UPDATES TO 2001-03 CATALOG
for
Courses and Curricula
Last Update: 6/30/04

The online 2001-03 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 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 2004		
Item	**Page**	**Additions/Corrections/Revisions**
Reduction of Units	246-7 286	For students in the listed degree program below, who are following the 2001-03 Catalog, the following change became effective Spring 2004: **Department approved electives reduced and total units reduced to 180.** BS Journalism BS Mathematics

Effective as of: Winter 2004		
Item	**Page**	**Additions/Corrections/Revisions**
Reduction of Units	234 289 112 170 261 175 241 237 244 249 252 254 256 295 294 293	For students in the listed degree programs below, who are following the 2001-03 Catalog, the following changes became effective Winter 2004: **1) Free electives reduced and concentration units adjusted.** BS Art and Design – reduced to 186 units. BS Kinesiology – reduced to 180 units. **2) Total units reduced to 180. Free electives reduced by 6 units.** BS Agricultural Business BS Business Administration BS Child Development BS Economics BA English BS Graphic Communication BA History BA Liberal Studies BA Modern Languages and Literatures BA Music BA Philosophy BS Physical Science BA Physics BS Physics BA Political Science

258	BS Psychology (see also: Fall 2001 changes in table below – free
262	electives reduced then to 18)
	BS Recreation Administration
143-4	BS Social Sciences
266	BA Speech Communication
268	BS Statistics
297	BA Theatre
270	

Effective as of: Spring 2003		
Item	**Page**	**Additions/Corrections/Revisions**
Experimental Courses	---	AERO X433, AG X315 (GE Area F), AGB X442, ASCI X265, ASCI X344, BIO X307 (GE Area F), BIO X391, BIO X392, BIO X393, BRAE X447, BRAE X532, CHEM X484, CHEM X550, CHEM X551, CSC X236, CSC X238, CSC X581, EDES X435, EE X440, EE X441, EHS X335, ENGR X440, ENVE X455, ES X335 (USCP), ES X380 (USCP), GSB X541, GSB X560, GSB X564, HIST X300, HIST X336 (GE D5), HIST X439, HNRS X132 (GE B3/4), HNRS X231 (GE C2), LS X213, LS X214, LS X230, LS X231, LS X232, LS X233, MATH X258, MATE X484, ME X347, PE X177, PHYS X211, PHYS X455, POLS X333 (GE Area F), TH X430

Effective as of: Winter 2003		
Item	**Page**	**Additions/Corrections/Revisions**
ART 318	328	Add “Total credit limited to 12 units.”
Experimental Courses	---	AERO X431, AERO X432, AGB X452, ART X488, ASTR X102 (GE B3&4), BRAE X415, BUS X395, BUS X464, CE X469, CHEM X545, CHEM X548, CSC X235, CSC X237, DSCI X300, ENGR X270, FNR X434, HNRS X211, HUM X335 (GE C4), IME X414, IME X577, MATE X211, MATE X483, MATE X504, ME X402, ME X404, PHYS X107 (GE B3), PPSC X110 (GE B2/B4), PPSC X421, PPSC X521

Effective as of: Fall 2002		
Item	**Page**	**Additions/Corrections/Revisions**
Commencement	78	Effective Fall 2002, it shall be the policy of Cal Poly that for a student to participate in graduation ceremonies, the student must satisfy at least one of the following: 1. The student shall have completed all degree requirements and no have participated in a graduate ceremony previously. 2. The student shall currently be enrolled in classes that would complete all of that student’s degree requirements. 3. The student shall be registered for classes for the following term that would allow the student to complete all of his/her degree requirements.
Experimental Courses	---	AERO X300, AERO X331, AG X581, ASCI X345, BIO X420, BOT X449, BUS X393, BUS X394, BUS X396, BUS X397, BUS X398, BUS X495, CE X468, CHEM X544, CHEM X547, CRSC/EHS/FRSC X120,

		EDUC X310, EDUC X427, EDUC X481, ENGL X251, IME X312, IT X446, LS X461, LS X462, MATH X300, ME X488, POLS X285, REC X315, REC X414, SCM X594
Grade Symbol Changes	87	Executive order 792 from the CSU Chancellor's Office mandates that effective with Fall 2002 grading cycle, the grading symbols **U (Incomplete Unauthorized)** and **SP (Satisfactory Progress)** are replaced and can no longer be used. The new grading symbols are now **WU** and **RP**; specific wording from the executtive order follows: **WU (Withdrawal Unauthorized)** – The symbol "**WU**" indicates that an enrolled student did not withdraw from the course and also failed to complete the course requirements. It is used when, in the opinion of the instructor, completed assignments or course activities or both were insufficient to make normal evaluation of academic performance possible. For purposes of grade point average and progress point compilation this symbol is equivalent to an "F". **RP (Report In Progress)** – The "**RP**" symbol is used in connection with courses that extend beyond one academic term. It indicates that work is in progress but that assignment of a final grade must await completion of additional work. Work is to be completed within one year except for graduate thesis.
Polymers & Coatings Science, MS	---	New program, approved after 2001-03 Catalog printed
Refunds of Registration Fees	63	**Title 5 Refund Policy:** **Refunds of Registration Fees** Please refer to the *Class Schedule* for dates relevant to each term. * To qualify for a **full** refund of mandatory campus fees, and nonresident tuition if applicable, all courses must be dropped through CAPTURE or POWER **PRIOR to the first day of the academic term.** * Resident students who drop some but not all units on or before the last day of the drop period, changing their enrollment status from over 6 units to 6 units or less, will be entitled to a refund of the resulting reduction in the State University fee, plus half of any college based portion of the campus academic fee. * Nonresident students who drop some but not all units on or before the last day to drop will be entitled to a refund of the applicable difference in tuition. If the dropped units changes enrollment status from over 6 units to 6 units or less, nonresident students will also be entitled to a refund of the resulting reduction in the State University fee, plus half of any college-based portion of the campus academic fee. * Beginning with the first day of the academic term, students who drop all courses prior to the end of the drop period or who officially withdraw no later than the **sixty percent point** in the academic term shall be entitled to a **pro-rata refund** of mandatory campus fees, and nonresident tuition if applicable. The length of the academic period is calculated from the first day of the academic term through the last final exam day of the term, including weekends but excluding any breaks of

		five (5) days or more. * Registration fee and tuition refunds are credited to the student's Cal Poly account. The student may **request a refund** disbursement by applying at the Student Accounts Office, Administration 211. A processing fee of $5.00 will be deducted from the refund amount. The student also has the choice of leaving the credit on account for future use.
SCOM 485	467	Total credit limited to 16 units, not 18.

