

EHS X335 Computer Applications for Landscape Horticulture (4)

Computer assisted Design and Drafting (CADD) applications for landscape horticultural business. In-depth study and exposure to various media essential to digital graphic landscape horticulture. CAD computer application skills for plan, detail, elevation, perspective, and section drawings. Hands-on exposure to CAD based estimating techniques, databases, and plant selection programs. Field trip may be required. 2 lectures, 2 laboratories. Prerequisite: EHS 122, EHS 126, EHS 232, EHS 301, and EHS 331 or EHS 321 or approval of instructor.

ENGL X412 New Media Arts II (4)
(Also listed as HNRS X412) (valid Winter 05 – Spring 05)

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/HNRS X411. 4 lectures. Prerequisite: ENGL 411/HNRS X411 and consent of instructor.

ENGL X412 New Media Arts II: Technology and Construction (4) (CR/NC)
(valid Winter 04 – Fall 04)

Primary technologies and design/critique theories currently at use in the professional creation of new media works. Credit/No Credit grading only. 4 lectures. Prerequisite: ENGL 145.

ENGL X457 Nietzsche (1) (Also listed as PHIL X457)

Key works of the 19th century German philosopher-poet from literary and philosophical viewpoints, emphasizing important philosophical ideas (eternal return, perspectivism, the death of God, the Overman, Apollo and Dionysus) and literary strategies (irony, personae, collage, aphorism, allegory). 4 lectures. Prerequisite: ENGL 134, ENGL 251 or ENGL 252 or ENGL 253; PHIL 230 or PHIL 231.

ENGL X460 Senior Project Seminar (1)

Discussion of selected subjects such as Renaissance Drama, comedy or tragedy, creative writing and the like, for purposes of defining individual topics for completion in ENGL 461. 1 seminar. To be taken concurrently with ENGL 461. Prerequisite: English department approval.

ENGL X461 Senior Project (3)

Three-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.

ENGR X270 Applications of CAD and RP for Biomedical Engineering Design (4)

Advanced technical communication principles used to communicate project design to manufacturing processes. Means to enhance reliability and to assure quality of engineered products and systems. Production of prototypes of biomedical implements. 3 lectures, 1 laboratory. Prerequisite: MATH 141 or consent of instructor.

ENGR X410 Behavior of Solids in the Nuclear Environment (3)

Behavior of solids pertinent to the nuclear power industry. Integrity of the pressure boundary. An atomistic explanation of material properties forming the foundation for the fracture mechanics design approach used in nuclear construction. Effects of reactor environment, including irradiation embrittlement, corrosion, and the precipitation of damaging phases after exposure to high temperatures for long times. Effects of materials processing and fabrication techniques on fracture toughness and embrittlement. Implication of these material changes during crucial periods, such as start-up and shut-down scenarios, thermal shock and cold over-pressurization. 3 lectures. Prerequisite: Equivalent of CHEM 124, MATE 210 or consent of instructor.

ENGR X440 Biomedical Engineering Design I (4)

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, MATE 210, STAT 321, IME 314, CE 204, CSC 234, and exposure to CAD or consent of instructor.

ENGR X510 Biomedical Engineering 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. 4 lectures. Prerequisite: CSC 101 or CSC 234, ME 302, or consent of instructor.

ENVE X240 Additional Engineering Laboratory (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. 2 laboratories.

ENVE X455 Occupational Health and Safety for Environmental Engineers (4)

Fundamentals of occupational health and safety, including theories of accident causation, stress and safety, mechanical hazard, falling hazard, pressure hazard, industrial toxicology, radiation hazard. Engineering design to minimize accidents and occupational exposure to hazardous materials. 4 lectures. Prerequisite: ENVE 331.

ENVE X552 Environmental Management for Semiconductor Industry (4)

Semiconductor manufacturing processes, toxic and hazardous chemicals and gases used in those processes; industrial hygiene issues. Review of applicable environmental regulations, and required permits. Field trip to a semiconductor fabrication facility. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

ERSC X144 Introduction to Earth Systems (4)

Survey of fundamental processes of Earth sciences. Application of systems thinking to understanding the dynamic interactions among geological, geographic, pedological, and human factors in shaping the Earth. 3 lectures, 1 activity.

ES X335 The Filipina/o American Experience (4) USCP

Survey of the historical development of Filipina/o American identities and communities. Social, cultural and political institutions that have influenced Filipina/o immigration, participatory citizenship, activism and cultural practices. 4 lectures. Prerequisite: ES 112, ES 212 or consent of instructor.

ES X370 Native American Architecture and Place (4) GE C4 USCP
(Also listed as ARCH X370)

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 Area A, GE Area C3.

ES X380 Critical Race Theory (4) USCP

Introduction to the history and evolution of the critical race theory movement, and to defining issues of the field; in particular, the relationship between race, power and the law. 4 lectures. Prerequisite: ES 112, ES 114 or consent of instructor.

FNR X418 Applied GIS (3)

Acquisition, organization and analysis of geographic data from diverse sources to develop data layers for analysis 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/GEOG 318.

FRSC X120 Introduction to Horticulture and Crop Science (4) (Also listed as CRSC/EHS X120)

Plant parts and processes, climate, and the interaction of plants and their environment. Managing the plant's environment, including water, soil and media, mineral nutrition. 3 lectures, 1 laboratory.

FRSC X415 Grapevine Physiology (4)

Understanding of grapevine physiology. Includes anatomy and morphology, taxonomy, physiological processes, growth cycle, phenology, bud break, flowering, fruit set, berry ripening. 3 lectures, 1 laboratory. Prerequisite: FRSC 231, FRSC 331, or consent of instructor.

FSN X540 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 (32 hours per week). Credit/No Credit grading only. Prerequisite: Acceptance into the Cal Poly Dietetic Internship program.

FSN X541 Dietetic Internship Seminar (2) (CR/NC)

Forum for dietetic interns to make presentations and share experiences in supervised practice. Total credit limited to 6 units. Credit/No Credit grading only. 2 seminars. Prerequisite: Acceptance into the Cal Poly Dietetic Internship program.

FSN X542 Dietetic Internship Class (2) (CR/NC)

Various hot topics and emerging issues in nutrition therapy, foodservice management and community nutrition, for enrichment in the internship experience. Total credit limited to 6 units. Credit/No Credit grading only. 2 lectures. Prerequisite: Acceptance into the Cal Poly Dietetic Internship program.

GEOL X395 Structural Geology (4)

Recognition, interpretation, and depiction of geologic structures. Understanding rock deformation through study of faults and folds. Required weekend field trips. Letter grade only. 3 lectures, 1 laboratory. Prerequisite: GEOL 201, GEOL 241, ERSC 223.

GRC X500 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: Graduate standing, GRC 101 and GRC 201 or advisor approval.

GRC X595 Cooperative Education Experience for Graduate Students (8-12)

Two-thirds to full-time work experience in industry of government relating to document systems management. One-quarter paid assignments. Formal report and evaluation required by the work supervisor, documenting satisfactory participation in high-level management activities. Not repeatable. Prerequisite: Graduate standing, GRC 101 and GRC 201 or advisor approval.

GSB X526 Knowledge Management and Business Intelligence (4)

Exploration of relationships among knowledge management, knowledge organizations and knowledge workers. Mapping of the field of knowledge management and exploration of the nature and key features of knowledge management. Examination and discussion of knowledge management and business intelligence central themes using case studies. Alternative ways to design, implement and improve knowledge management systems in organizations. Business intelligence, decision support systems and data warehousing. Use of business intelligence support tools to integrate querying, reporting, OLAP, data mining and data warehousing functions. 3 lectures, 1 activity. Prerequisite: MBA first-year required GSB courses or equivalent.

GSB X527 A Managerial Approach to Project Management (4)

Focus on project management tools and processes required to establish priorities for and management of projects within normal and abnormal scope, money and time constraints. Planning, organizational and resource challenges common to a variety of project types. Product life cycle, normal operational, new product introduction and profit oriented product family projects reviewed in service and production environments. 3 lectures, 1 activity. Prerequisite: MBA first-year required GSB courses or equivalent.

GSB X535 Advanced Accounting Process Analysis and Risk Assessment (4)

Contemporary topics associated with documenting and assessing risk, controls, and business processes. Topics include business objectives and organizational performance, risk identification and assessment, application of assessment techniques, and the role of accounting information systems in controlling transaction authorization. 3 seminars, 1 activity. Prerequisite: BUS 429 or equivalent.

GSB X536 Advanced Financial Reporting Issues (4)

Comprehensive coverage of selected advanced financial accounting and reporting topics. Topics include restructuring charges, accounting for income taxes, pensions, leases, accounting charges, and consolidated statement topics. 4 seminars. Prerequisite: BUS 322 or equivalent.

GSB X537 Corporate Governance in Ethical Organizations (4)

Coverage of mechanisms, at the firm level, that contribute to more effective corporate governance and ethical climate at publicly traded corporations. Topics include role of boards of directors, audit committees, structures and systems that affect ethical climate in organizations. 4 lectures. Prerequisite: Graduate standing.

GSB X541 Federal Income Tax for Business (4)

Introduction to the principles of business taxation. Emphasis on the role taxes play in financial and managerial decision making and how taxes motivate people and institutions to engage in certain transactions and activities. 4 lectures. Prerequisite: GSB 511.

GSB X560 Derivative Markets and Instruments (4)

The application of financial theory to the problems of valuing derivative securities and the management of business risks with derivative securities.. The principal securities considered include forwards, futures, options, and swaps. 4 seminars. Prerequisite: GSB 512 and GSB 585.

GSB X564 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. 2 lectures, 2 seminars. Prerequisite: GSB 520 or GSB 531.

HCS X120 Principles of Horticulture and Crop Science (4)

Introduction to horticulture and crop science. Basic plant processes, classification, anatomy, physiology, and

biotechnology. The effect of the environment on plants and how we control it. Introduction to plant growth including propagation, media, irrigation, nutrition, management, harvest, and post-harvest handling. Uses of plants. 3 lectures, 1 laboratory.