Effective as of: Summer 2002		
Item	**Page**	**Additions/Corrections/Revisions**
CSC 302	366	Prerequisite: Completion of GE Area B, and junior standing.
Experimental Courses	---	AERO X526, AGC X424, ARCH X450, ENVE X534, SCM X593, TH X410
FNR 312	398	Prerequisite: Completion of GE Area B, and junior standing.
FNR 321	398	Prerequisite: Completion of GE Area B, and junior standing.
FSN 319	403	Prerequisite: Completion of GE Area B, and junior standing.
GRC 377	408	Prerequisite: Completion of GE Area B, and junior standing. (See also Fall 2001, below.)
MATE 359	435	Prerequisite: Completion of GE Area B, and junior standing.
PSC 307	457	Prerequisite: Completion of GE Area B, and junior standing.
PSC 320	457	Prerequisite: Completion of GE Area B, and junior standing.

Effective as of: Spring 2002		
Item	**Page**	**Additions/Corrections/Revisions**
ARCH 463	325	Total credit limit changed from 2 units to 6 units.
CHEM 471		Selected Advanced Laboratory: change from (1-3) to (1-4); total credit limited to 8 units. Added as "generic" course.
Experimental Courses	---	AERO X320, ARCE X448, BIO X300 (GE B5), BUS X408, BUS X421, BUS X432, BUS X437, BUS X445, BUS X459, CE X527, ECON X340, EDUX X443, FRSC X415, FRSC X416, HUM X315 (GE D5), IME X158, IME X312, IME X520, KINE X323, MATH X182 (GE B1), MCRO X320, PE X113, PPSC X110, PPSC X451
General Education	80	For catalogs prior to 2001-03 (Chart 1, first table on page): **Area D Social, Political, Economic Inst. (min. 15 units) (to PDF file)** *Take a minimum of one course from either D1a or D1b (Area D1):* D1a American institutions (History) *(Area D1)* D1b American institutions (Government) *(Area D1)* *Take **three courses** from D2, D3, D4a, D4b: (link to PDF file)* D2 History *(HIST 315 or Area D5 HIST course)* D3 Economic institutions *(Area D2)* D4a Social institutions elective *(Area D3)*

		D4b Social institutions elec (300-400 level) *(Area D5)*
General Education	80	For catalogs prior to 2001-03 (Chart 1, first table on page): **Area E Life Understanding (min. 3 units) (to PDF file)** **(**Delete statement, "No more than one course in any Area E category:" so that Area E reads, revised, as follows:) *Take one course from E1 or E2: (link to PDF file)* E1 Psychology *(Area D4)* E2 Life understanding elective *(Area D4)*
GRC 211	407	Insert statement, "Miscellaneous course fee may be required – see *Class Schedule*".
GRC 471 and GRC 474	409	Insert statement, "Major credit limited to 4 units; total credit limited to 18 units."
IME 144	418	Miscellaneous course fee may be required – see *Class Schedule*. (Fee requirement transferred from IME 145 to IME 144.)
Withdrawals from Courses	89	Modify first sentence of the third paragraph of this section to read, "Between the end of the 7th week of instruction and the last day of instruction, withdrawals are permitted only if the withdrawal is based on an emergency situation clearly beyond the control of the student."

Effective as of: Winter 2002		
Item	**Page**	**Corrections/Revisions**
Experimental Courses		HNRS X375 (GE D5), MATE X468, ME X446, ME X464
GRC 218 and GRC 338	407-408	Insert statement, "Miscellaneous course fee may be required – see *Class Schedule*".

Effective as of: Fall 2001		
Item	**Page**	**Corrections/Revisions**
Architecture, B.Arch	155	Both ARCH 218 and ARCH 219 are required Major Courses. ARCH 218 provides GE Area C credit.
Child Develop-ment, BS	260	BIO 302, a Support Course, provides GE B5 credit, not B2.
City and Regional Planning, BS	158-9	ECON 201, a Support Course, provides GE D2 credit. Total GE units: 56 (16 units in Support). Total free electives: 11.
Computer Science Minor	208	Third paragraph added: "Admission to the minor is limited and selections will be made based upon the applicant's performance in the core courses. Please see the College of Engineering Advising Center for further information *before* planning to enter the minor."
ENGL 338	389	Modes of instruction are 3 lectures and 1 activity (not 4 lectures).
ENGL 400	391	Total credit limit changed from 4 units to 6 units.

Experimental Courses		AERO X202, AGB X444, ANT X309, ARCH X340, ASCI X212, ASCI X311, ASCI X406, ASCI X415, ASCI X425, BIO X105, BIO X347, BIO X451, BRAE X439, BUS X301, BUS X385, BUS X420, BUS X436, BUS X458, BUS X496, CE X423, CE X458, CE X459, CE X484, CPE X104, CPE X105, CPE X107, CPE X317, CPE X456, CPE X457, CPE X461, CPE X462, CPE X469, CSC X104, CSC X105, CSC X107, CSC X456, CSC X457, CSC X469, CSC X491, CSC X492, CSC X564, EDUC X441, EDUC X460, EDUC X462, EDUC X463, EDUC X 465, EDUC X467, EDUC X471, EDUC X472, EDUC X473, EDUC X474, EDUC X475, EDUC X476, EDUC X477, 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 X334, EHS X382, ENGL X103, ENGL X260, ENGL X360, ENGL X424, ENGL X460, ENGL X461, ENGL X527, ENGL X528, ENGR X481, ENGR X482, ENVE X450, ENVE X472, ENVE X537, ENVE X552 FORL X250, GRC X331, GRC X335, GRC X433, GSB X530, HIST X418, HNRS X101, HNRS X112, HNRS X201, HNRS X215, HNRS X303, HNRS X304, HNRS X315, HNRS X320, HNRS X490 HUM X318, HUM X330 IME X412, IME X417, IT X406, KINE X301, KINE X322, KINE X406, KINE X423 LS X250, LS X311 MATE X467, MATH X110, MATH X331, ME X460, ME X465, ME X506, ME X518, ME X523, ME X541, MU X189, MU X259, MU X260, MU X315, MU X389 PEM/PEW X195, PHYS X417, PM X320, REC X417, REC X420, SCM X320, SCM X321, SCM X322, SCM X323, SCM X324, SCM X325, SCM X326, SCM X327, SCM X328, TH X250, WS X450
General Education	80	For catalogs prior to 2001-03 (first table on page): **Area D Social, Political, Economic Inst. (min. 15 units) (to PDF file)** **(**Delete statement, “No more than one course in any Area D category” so that Area D reads, revised, as follows:) *Take a minimum of one course from either D1a or D1b (Area D1):* D1a American institutions (History) *(Area D1)* D1b American institutions (Government) *(Area D1)* *Take one course from three of the following four categories: D2, D3, D4a, D4b: (to PDF file)* **(See also change effective Spring 2002, listed above)** D2 History *(HIST 315 or Area D5 HIST course)* D3 Economic institutions *(Area D2)* D4a Social institutions elective *(Area D3)* D4b Social institutions elec (300-400 level) *(Area D5)*

"	80	For catalogs prior to 2001-03 (first table on page): **Area A Communication (minimum 11 units) (to PDF file)*Take one course from A1 and one course from A3*:** A1 Expository Writing *(Area A1)* A3 Speech *(Area A2)* ***Take a minimum of one course from either A2 or A4:*** A2 Critical Thinking *(Area A3)* A4 Argumentative Writing *(Area A3)*
"	80	For catalogs prior to 2001-03 (first table on page): **Area B: (to PDF file)** B1a Physical Science *(Area **B3**)* B1b Life Science *(Area **B2**)*
"	80	For Students Changing to 2001-03 Catalog (second table on page): "**AREA F TECHNOLOGY (to PDF file)**(upper div)….4…..4…..0**"** **Should instead read:** "AREA F TECHNOLOGY **(not upper div)….3…..3…..0"**
GEOL 102	406	Title should be "Introduction to Geology". Also: "Not open for credit to students who have completed GEOL 201 or the equivalent."
GRC 377	408	Prerequisite: Completion of GE Area B. (See also Summer 2002, above.)

Industrial Engineering, MS	---	New program, approved after 2001-03 Catalog printed
Psychology, BS	261	PSY 340, a Major Course, provides GE B5 credit; this should be reflected in Area B in the General Education units. BIO 302, a Support Course, does not provide GE B2 credit. Total GE units: 60 (12 units in Major/Support). Total free electives: 18.
Social Sciences, BS	266	EDUC 300 in Teaching Concentration, is a 3-unit course, not 4-unit.
SPAN 123	469	USCP credit approved, effective Fall 2001.--
Speech Communication, BA	268	Under Major Courses, add the following paragraph to "Speech Communication electives….16": "Only 4 units of supervised instruction, including SCOM 400, SCOM 450 and SCOM 485 may be counted here."

EXPERIMENTAL COURSES -- 2001-03

Updated 10/31/03

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 X202 Basic Flight Training (5)

Basic flight instruction on the ground and in the airplane. Preflight, taxi, takeoff, climbs, turns, straight and level flight, landings, stalls, radios, navigation, cross-country navigation, and emergency procedures. All flights in the daytime (VFR) with a FAA certified flight instructor employed by the Aerospace Engineering Department. No solo flying allowed for students. 2 lectures, 3 laboratories. Prerequisite: AERO 102, proof of passing the FAA Knowledge Test, or consent of instructor.

AERO X300 Aerospace Engineering Analysis (5)

Analytical methods for aerospace engineering problems. Topics include vector calculus, linear algebra, differential equations, Laplace transforms and Fourier series. Computer programming and numerical methods as applied to problems in aerodynamics, structures, stability and control and astronautics. 5 lectures. Prerequisite: PHYS 133, MATH 242, AERO 215, ME 211. Co-requisite: STAT 312, ME 212, CE 205.

AERO X320 Fundamentals of Guidance and Control (4)

Introduction to state-space and transfer function models for aircraft, spacecraft, missiles, and helicopters. Elementary classical and modern analysis techniques using computers. 4 lectures. Prerequisite: AERO 215. Concurrent: AERO 315.

AERO X331 Aerospace Structural Analysis I (5)

Deflection analysis. Principles of fictitious displacement, virtual work, and unit load method. Energy methods: dummy load method; Castigliano's theorem; Maxwell-Betti reciprocal theorem; minimum principles; Rayleigh-Ritz's method; and Galerkin's method. Finite element analysis. Structural instability. Stress analysis of aircraft and spacecraft components. Structural constraint. Elementary aeroelasticity. 5 lectures. Prerequisite: AERO 300.

AERO X431 Aerospace Structural Analysis II (3)

Basic concepts and governing equations with applications to typical aerospace structures. Concepts studied

include: analysis of aircraft and aerospace structures; airworthiness and airframe loads; stress analysis of aircraft components; structural constraints; elementary aeroelasticity; introduction to modern fatigue and fracture mechanics analysis; and introduction to composite structures analysis. 3 lectures. Prerequisite: AERO X331.

AERO X432 Advanced Composite Structures Analysis (4)

Review of isotropic material behavior. Behavior of unidirectional fiber composites. Properties of short-fiber composites and isotropic lamina. Analysis of laminated composites. Residual stresses and strains of composites. Strength and hygrothermal behavior of composite materials. Optimization design of pressure vessels. Bending, buckling, and vibration of laminated plates. Notched strength. Fatigue behavior and fracture mechanics of composite structure. 3 lectures, 1 laboratory. Prerequisite: AERO 331.

AERO X433 Experimental Stress Analysis (1)

Employing the knowledge of stress analysis and aerospace structural analysis in an individual and group design project dealing with aerospace structures. 1 laboratory. Prerequisite: AERO X331, AERO X431.

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.

AG X315 Organic Agriculture (4) GE Area F

Origins, application, regulation, and technology of organic agriculture. Theoretical and practical issues surrounding organic agriculture from a cross-disciplinary perspective. Topics include: the history of the organic movement, current regulation and certification, and field management practices and technologies. Features industry guest lecturers. Not open to CRSC, FRSC, or SS majors to fulfill Area F requirement. 3 lectures, 1 activity. Prerequisite: Junior standing and completion of GE Area B.

AG X581 Graduate Seminar (1-3)

Advanced topics in agriculture and natural resources. Group study of current research and industry trends. Invited speakers will cover a variety of topics. Total credit limited to 9 units. 1-3 seminars. Prerequisite: Graduate standing or consent of instructor.

AGB X442 Agricultural Policy Resolution (4)

Building consensus within California agriculture to increase California's impact on future national farm policy. 4 lectures. Prerequisite: Junior standing.

AGB X444 Wine Marketing Analysis (4)

Study of legal aspects of wine marketing with emphasis on Federal (BATF) requirements. Application of statistical theory to the collection, interpretation, and forecasting of wine and grape industry data; emphasis on production and sales. Introduction to standard accounting ratios. 3 lectures, 1 activity. Prerequisite: Senior standing and statistics major.