HIST X316 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 Area A. Completion of two courses in lower-division Area D (preferably D2 and D3), or consent of instructor.

HIST X323 New Ways of Seeing the Past (4) GE D5

Popular history in the United States, with particular reference to historical novels, autobiographies, memoirs and comics. 4 lectures. Prerequisite: Completion of two courses in Area D or Area C or both, or consent of instructor.

HIST X324 The Historical Novel in the United States, 1960s to the Present (4) GE D5

Introduction to the historical novel as 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: GE D1 and any other lower division Area D course.

HIST X336 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: Enrollment in London Study Program; completion of GE Area A; completion of two courses from Areas D1, D2, D3, D4; and junior standing or permission of the instructor.

HIST X439 The Historical Novel in the United States, from the 1960's to the Present (4)

Introduction to what has been called "the new historical novel." The rise of the new historical novel in the 1960's and its development over the succeeding forty years. A close reading of several illuminating examples, set against the historical circumstances in which they were written and the historical circumstances they purport to represent. How to evaluate the historical novel's claims to intellectual legitimacy. 3 lectures, 1

activity. Prerequisite: Junior standing or consent of instructor.

HNRS X134 General Physics (4) (Also listed as PHYS X141) 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. 4 lectures. Prerequisite: MATH 141 with grade C- or better and MATH 142 or MATH 182 (or concurrent enrollment). Recommended: high school physics.

HNRS X211 Materials Science and Engineering (3) (Also listed as MATE X211)

MATE 210 for honor students. A more in-depth treatment of the topics presented in MATE 210. 3 lectures. Prerequisite: CHEM 111, CHEM 124, or CHEM 127; MATH 141.

HNRS X231 Philosophical Classics: Social and Political Philosophy (4) GE C2 (Also listed as PHIL 231)

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 X241 Calculus IV (4) (Also listed as MATH 241)

Partial derivatives, multiple integrals, introduction to vector analysis. 4 lectures. Prerequisite: HNRS/MATH 143, and consent of Honors Program.

HNRS X244 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 X319 Natural Resource Ecology, Theories and Applications (4) GE B5 (Also listed as FNR 319)

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 X411 Writing Interactive Documents (4) (Also listed as ENGL 411)

Computer-based writing in theory and practice: hypertext, e-mail, online documentation, multimedia, networked group editing; compound electronic documents, interdocument linking. Technical, business, scholarly, pedagogical and creative applications. Total credit limited to 8 units. 4 lectures. Prerequisite: advanced skills in writing and/or graphics, and/or computer programming; upper-division standing, and consent of instructor.

HNRS X412 New Media Arts II (4)
(Also listed as ENGL X412) (valid Winter 05 – Spring 05)

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/HNRS X411. 4 lectures. Prerequisite: ENGL 411/HNRS X411 and consent of instructor.

HUM X318 Culture of Spain Activities (2) (CR/NC)
(valid Spring 03 through Spring 05)

Activities related to interdisciplinary examination of the culture of Spain. Focus on the history, literature, art, philosophy, and language of Spain from the era of the early migrations of antiquity through contemporary Spanish life. Credit/No Credit grading only. 2 laboratories. Corequisite: HUM 310, subtopic "Culture of Spain." Prerequisite: Junior standing or consent of instructor. Limited only to students enrolled in the Salamanca Study Program.

HUM X450 Summer Internship in London (12) (CR/NC)

Extensive work experience in a London placement. Administration, orientation, and supervision by the Foundation for International Education (FIE) in London. Must be able to do independent work in a career field in an international setting. Intensive two-week orientation course; eight-week full-time work assignment. Evaluation by course instructor, internship supervisor, and employer. Credit/No Credit grading only. 4 lectures, 8 supervision. Prerequisite: Junior standing or above; 2.6 GPA; and advisor approval.

IME X414 Network Applications for Engineers (4)

Networking theory, Internet-based fundamentals of client-server interaction, thick-client and thin-client programming of commercial and industrial applications, e-business environment establishment, wireless communications technologies, m-commerce introduction, and database-centered platform independent engineering and business applications. 3 lectures, 1 laboratory. Prerequisite: IME 312.

IME X507 Graduate Seminar (2)

Selected topics of interest to Industrial Engineering and Integrated Technology Management graduate students. Open to graduate students and selected seniors. *Class Schedule* will list topic selected. 1 seminar, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

IME X577 Engineering Entrepreneurship (4)

The special requirements of entrepreneurship in a high-tech environment. Tools to evaluate and pursue technology-based business opportunities provided through guest lectures, focused seminar topics, a business plan project, and case studies. 3 lectures, 1 laboratory. Prerequisite: Consent of instructor.

IT X456 Textile Product Quality Assurance (4)

Quality assurance in the textile/apparel industry. Materials and product testing and evaluation through laboratory experimentation. Developing standards and specifications for textile products, inspection processes, sampling and testing procedures. Integration of products with materials and consumers. 3 lectures, 1 laboratory. Prerequisite: IT 336, completion of Areas A, B, & F, or consent of instructor.