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 lectures. Prerequisite: Junior standing.

AGC X424 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: Junior standing or consent of instructor.

ANT X309 Elements of Archaeology (4)

Introduction to archaeological method and theory covering the history and development of archaeological thought, approaches to data recovery, dating and analysis of artifacts and ecofacts, and construction of models of prehistoric human behavior through application of archaeological theories. 4 lectures. Prerequisite: ANT 201 or ANT 202.

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 rehabilitation strategies for buildings. 3 laboratories. Prerequisite: ARCE 303, ARCE 304, ARCE 305, ARCE 412, and ARCE 444.

ARCH X340 Architectural Photography (3)

Advanced techniques of photography related to architecture and environmental design fields. Emphasis on subject analysis, composition and presentation. Large and small film formats, studio and on-site lighting and color correction. Assignments to include architecture, landscape, construction in the field, and models and drawings in the studio. 1 lecture, 2 activities. Prerequisite: ARCH 337 or consent of instructor.

ARCH X450 Digital Design and Visualization (5)

Theory, principles and techniques of computer aided architectural or product design, visualization, and digital animation. Utilization of desk top computers and 2-D and 3-D software as integrated tools for development of a comprehensive computer enhanced design process. 5 laboratories. Prerequisite: For architecture majors, all prerequisites required by the year and course level for which the student is seeking credit; for non-architecture majors, junior standing or permission of instructor; for local professionals not seeking academic credit, permission of instructor.

ART X488 Advanced Web Design (4)

Development of theoretical skills necessary to design a successful web user interface; information architecture and visual identity for digital environments; and the development of the technical skills necessary to design advanced interactivity. 2 lectures, 2 laboratories. Prerequisite: ART 484, ART 487, and senior standing. Art and Design majors only.

ASCI X212 Livestock Show Management (3)

Application of the management and operations of Cal Poly's Western Bonanza Livestock Show. Principles and procedures in planning, organizing, financing, promoting and managing a major livestock show and the fair industry. Total credit limited to 6 units. 1 lecture, 2 activities.

ASCI X265 Equine Halter Training (3)

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 X311 Advanced Beef Cattle System Management (4)

Management principles for the sustainability of commercial beef cattle operations. Systems approach for goal setting, financial analysis, range management, breeding systems, nutrition, health programs, marketing, and production practices to enhance profitability of commercial cow/calf operations. 3 lectures, 1 laboratory. Prerequisite: ASCI 141 or consent of instructor.

ASCI X344 Equine and Human Communication (3)

Behavior of the horse and its relationship with people. Learning, motivation, social behavior and communication with techniques to improve the safety and understanding between people and horses. 3 activities. Prerequisite: ASCI 144 and ASCI 214 or consent of instructor.

ASCI X345 Equine Behavior Modification (5)

Advanced principles of equine behavior modification for training young horses under saddle. Identifying differences in individual horses's attitudes, techniques to teach horses to respond to different stimuli, management of young equine athlete. 5 activities. Prerequisite: ASCI 344 or consent of instructor.

ASCI X406 Applied Animal Embryology (5)

Advanced techniques in embryo manipulation including embryo development, transfer, in vitro fertilization, cryopreservation, embryo biopsy and splitting. Discussions of current advances and ethical consideration in cloning and transgenic animal production. 3 lectures, 2 laboratories. Prerequisite: VS 223; ASCI 401 or DSCI 330 recommended.

ASCI X415 Developing HACCP Plans for Meat and Poultry Operations (3)

Using Hazard Analysis and Critical Control Point (HACCP) principles to develop regulatory inspection plans for meat and poultry processes; development and use of prerequisite programs; microbiological and process overviews. 3 lectures. Prerequisite: ASCI/FSN 211 or ASCI/FSN 209; ASCI/FSN 384 or PM 250, or 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.

ASTR X102 Introduction to the Stars and Galaxies (4) GE B3 & B4

Descriptive astronomical properties of the sun, stars, galaxies and interstellar material. Exploration of cosmological models of an expanding universe. Laboratory exercises 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 laboratory. Prerequisite: Appropriate score on the ELM examination for MATH 116 eligibility, or an ELM exemption, or MATH 104.

BIO X105 General Biology Laboratory (1)

Observations and experiences involving basic principles in the biological sciences. Emphasis on the diversity of living systems. Cell structure and function. Genetics and ecological relationships. 1 laboratory. Prerequisite: Previous enrollment in BIO 101.

BIO X300 Biology of Cancer (4) GE B5

Introduction to the causes, characteristics and treatment of human cancer. Topics include effects of carcinogens and radiation; the genetics of cancer; molecular, cellular and physiological changes; common cancers such as lung, skin, and leukemia; conventional chemotherapy and new treatments. Not for major credit in biological sciences, microbiology or biochemistry. 2 lectures, 2 seminars. Prerequisite: Completion of a college-level course in biology and junior standing.

BIO X307 World Aquaculture: Applications, Methodologies and Trends (4) GE Area F

Life histories and habitats of important species of fishes, invertebrates. Methodologies for the commercial propagation of specific forms. Global and regional coverage, including socioeconomic trends, controversies and applications in developed and less developed regions of the world. Not open for GE credit for majors in the Biological Sciences Department. 3 lectures, 1 activity. Prerequisite: One course in biology (BIO, ZOO, BOT or MCRO prefix), completion of GE Area B, and junior standing.

BIO X347 Bioinformatics I (4)

Introduction to molecular biology databases and computer applications in data mining. Use of computer software for nucleic acid, genome and protein sequence analysis; genetic database tools; industrial applications of bioinformatics; ethical and societal impact of genetic manipulation. 3 lectures, 1 laboratory. Prerequisite: Completion of a course in biology, preferably BIO 111 or BIO 151, or consent of instructor.

BIO X391 Spring Field Quarter I – Field Ecology (4)

Field studies of terrestrial and aquatic ecosystems of California. Investigation of habitat diversity, environmental factors, composition and functional biology, and seasonal progression of animal and plant communities. Several extended field trips. 2 lectures, 2 laboratories. Prerequisite: Completion of introductory biology series (BIO 151, BIO 152, BIO 153) BIO 325; corequisite: BIO X392, BIO X393, BIO 400 (2 units). Spring quarter only.

BIO X392 Spring Field Quarter II – Field Botany (4)

Terrestrial and aquatic plant communities of California. Field identification of native and introduced plants in

nature. Factors affecting plant distribution and relationships. Several extended field trips. 2 lectures, 2 laboratories. Prerequisite: Completion of introductory biology series (BIO 151, BIO 152, BIO 153), BIO 325, BIO 343; corequisite: BIO 391, BIO 393, BIO 400 (2 units); recommended: BOT 313. Students completing BIO X392 will not be able to receive degree credit for BOT 333 as well. Spring quarter only.

BIO X393 Spring Field Quarter III – Field Zoology (4)

Terrestrial and aquatic animal communities of California. Natural history, population and community ecology, and identification of vertebrates and invertebrates. Determinants of animal distribution. Major mechanisms determining diversity. Several extended field trips. 2 lectures, 2 laboratories. Prerequisite: Completion of introductory biology series (BIO 151, BIO 152, BIO 153), BIO 325, BIO 343; corequisite: BIO X391, BIO X392, BIO 400 (2 units). Spring quarter only.

BIO X420 Spatial Information in Ecology (4)

Concepts and applications of global positioning devices, Geographical Information Systems (GIS) and image analysis in addressing spatial questions within the fields of wildlife management, ecology and field botany. Emphasis on actual case studies. 4 lectures. Prerequisite: BIO 325 or equivalent.

BIO X451 Topics in Human Genetics: The Genome Project (2)

The changes in scientific questions brought about by having the full DNA sequence of humans made available. Address of some of the ethical, legal, and social questions raised by the Genome Project. 2 lectures. Prerequisite: A course in genetics.

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 X415 Hydrology (4)

Collection, organization and use of precipitation and runoff data, flood frequency, stream gauging and use of hydrograph, principles of groundwater and flood routing, sizing and economics of soil and water conservation structures. 3 lectures, 1 laboratory. Prerequisite: Junior standing, MATH 141, and SS 121 or consent of instructor.

BRAE X439 Vineyard Water Management (4)

Management of rain and irrigation water in vineyards. Irrigation scheduling, managing water stress, climate control with irrigation, and irrigation methods commonly used. Covers management for wine, table grapes, and raisins. 3 lectures, 1 laboratory. Prerequisite: BRAE 340 or BRAE 236.

BRAE X447 Advanced Surveying with GIS Applications (4)

Integration of collecting and processing field data; generating graphical representation of the data; design based on the data and laying out the design in the field; and available record resources for use in GIS systems and their accuracy. 2 lectures, 2 laboratories. Prerequisite: BRAE 239.

BRAE X532 Water Wells and Pumps (4)

Water well drilling, design, and development. Pump characteristics and system head. Series and parallel operation. Design of pump intakes. Variable speed electric drives and engines. Pump testing. 3 lectures, 1 laboratory. Prerequisite: BRAE 340 or equivalent, or BRAE 312 or equivalent.

BUS X301 Introduction to Technopreneurship (4)

Familiarization with terms, concepts, and issues associated with conceptualizing, forming, and growing technology-based and technology-enhanced businesses. Identification and analysis of, and effective response to, technopreneurial opportunities. 4 seminars. Prerequisite: Junior standing.

BUS X385 Work/Life Balance (4)

Introduction to work/life balance issues and their successful resolutions. Laws, policies, practices and programs that contribute to the company's overall strategic business plan. Key goals of staying competitive and maintaining a diverse workforce through recruitment, retraining, and retention. 4 lectures. Prerequisite: BUS 387 or equivalent.

BUS X393 Database Systems in Business (4)

Data base systems, data analysis and modeling for business applications. Relational, post-relational and object-oriented. Entity-relationship diagrams and CASE tools. Information systems architecture, object modeling, Web-based database systems and a database project. 4 lectures. Prerequisite: BUS 391, CSC 101, CSC 102, CSC 103, or BUS 390, and junior standing.

BUS X394 Systems Analysis and Design (4)

Systems analysis and design. Project team creation and performance monitoring. Systems development life

cycle and project management, process modeling using data flow diagrams, data modeling with E/R diagrams, CASE tools, object modeling with UML, and prototype development. 4 lectures. Prerequisite or corequisite: BUS X393 and junior standing.

BUS X395 Systems Design and Implementation (4)

Continuation of BUS X394. Project management, software testing, documentation, help facility creation, implementation, and maintenance. A fully operational application developed as part of the course. 4 lectures. Prerequisite: BUS X393, BUS X394.

BUS X396 Network Components I (4)

Open Systems Interconnect (OSI) Model. Electronics and media related to network connectivity. Local Area Networks (LANs) and network design and documentation considerations. 4 lectures. Prerequisite: BUS 391; corequisite: BUS 390 or consent of instructor.

BUS X397 Network Components II (4)

In-depth direction for the Network IOS command-line interface. Router components and configuration, IP addressing, routing and routed protocols. 4 lectures. Prerequisite: BUS 396.

BUS X398 Network Components III (4)

Design and network management for both LANs and WANs. Advanced routing protocols and security issues (access lists). WAN encapsulation methods (PPP, ISDN, and Frame Relay). 4 lectures. Prerequisite: BUS 397.

BUS X408 Technopreneurial Growth Strategies (4)

Strategic and organizational concepts and issues associated with growing technology-based and technology-enhanced businesses. Strategic identification and analysis of, and effective response to, technopreneurial growth opportunities in domestic and international markets. 4 seminars. Prerequisite: Senior standing.

BUS X420 Advanced Financial Reporting I (4)

Comprehensive coverage of selected advanced financial accounting and reporting topics, including revenue recognition, software development costs, employee stock option plans, pensions and post retirement benefit plans, accounting for income taxes, leases, specialized inventory issues and advanced consolidation issues. 4 lectures. Prerequisite: BUS 322.

BUS X421 Accounting Process Analysis (4)

Comprehensive coverage of accounting processes. Computerized accounting processes, internal controls, process mapping and audit considerations. Auditor risk analysis of control weaknesses within ERP accounting processes. 3 lectures, 1 activity. Prerequisite: BUS 321 with a minimum grade of C–.

BUS X432 Insurance Planning and Risk Management (4)

Introduction to insurance planning and risk management and its role in financial planning. Key concepts include determining risk exposure and selecting insurance products. Legal aspects of property and liability policy, life, health, and social insurance. 4 lectures. Prerequisite: BUS 342.

BUS X436 Entrepreneurial Finance (4)

Process of financing new and fast-growing firms. Readings on venture capital process, from seed capital through initial public offering. Valuation of firms seeking venture capital, and those planning initial public offering. Valuing convertible securities. Real options valuation. 4 lectures. Prerequisite: BUS 342, BUS 431.