JOUR X219 Mass Media in a Multicultural Society (4)

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. Prerequisite: JOUR 203.

JOUR X415 Advanced Public Relations Practice (4)

Application of public relations tools/techniques required to create, manage, and implement a comprehensive, professional public relations campaign. Research, planning, writing goals and objectives; establishing themes, strategies, and plan evaluations. Public relations crisis management. 4 lectures. Prerequisite: JOUR 413.

KINE X324 Sport, Media and American Popular Culture (4) GE D5 USCP

Issues of class, race/ethnicity, gender, various forms of deviance, and other aspect of social life. Exploration of sociological manifestations and implications of how the aforementioned social issues are embedded in mediated forms of sports. No GE Area D5 credit for Kinesiology majors. 3 lectures, 1 activity. Prerequisite: Completion of GE Areas A, D1 and D3.

KINE X424 Organization and Implementation of a K-12 Physical Education Program (4)

Organization, selection, presentation, strategy, application, and interpretation of K-12 subject matter in physical education. 4 lectures. Prerequisite: KINE 300, KINE 419, KINE 422 and KINE 423.

LS X213 Historical and Cultural Influences in the Development of Art, Science and Education (4)

Interconnectedness of the development of innovations in art, science and approaches to education in cultures ancient to modern. Focus on the intellectual contributions, artistic forms and traditions, including religious beliefs, as well as the evolution of artistic and scientific thought and its influence on educational systems from the medieval monasteries to contemporary universities. 4 lectures.

LS X214 The Constitution and American Educational Institutions (4)

Introduction to Bill of Rights and Constitution with focus on examination of significant legislation and American court cases that have affected public education from the colonial period to present. Overview of contributions of Franklin, Jefferson, Webster and other early figures. Landmark decision regarding discrimination, women's rights, religion, censorship, disabilities and student civil liberties. 4 lectures.

LS X311 Visual Arts in the Elementary Classroom (4)

Use of multi-strategies to gain thorough understanding of the theory and philosophy of visual arts, as this relates to child development and visual arts processes for the elementary classroom. 4 lectures. Prerequisite: LS 101 or consent of instructor.

MATE X130 Introduction to Materials Engineering Practice Design Laboratory III (1)

Third design laboratory in a sequence. Includes working in teams on project that benefits humanity. Issues of engineering ethics, technology and society, the environment and sustainability. 1 laboratory. Prerequisite: MATE 120.

MATE X211 Materials Science and Engineering (3) (Also listed as HNRS X211)

MATE 210 for honor students. A more in-depth treatment of the topics presented in MATE 210. 3 lectures. Prerequisite: CHEM 111, CHEM 124, or CHEM 127; MATH 141.

MATE X330 Composites (3)

Fundamentals of polymer-matrix, ceramic-matrix, and metal-matrix composites from materials engineering and applied mechanics viewpoints. Materials (matrices, fibers) treated in detail. Beginning applied mechanics of continuous and discontinuous fiber-reinforced composites covered including properties of an orthotropic

lamina; behavior of laminated plates. 3 lectures. Prerequisite: MATE 210, MATE 350, CE 204 or consent of instructor.

MATE X335 Composites Laboratory (1)

Processing, manufacturability, testing, and performance of fiber-reinforced polymer matrix composite materials. Selection of composite materials for engineering applications based on manufacturability and performance indices. Determination of material properties of composites using standardized testing methods. 1 laboratory. Concurrent: MATE X330.

MATE X402 Research Methods (1)

Introduction to research and analytical techniques. The purpose of basic research; how scientific knowledge is communicated; journal articles; library and online research; presentation of data; the scientific method; researchers in history. 1 activity. Prerequisite: CHEM 111, CHEM 124, or CHEM 127; PHYS 121 or PHYS 131.

MATE X481 Corporate Culture (1) *(effective Spring 04 thru Spring 05)*

Practical working knowledge of key corporate topics such as leadership, ethics, organizational structure, intellectual property, communication, life-long learning, global and social impacts of technology and the product development process. 1 laboratory. Prerequisite: Senior standing. Corequisite: MATE 482 for Materials Engineering majors.

MATE X481 Corporate Culture (1) *(effective Fall 03 thru Winter 04)*

Aspects of corporate culture. Corporate ethics, professional communications, life-long learning and corporate dynamics. 1 lecture. Prerequisite: Senior standing.

MATE X482 Senior Project Design I (1)
(effective Spring 04 thru Spring 05)

Foundations of senior project design. Enables students to complete the preliminary stages of selecting their senior project, researching experimental approaches, evaluating realistic constraints, assessing the societal impact, and creating their project timeline. 1 lecture. Prerequisite: Senior standing. Concurrent: MATE X481.

MATE X482 Senior Project Design Laboratory I (1)
(effective Fall 03 thru Winter 04)

Foundations of senior project design. Enables students to complete the preliminary stages of selecting their senior project, designing experiments, evaluating realistic constraints, conducting initial experiments, managing their project timeline. 1 laboratory. Prerequisite: Senior standing. Concurrent: MATE X481.

MATE X483 Senior Project II (2)
(effective Fall 04 thru Spring 05)

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, 1 supervision. Prerequisite: MATE X482.

MATE X483 Senior Project Design Laboratory II (2)
(effective Fall 03 thru Summer 04)

Continuation of senior project planning. Completion of a senior project under the guidance of a faculty supervisor. Research methodology, experimental design, experimental work and data analysis. 2 laboratories. Prerequisite: MATE X482.

MATE X484 Senior Project III (2)
(effective Fall 04 thru Spring 05)

Continuation of MATE X483. Completion of a senior project data analysis and communication under the guidance of a faculty supervisor. Mathematical modeling and technical communication. 1 lecture, 1 supervision. Prerequisite: MATE X483.

MATE X484 Senior Project Design Laboratory III (2)
(effective Fall 03 thru Summer 04)

Continuation of MATE X483. Completion of a senior project under the guidance of a faculty supervisor. Experimental design, experimental work and data analysis, technical communication. 2 laboratories. Prerequisite: MATE X483.

MATE X504 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, intermetallics, semiconducting polymers, etc. Interrelationships of processing, structure, properties, and performance in different materials systems. 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. 4 lectures. Prerequisite: MATE 210 or equivalent, graduate standing or consent of instructor. Special topics course. 4 lectures. Prerequisite: MATE 210 and graduate standing or consent of instructor. *Special topics course.*

MATE X540 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 230, MATE 235 or consent of instructor; corequisite: MATE X545. *Special topics course.*

MATE X545 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 numerical wear modeling, materials characterization via metallography, scanning electron microscopy, and surface profilometry. Experiments focusing on real engineering systems and their degration as a result of wear. 1 laboratory. Prerequisite: MATE 210, MATE 215, MATE 230, MATE 235 or consent of instructor; corequisite: MATE X540.

MATH X182 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. Miscellaneous course fee may be required in sections with a computer component – see *Class Schedule*. Not open to students with credit in MATH 142. 4 lectures. Prerequisite: MATH 141 or equivalent.

MATH X192 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 X258 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 X300 Technology in Mathematics Education (4)

Existing hardware and software designed for educational uses. 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. 2 lectures, 2 activities. Prerequisite: MATH 141 or MATH 329, and a course in CSC or MATH 211, or consent of instructor.

MATH X318 Advanced Engineering Mathematics (4) (GE B6)

Power series solutions of differential equations and Bessel functions. Fourier series and transforms; matrices. 4 lectures. Prerequisite: MATH 242.

MATH X326 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 X350 Mathematical Software (4)

Problem solving using mathematical software. 4 lectures. Prerequisite: CSC/CPE 101 or CSC X235, and MATH 206 or MATH 244, and MATH 241, or consent of instructor.

MATH X422 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 X459 Senior Seminar (4)

Written and oral analyses and presentations by students on topics from advanced mathematics and mathematical modeling. 4 seminars. Prerequisite: MATH 248 with a grade of C- or better, and completion of at least two upper-division courses in the math major, or consent of instructor.

MATH X491 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.

ME X347 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 341, CSC 231.

ME X402 Orthopaedic Biomechanics (4)

Biomechanical analysis of the musculoskeletal system. Emphasis on the use of statics, dynamics, and strength of materials to analyze the mechanical loads acting on human joints, the mechanical properties of tissues, and the design of artificial joints and tissue implants. 4 lectures. Prerequisite: ME 328 or consent of instructor.

ME X404 Introduction to 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 or consent of instructor.

ME X446 Hybrid Electric Vehicle Design (4)

Topics including chemical fuel systems, electric motor drives, energy storage systems, and HEV strategies. System design includes fuel economy, emissions, power source tradeoffs, transient control, and component integration. 3 lectures, 1 laboratory. Prerequisite: ME 344.

ME X465 Senior Project (5)

Selection and completion of a project under faculty supervision. Team projects geared to enhance design classes, co-op experience, professional society activity, or technical electives, and must be preapproved by faculty. Substitutes for ME 461 in a structured environment. 3 lectures, 2 laboratories. Prerequisite: Consent of instructor.

ME X488 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 302, ME 329, ME 342.

ME X501 Linear Elasticity (4)

Introduction to continuum mechanics, tensor calculus and indicial notation. Stress, strain, and balance laws for linear elastic solids. Constitutive equations for isotropic and anisotropic materials, and thermoelastic materials. Analytical solutions to selected boundary-value problems. Linear poroelasticity. 4 lectures. Prerequisite: ME 401 or consent of instructor.

ME X506 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 X518 Machinery Vibrations and Rotor Dynamics (4)

Study of 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. Includes research project on related topic. 3 lectures, 1 laboratory. Prerequisite: ME 318 and graduate standing.

ME X554 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 X565 Introduction to Spacecraft Structures and Mechanisms (4)

Introduction to spacecraft structures and mechanisms, including solid mechanics, dynamics and vibration, modal analysis and thermal effects. 4 lectures. Prerequisite: Graduate standing.