BUS X437 Retirement and Estate Planning (4)

Retirement planning and employee benefits, Social Security and Medicare, types of retirement plans, qualified plan characteristics, distribution options, and group insurance benefits. Trusts, power of attorney, and probate. 4 lectures. Prerequisite: BUS 342.

BUS 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 X458 Global Electronic Marketing (4)

Electronic commerce (e-commerce) and the traditional marketing process. Topics include marketing planning stages for online activities, tools of electronic marketing resources, integrating the promotional mix, capturing customer profiles and establishing the “virtual store.” 4 lectures. Prerequisite: BUS 346, BUS 391, senior standing.

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 typical of those which graduates could encounter in their fields of employment. Formal report required. 4 seminars. Prerequisite: Senior standing.

BUS X495 Unix Fundamentals (4)

System administration, including the essential tasks of stand-alone installation, file system management, backup procedures, process control, user administration, and device management. Maintaining Sun systems, configuring and troubleshooting the NFS, and configuring the Network Information System (NIS) environment. 4 lectures. Prerequisite: BUS 493 and consent of instructor.

BUS X496 E-Commerce: Development and Business Structure (4)

Electronic commerce. Importance of the internet. Issues of handling of money, security, and electronic marketplace. Virtual factory and strategies for electronic commerce. Software products used to develop e-commerce applications. 3 lectures, 1 activity. Prerequisite: BUS 391.

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 X458 FRP Design (4)

Properties and mechanical characteristics of fiber reinforced polymer (FRP) composite materials; their application in civil engineering structures as primary or secondary reinforcement (FRP rebars); and design techniques based on newly developed ACI 440 design guidelines and worldwide experience on FRP design. 3 lectures, 1 laboratory. Prerequisite: CE 351 and CE 355.

CE X459 FRP Strengthening of Reinforced Concrete Structures (4)

Flexural and shear strengthening reinforced and prestressed concrete members using fiber reinforced polymer composite plates and laminates; seismic repair and rehabilitation of columns, slabs, beams and structures. Design philosophy and design methodology, based on current understanding of FRP-strengthening techniques. 3 lectures, 1 laboratory. Prerequisite: CE 351 and CE 355.

CE X468, X469 Community Engineering Projects I, II (2) (2)

Student teams working in cooperation with a local community organization to complete an integrated civil design project. Projects representative of those encountered in professional practice. Focus on management as well as design issues. Volunteer service required. 2 laboratories each course. Prerequisite: Senior standing and consent of instructor.

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 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 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.

CHEM X544 Polymer Physical Chemistry and Analysis (3)

Physical properties of polymers and coatings and their measurement; molecular weight averages, glass transition, thermodynamics of polymers, viscoelastic properties, theology; molecular weight determination, thermal analysis, spectroscopic analysis, mechanical testing, atomic force microscopy. Not open to students with credit in CHEM 444. 3 lectures. Prerequisite: CHEM 351. Corequisite: CHEM 547. Required: MS Polymers and Coatings Science.

CHEM X545 Polymer Synthesis and Mechanisms (3)

Polymerization methods and mechanisms; chemistry of initiators, catalysts and inhibitors; use of representative types; synthesis, film formation, structure and properties of polymers commonly used in coatings and adhesives. Polymer nomenclature. 3 lectures. Not open to students with credit in CHEM 445. Prerequisite: CHEM 317 or equivalent. Corequisite: CHEM X548.

CHEM X547 Polymer Characterization and Analysis Laboratory (2)

Polymer characterization and analysis. Molecular weight analysis using viscometry, light scattering, and gel permeation chromatography. Thermal analysis using differential scanning calorimetry, thermal mechanical analysis and dynamic mechanical analysis. Polymer rheology. Infrared, Raman and FT-NMR spectroscopy. Atomic force microscopy. Fabrication and testing of conducting polymeric materials. Not open to students with credit in CHEM 447. 2 laboratories. Corequisite: CHEM X544. Required: MS Polymers and Coatings Science.

CHEM X548 Polymer Synthesis Laboratory (2)

Polymer synthesis using solution, suspension, bulk, emulsion techniques. Synthesis of chain growth polymers using free radical, anionic, cationic, and other catalysts. Synthesis of step-growth polymers. Kinetics of polymer reactions. Synthesis of resins used in modern coatings. Not open to students with credit in CHEM 448. 2 laboratories. Prerequisite: CHEM 317. Corequisite: CHEM X545.

CHEM X550 Formulation of Modern Coatings (3)

Formulation of modern coatings. Raw materials including resins, solvents, pigments, and additives. Formulation principles for solvent-borne and high solids coatings, water-borne coatings, powder coatings, radiation cure coatings and architectural coatings. Regulatory issues; VOC's. Coating properties, film formation, film defects, application methods, color and color acceptance. 3 lectures. Prerequisite: CHEM 444 or CHEM 544. Corequisite: CHEM X551.

CHEM X551 Laboratory Formulation of Modern Coatings (2)

Laboratory formulation of modern coatings. Formation of pigment dispersions. Formulation of solvent-borne and high solids coatings, water-borne coatings, powder coatings, radiation cure coatings and architectural coatings. VOC measurements. Measurement of coating properties, film formation, film defects, application methods, color and color acceptance, hiding, gloss. Accelerated weathering. 2 laboratories. Corequisite: CHEM X550.

CPE X104 Introduction to Computer Science I (4)
(Also listed as CSC X104)

Introduction to principles and problem solving methods of computer science. Application of mathematics and logic to solving computing problems; principles of abstraction, decomposition, and encapsulation; algorithms for computing; fundamentals of data representation and computing machine operations; introduction to object-oriented programming principles. 3 lectures, 1 laboratory. Prerequisite: Consent of instructor. Corequisite: CSC 141.

CPE X105 Introduction to Object Oriented Programming (4)
(Also listed as CSC X105)

Introduction to object oriented software implementation using a modern OO language: classes, objects, methods, data types, variables, expressions, input, output, control structures, exceptions, inheritance, basic data structures, searching, sorting, coding, testing, documentation. 3 lectures, 1 laboratory. Prerequisite: CPE X104 with a C- grade or better.

CPE X107 Review of Computer Science Fundamentals (2)
(Also listed as CSC X107)

Review of material from CSC 102 using CSC department core programming language. Intended for students with existing background in ACM CS 2 material needing review and an opportunity to adapt to the CSC core language. Not allowed for CSC technical elective credit. 1 lecture, 1 laboratory. Prerequisite: Consent of instructor.