ME X579 Fluid Power Control (4)

Design, analysis, and control of fluid power systems. Steady-state analysis of valves, actuators, and transmissions. Dynamic modeling, response, stability, and control analysis via linear element representation and computer simulation. 3 lectures, 1 laboratory. Prerequisite: ME 422 or equivalent.

PE X113 Intermediate Billiards (1) (CR/NC)

Intermediate skill level for pocket billiards. Credit/No Credit grading only. 1 activity. Prerequisite: PE 107 or consent of instructor.

PE X177 Touch Rugby (1) (CR/NC)

Basic concepts of passing, receiving, defense and offense methods and strategies, and as applied to touch rugby. Credit/No Credit grading only. Open to all students. 1 activity.

PE X181 Non-Traditional Sports – Lacrosse (1) (CR/NC)

Fundamental skills, rules and strategies used in playing Lacrosse. Credit/No Credit grading only. 1 activity.

PEM/PEW X195 Golf (2)

Practice time for members of NCAA Golf Team. 2 laboratories. Prerequisite: Approved member of team.

PHIL X421 Philosophy of Space, Time and Matter (4)

Investigation of the philosophical foundations and interpretation of Einstein's theories of relativity and elementary quantum mechanics. Emphasis on philosophical issues relevant to contemporary philosophy of science such as the meaning of theoretical terms and scientific realism. 4 lectures. Prerequisite: PHIL 230 or PHIL 321.

PHIL X457 Nietzsche (1) (Also listed as ENGL X457)

Key works of the 19th century German philosopher-poet from literary and philosophical viewpoints, emphasizing important philosophical ideas (eternal return, perspectivism, the death of God, the Overman, Apollo and Dionysus) and literary strategies (irony, personae, collage, aphorism, allegory). 4 lectures. Prerequisite: ENGL 134, ENGL 251 or ENGL 252 or ENGL 253; PHIL 230 or PHIL 231.

PHYS X141 General Physics (4) (Also listed as HNRS X134) 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. 4 lectures. Prerequisite: MATH 141 with grade C- or better and MATH 142 or MATH 182 (or concurrent enrollment). Recommended: high school physics.

PHYS X211 Modern Physics I (4)

Special relativity, fundamental principles of quantum mechanics emphasizing the modern description of atomic phenomena. wave particle duality, Boh theory, Schroedinger Equations, elementary atomic structure. 3 lectures, 1 activity. Prerequisite: PHYS 123, or PHYS 132 and PHYS 133, and MATH 241.

PHYS X455 Computational Physics (4)

Development of computer algorithms and their applications to physics problems. Errors, uncertainties, and algorithms. Numerical methods, including integration and differentiation. Data modeling and curve fitting. Deterministic randomness, Monte Carlo applications. Numerical solution of differential equations. 4 lectures. Prerequisite: 300-level physics course and knowledge of a computer programming language.

PM X325 Egg Production, Processing and Distribution (4)

Management of replacement pullets and laying hens, including flock scheduling, vaccination and handling procedures, nutrition management, costs of operation and production projections. Quality determination, processing, sales and distribution of shell eggs and egg products. 3 lectures, 1 laboratory. Prerequisite: PM 225.

PPSC X421 Plant-Pest Interactions (4)

Strategies for managing pest insects, pathogens and weeds through cultural controls and enhancement of plant defenses. Focus will be primarily on insects, but will include examples of pathogens and weeds. Biochemical and physical factors involved in plant resistance to pest attack, and the evolution and genetic basis thereof. Effects of irrigation, fertilization, tillage and cover cropping on pest population densities and the use of chemicals for induced resistance or systemic acquired resistance. 3 lectures, 1 laboratory. Prerequisite: PPSC 311 or ZOO 335, BOT 323 or PPSC 221.

PPSC X521 Plant-Pest Interactions (4)

Strategies for managing pest insects, pathogens and weeds through cultural controls and enhancement of plant defenses. Focus will be primarily on insects, but will include examples of pathogens and weeds. Biochemical and physical factors involved in plant resistance to pest attack, and the evolution and genetic basis thereof. Effects of irrigation, fertilization, tillage and cover cropping on pest population densities and the use of chemicals for induced resistance or systemic acquired resistance. 3 lectures, 1 laboratory. Prerequisite: PPSC 311 or ZOO 335, BOT 323 or PPSC 221, and graduate standing.

PSC X320 Energy and the Environment for the New Millennium (4) GE Area F

Science and technology of current and future energy sources along with associated environmental problems. Energy production, consumption, efficient usage, fossil fuels, nuclear, solar, other renewables. Risks, benefits, planning, economics. 3 lectures, 1 activity. Prerequisite: Completion of GE Area B, and junior standing. Physical Science majors will not receive GE Area F credit.

PSC X424 Organizing and Teaching of Physical Sciences (4)

Techniques, aims, and objectives in teaching of physical sciences and general sciences at the secondary level. Selection and organization of teaching material, including strategies for ELL and special needs students. Evaluation of results. 4 lectures. Prerequisite: Evidence of satisfactory preparation in physics and chemistry.