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 X456 Computer Systems and Network Security (3) (Also listed as CSC 456)

Survey of topics in computer system and network security, including protection, access control, distributed access control, operating system security, applied cryptography, network security, firewalls, secure coding practices, and case studies from real-world systems. 3 lectures. Prerequisite: CPE/CSC 453 or consent of instructor.

CPE X457 Computer Systems and Network Security Laboratory (1) (Also listed as CSC 457)

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.

CPE X461 Senior Project (3)

Selection and completion of an individual or team project in laboratory environment under faculty supervision. Project results presented in formal report. Miscellaneous course fee may be required–see *Class Schedule*. 3 laboratories. Prerequisite: CPE 315, CPE 319, CPE 359.

CPE X462 Senior Project (2)

Selection and completion of an individual project or team project in laboratory environment under faculty supervision. Project results presented in formal report. Miscellaneous course fee may be required–see *Class Schedule*. 2 laboratories. Prerequisite: CPE 461 or CPE X461.

CPE X469 Distributed Computing II (4)

Sequel to CSC 369. Topics in distributed computing, with emphasis on object-based and component-based software development and fault-tolerance in distributed computing. 3 lectures, 1 laboratory. Prerequisite: CSC 369.

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

Introduction to horticulture and crop science. 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 X104 Introduction to Computer Science I (4)
(Also listed as CPE X104)

Introduction to principles and problem solving methods of computer science. Application of mathematics and logic to solving computing problems; principles of abstraction, decomposition, and encapsulation; algorithms for computing; fundamentals of data representation and computing machine operations; introduction to object-oriented programming principles. 3 lectures, 1 laboratory. Prerequisite: Consent of instructor. Corequisite: CSC 141.

CSC X105 Introduction to Object Oriented Programming (4)
(Also listed as CPE X105)

Introduction to object oriented software implementation using a modern OO language: classes, objects, methods, data types, variables, expressions, input, output, control structures, exceptions, inheritance, basic data structures, searching, sorting, coding, testing, documentation. 3 lectures, 1 laboratory. Prerequisite: CSC X104 with a C- grade or better.

CSC X107 Review of Computer Science Fundamentals (2)
(Also listed as CPE X107)

Review of material from CSC 102 using CSC department core programming language. Intended for students with existing background in ACM CS 2 material needing review and an opportunity to adapt to the CSC core language. Not allowed for CSC technical elective credit. 1 lecture, 1 laboratory. Prerequisite: Consent of instructor.

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 X456 Computer Systems and Network Security (3) (Also listed as CPE 456)

Survey of topics in computer system and network security, including protection, access control, distributed access control, operating system security, applied cryptography, network security, firewalls, secure coding practices, and case studies from real-world systems. 3 lectures. Prerequisite: CPE/CSC 453 or consent of instructor.

CSC X457 Computer Systems and Network Security Laboratory (1) (Also listed as CPE 457)

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 X469 Distributed Computing II (4) (Also listed as CPE 469)

Sequel to CSC 369. Topics in distributed computing, with emphasis on object-based and component-based software development and fault-tolerance in distributed computing. 3 lectures, 1 laboratory. Prerequisite: CSC 369.

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 X564 Computer Networks Seminar (4)

Exploration of advanced topics in computer networks and multimedia systems. Students will give oral presentations on current networking literature. Lab will be a case study on implementing a network solution at a large corporation. 3 seminars, 1 laboratory. Prerequisite: CPE/CSC 464.

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 X300 Dairy Cattle Sale Management (3)

Selection of dairy cattle for consignment sale, advertising, cattle preparation, and marketing at a consignment sale. Includes financial management, health of cattle, sale catalog design, and cattle merchandising. Total credit limited to 8 units. 1 seminar and supervised work. Prerequisite: Junior standing or consent of instructor; DSCI 121 or DSCI 230, DSCI 241.

ECON X340 Advanced Econometrics (4)

Advanced topics in undergraduate econometrics. Single equation estimation topics including: distributed lag models, causality, cointegration and error correction models and nonlinear estimation. Forecasting with a single equation model. Simultaneous equation estimation, including instrumental variables, two stage least squares and seemingly unrelated regression. 3 lectures, 1 activity. Prerequisite: ECON 339.

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 X310 Effective Teaching and Classroom Management with a Multicultural Perspective in K-3 and 4-8 Settings (4)

Knowledge, theory, fieldwork, and research related to effectively managing, planning, and teaching in K-3 and 4-8 classrooms; connections between preventing discipline problems and choices about curriculum, instruction, and management, creating a positive learning environment for all students. 2 seminars, 2 activities. Prerequisite: LS 230.

EDUC X427 Theories, Methods and Assessment for First and Second Language Acquisition in Secondary Schools (3)

Theories, methods, materials and assessment involved in the instruction of English language learners. Bilingual, transitional, and English-only programs compared across a historical framework. An integrated language arts approach emphasized, including application of reading programs based on theories of language acquisition. 2 seminars and 1 activity. Prerequisite: Admission to single subject teaching credential program, junior standing in agricultural education major, or consent of instructor.

EDUC X441 Education Specialist Level II Induction Seminar (2)

Orientation class to develop a two (minimum) to five (maximum) year plan that will result in a Professional Clear Educational Specialist Credential. The plan will contain elements that: a) extend the learning of the Level I credential, b) foster critical reflection, c) include involvement of employer (i.e. school district) representatives, & d) include both university and non-university academic work. 1 seminar, 1 activity. Prerequisite: Admission to the (Level II) Professional Educational Specialist Program.

EDUC X443 Assessment of Level II Education Specialist Candidate (2) (CR/NC)

Use of authentic fair assessment process to verify that the candidate has met the Level II Performance standards and other expectations. Candidate assistance in preparation for culminating assessments. Credit/No Credit grading only. 1 seminar, 1 activity. Prerequisites: Admission into the Professional Level II Credential Program; EDUC 441; completion of all Level II coursework and related activities.

EDUC X460 Curriculum and Instruction for Democratic Secondary Schools (3)

Introduction to traditional academic, student-centered, and democratic approaches to curriculum design and methods of teaching. Preparation for 1-week intensive teaching experience in 6-12 grade classrooms. 2 seminars, 1 activity. Prerequisite: Admission to post-baccalaureate Single Subject Credential Program or consent of instructor. Corequisite: EDUC 461.