PSY X325 Positive Psychology (4)

Introduction to the scientific study of the enhancement of strengths and optimal functioning in humans. Basic research and assessment and helping concepts in understanding optimal functioning within diverse populations. 4 lectures. Prerequisite: PSY 201 or PSY 202.

REC X205 Leadership in Recreation, Parks and Tourism (4)

Recreation, parks and tourism leadership with small and large groups. Examination of the skills, knowledge, and abilities required of effective leaders in leisure organizations and settings. 3 lectures, 1 activity. Prerequisite: REC 101 or REC 127 or consent of instructor.

REC X230 Challenge Course Leadership and Facilitation (4)

Techniques and models used in challenge course leadership and facilitation. Leadership styles, challenge course terminology, facilitation models, safety guidelines, and learning styles. 3 lectures, 1 laboratory. Prerequisite: Sophomore standing or consent of instructor.

REC X315 Leisure Resources and Community Development (4)

Investigation of community development principles, costs, and benefit 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. Community-based learning required. 4 lectures. Prerequisite: Completion of GE Area A.

RELS X310 Christianity (4) GE C4

Critical examination of the development of the Christian religion from the story of Jesus in the Gospels to issues in Church formation, such as the role of Paul, dissenting views, Protestant and Catholic theologies, the Trinity and social consciousness. 4 lectures. Prerequisite: Completion of GE Area A and PHIL 230 or PHIL 231.

RELS X311 Islam (4) GE C4 *(GE credit approved after Spring '04 Schedule printed)*

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.

SCM X330 Ocean Discovery through Technology (4) GE Area F

Advances in technology are providing society with a new understanding of the ocean. Emphasis on the advances made in sensors and sensor platforms, such as ships, satellites, and underwater vehicles. An introduction to the marine science and current issues provides context for the course. 3 lectures, 1 activity. Prerequisite: Completion of GE Area B and junior standing.

SCM X593 CCSP Science Leadership Institute (4)

Timely and relevant content matter instruction and hands-on activities, inquiry-based lesson development and development of skills necessary for successful integration of language and reading skills and technology into the science curriculum. Optional focus on standards-based texts. Required completion of significant leadership project applying content and skills in participant's school. *Class Schedule* will list topic selected. Total credit limited to 8 units. 4 seminars. Prerequisite: Teacher credential and participant in CCSP.

SCM X594 CCSP Junior High Science Institutes (1) (CR/NC)

10+ hour intensive inservice workshops for 6-8th grade science teachers. Content and hands-on activities presented by Cal Poly and Cuesta faculty or local experts, concentrating on California Science Standards. Required assignment: draft of lesson plan applying acquired content. Total credit limited to 5 units; may be in same term. Credit/No Credit grading only. 1 seminar. Prerequisite: Teacher credential and participant in CCSP.

SCOM X315 Intergroup Communication (4)

Survey of theory and research concerning language and communication between various social groups (e.g., age, sex, race, sexual orientation), with an emphasis on understanding the role verbal, nonverbal, and mass communication plays in identity formation and differentiating group members. 4 lectures. Prerequisite: Completion of GE Area A.

SOC X450 Southeast Asian Economic Development (4)

Focus on poverty and economic development in Southeast Asian countries. The historical, political, and cultural differences among the Southeast Asian nations that lead to different outcomes for economic development and poverty reduction in these nations. Specific development and poverty reduction programs in the successful nations (primarily Thailand and Vietnam) that have led to rapid poverty reduction in these nations. Research papers required. 4 seminars. Prerequisite: Junior standing.

STAT X320 Statistical Concepts and Methods for Mathematics and Statistics (4)

Introduction to statistical concepts and methods at post-calculus level. Observational studies, controlled experiments, scope of conclusions. Graphical, numerical summaries. Concepts, interpretations of significance tests, confidence intervals. Hypergeometric, binomial, and normal distributions. Use of MINITAB statistical package. 4 lectures. Prerequisite: MATH 142.

TH X410 Digital Filmmaking (4) (CR/NC)

Fundamental digital filmmaking skills and processes including script writing, story boarding, cinematography, editing. Student production of dramatic, documentary or animated short films. Credit/No Credit grading only. 4 laboratories. Prerequisite: TH 210.

UNIV X333 World Food Systems (4) GE Area F

Integrated, interdisciplinary study of the technologies of global food production, environmental and social issues related to the application of those technologies, and moral and ethical issues associated with global food production and distribution. Emphasis on the politics of change. 4 lectures. Prerequisite: Junior standing and completion of Area B.

UNIV X350 The Global Environment (4) GE Area F

Interdisciplinary investigation of how human activities impact the Earth's environment on a global scale. Examination of population, resource use, climate change, and biodiversity from scientific/technical and social/economic/historical/political perspectives. Use of remote sensing maps. Sustainable solutions. 3 lectures, 1 activity. Prerequisite: Completion of GE Areas A and B and junior standing.

UNIV X361 Modernism (4) GE C4

Interdisciplinary survey of the eighteenth, nineteenth and twentieth-century concepts and cultural movements known as modernism throughout Europe, North America and Latin America. Disciplines may include architecture, art, drama, literature, music, philosophy and photography. 4 lectures. Prerequisite: Completion of GE Area A and one class from Area C.

VS X340 Immunology and Diseases (4)

Introduction to immune system, including innate and acquired immunity. Application to immunological analyses in poultry and other domesticated animals. Examination of current disease issues in those species. 3 lectures, 1 laboratory. Prerequisite: VS 223.

WVIT X463 Issues and Trends in the Wine Industry (2)

Current topics in viticulture, enology and the wine business as a whole. Emphasis on controversial topics and future projections of the industry's vision. 2 seminars. Prerequisite: Senior standing.

BS WINE and VITICULTURE – 2003-05 Catalog – *Approved effective Spring 2004*

College of Agriculture
Agricultural Sciences Bldg. (11), Room 211
(805) 756-2161, FAX: (805) 756-6577

60 units upper division | 2.0 GPA | GWR | USCP
** = Satisfies General Education requirement*

MAJOR COURSES

WVIT 102 Grapes and Wines of the World	4
CHEM 111 Survey of Chemistry (B3)*	5
SS 121 Introductory Soil Science	4
BUS 212 Financial Accounting for Nonbusiness Majors	4
FRSC 231 Viticulture	4
FRSC 331 Advanced Viticulture	4
AGB/HCS/FSN 339 Internship	4
BRAE 340 Irrigation Water Management (F)*	4
FSN 341 Wine and Fermented Foods	3
AGB 401 Managing Cultural Diversity in Agricultural Labor Relations	4
FSN 411 Sensory Evaluation of Food	3
AGB 443 Branded Wine Marketing	4
AGB 460/461/HCS/FSN 461/462 Senior Project	2,2
WVIT 463 Issues and Trends in Wine	2
Concentration courses (see below)	45-49
Advisor-approved electives	20
	118–122

GENERAL EDUCATION (GE)

72 GE units required; 24 units are in Support.
* 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 Concentration	0
D3 Comparative Social Institutions	4
D4 Self Development (CSU Area E)	4
D5 Upper-division elective	4
Area F Technology Elective (upper division) * 4 units in Major	0
	48
ELECTIVES	**14–10**
	180

CONCENTRATIONS (select one)

Enology Concentration

FSN 264 Survey of Food Chemistry	4
FSN 270 Food and Wine Plant Sanitation	4
FSN 334 Food Packaging	4
FSN 374 Food Laws and Regulations	4
FSN 464 Wine Chemistry and Analysis	4
FSN 470 Selected Advanced Topics	4
MATH 118 Pre-Calculus Algebra *or* MATH 161 Calculus for Life Sciences I (B1)*	4
CHEM 312 Survey of Organic Chemistry	5
ECON 201 Survey of Economics (D2)*	4
MCRO 221 Microbiology (B2)*	4
STAT 218 Applied Statistics for the Life Sciences (B1)*	4
	45

Viticulture Concentration

FRSC 210 Viticultural Practices	2
FRSC 415 Vine Physiology	4
PPSC 311 Agricultural Entomology	4
PPSC 321 Weed Ecology	4
PPSC 414 Grape Pest Management	4
MATH 118 Pre-Calculus Algebra *or* MATH 161 Calculus for Life Sciences I (B1)*	4
BIO 303 Survey of Genetics	3
BOT 121 General Botany (B2)*	4
BRAE 439 Vineyard Water Management	4
ECON 201 Survey of Economics (D2)*	4
SS 221 Fertilizers and Plant Nutrition	4
STAT 218 Applied Statistics for the Life Sciences (B1)*	4
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Wine Business Concentration

AGB 202 Sales, Communication and Leadership in Agribusiness	4
AGB 212 Agricultural Economics	4
AGB 301 Food and Fiber Marketing	4
AGB 310 Agribusiness Credit and Finance	4

AGB 323 Agribusiness Managerial Accounting	4
AGB 422 Logistics in Global Agribusiness	4
AGB 444 Wine Compliance and Market Analysis	4
AGB 450 Agribusiness Strategy Formulation	4
BIO 111 General Biology (B2)*	4
ECON 222 Macroeconomics (D2)*	4
MATH 118 Pre-Calculus Algebra *or* MATH 221 Calculus for Business and Economics (B1)*	4
STAT 221 Introduction to Probability and Statistics (B1)*	5
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Master of Public Policy (MPP) – 2003-05 Catalog

Political Science Department
Faculty Office Bldg. (47), Room 14-A
805 756-2984

Note: Program effective Fall 2003.
Approved by the Chancellor's Office after the 2003-05 Catalog went to print.

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 will be undertaken. Both group reports and individual papers will be developed, presented, and discussed. 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 (4 units).

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).

Required Courses	*Units*
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
Electives	18
Additional 400 and 500-level courses, to be selected with graduate adviser's approval. *At least 6 units must be at the 500 level.*	
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