EDUC X462 Organization and Management of Instructional Environments for Diverse Learners in the Secondary School (3)

Principles, methods and practices of organizing and managing secondary classrooms, including multiple models of classroom discipline and the management of cooperative learning. Issues of law as they relate to teacher’s responsibilities in the classroom. Preparation for a one-week intensive teaching experience in 6-12 classrooms. 2 seminars, 1 activity. Prerequisite: EDUC 300 or equivalent and junior standing or consent of instructor. Corequisite: EDUC X463 (AGED students take only EDUC X462).

EDUC X463 Field Experience for Organization and Management of Instructional Environments (1)

(CR/NC)

Required field experience for EDUC X462, development of management strategies for 6-12 classroom, including the management of cooperative groups. Preparation for one-week intensive teaching experience. Credit/No Credit grading only. 1 activity. Prerequisite: EDUC 300 or equivalent and junior standing or consent of instructor. Corequisite: EDUC X462 (AGED students take only EDUC X463).

EDUC X465 Field Experience for Literacy in the Content Area (1) (CR/NC)

Required field experience for EDUC X464. Demonstration of small group literacy assessment and instruction in 6-12 classrooms. Preparation for one-week intensive teaching experience in 6-12 classroom. Credit/No Credit grading only. 1 activity. Prerequisite: EDUC 300 or equivalent. Corequisite: EDUC X464.

EDUC X467 Field Experience for Learners, Learning and Assessment in Secondary Schools (1) (CR/NC)

Field experience for EDUC 466. Creating and using forms of assessment in 6-12 classrooms. Analyzing student learning through observations. Credit/No Credit grading only. 1 activity. Prerequisite: EDUC 460 through EDUC 465. Corequisite: EDUC 466, EDUC 468 and EDUC 469 (AGED students not required to take EDUC 466).

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 and procedures created 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 activity and supervised work. Prerequisite: EDUC 480 or test equivalent.

EDUC X543 Advanced Studies in Assessment, Behavioral Support, Curriculum for Transition in

Special Education (4)

Advanced knowledge and skills in ability to conduct instructional, behavioral and socio-vocational assessments and to analyze data to determine whether and how to modify academic instruction, social skills training, and/or career/vocational preparation. 3 seminars, 1 activity. Prerequisite: Acceptance into the Level II Educational Specialist Credential Program; EDUC 441.

EDUC X544 Advanced Collaboration, Consultation, and Instructional Techniques for Teachers of Pupils with Mild/Moderate Disabilities (4)

Advanced studies and skills in assessment, curriculum and instructional techniques for teachers of pupils with mild/moderate disabilities. Emphasis on the collaborative and consultative role of the special educator. 3 seminars, 1 activity. Prerequisite: Admission into the Level II Education Specialist Credential Program; EDUC 441.

EDUC X548 Advanced Collaboration, Consultation, and Instructional Techniques for Teachers of Pupils with Moderate/Severe Disabilities (4)

Advanced studies in assessment, curriculum and instructional techniques for teachers of pupils with moderate/severe disabilities. Emphasis on the collaborative, consultative, and management roles of the special educator. 3 seminars, 1 activity. Prerequisite: Admission into the Level II Education Specialist Credential Program; EDUC 441.

EDUC X593 Central Coast Science Project: Energy and the Environment (6) (CR/NC)

K-12 science inservice workshop. Content, activities and resources shared connecting to the theme “energy and the environment.” Investigation, experimentation and use of inquiry in science education emphasized. Strategies presented for integrating technology into science curriculum. Field trips to Duke Power Plant and Guadalupe Dunes. Credit/No Credit grading only. 6 seminars. Prerequisite: Teacher credential and participant in CCSP.

EDUC X594 Central Coast Science Project: Leadership Project (1) (CR/NC)

Independent study to follow EDUC X593. Project developed which applies skills and knowledge acquired in EDUC X593 for assuming leadership roles in science education in participants’ schools and districts. Credit/No Credit grading only. Total credit limited to 5 units; repeatable in the same quarter. Prerequisite: Teacher credential and participant in CCSP.

EDUC X595 CCSP CPDI/ELL Program: Growing in Language and Science Using the School Garden (4) (CR/NC)

K-12 science inservice workshop. Content, activities and resources shared on using a school garden to teach science and language development. Strategies presented for integrating standards, literacy and technology, the new framework, school-adopted instructional materials and local resources into the curriculum. Field trips to school garden in Paso Robles. Credit/No Credit grading only. 4 seminars. Prerequisite: Teacher credential and participant in CCSP.

EDUC X596 CCSP CPDI/ELL Program: Garden Project (2) (CR/NC)

Independent study to follow EDUC X595. Project developed which applies skills and knowledge acquired in EDUC X595 for implementing garden-based lessons in participants' schools and districts. Credit/No Credit grading only. Total credit limited to 8 units; repeatable in the same quarter. Prerequisite: Teacher credential and participant in CCSP.

EDUC X597 Central Coast Science Project: Junior High School Science Institutes (1) (CR/NC)

Intensive inservice workshops for 6-9th grade science teachers. Content and hands-on activities presented, concentrating on California Science Standards. Required assignment of draft lesson plan applying acquired content. Credit/No Credit grading only. Total credit limited to 4 units. Prerequisite: Teacher credential and participant in CCSP.

EE X220 Signals and Systems I (4)

Introduction to mathematical modeling techniques used in the design of electronic systems. Applications include communication systems; audio, video, and image processing systems; communication networks, and robotics and control systems. Modeling techniques include linear-time-invariant systems, elementary nonlinear systems, discrete-event systems, infinite state space models and finite automata. Analysis techniques introduced include frequency domain, Z transform domains and automata theory. A Matlab-based laboratory is included. 3 lectures, 1 laboratory. Prerequisite: MATH 143, CSC 101, PHYS 132, CPE/EE 219/259, or consent of instructor.

EE X221 Integrated Circuits and Electronics I (4)

Completion of signals and systems, including recursive filters and spectrum analysis. Resistive circuits, voltage and current sources, network theorems, Op-amp circuits. First and second order circuit models and analysis. Internal operations, terminal characteristics, and models of diodes and transistors (bipolar and field-effect). Use of electrical and electronic test equipment. Experimental verification of circuit analysis concepts. 3 lectures, 1 laboratory. Prerequisite: EE X220; corequisite: MATH 242, PHYS 133.

EE X222 Integrated Circuits and Electronics II (4)

Continuation of EE X221. Sinusoidal steady state analysis and modeling; power. Introduction to solid state

electronic devices, analysis, and modeling. 3 lectures, 1 laboratory. Prerequisite: EE X221, PHYS 211.

EE X440 RF Wireless Communications (3)

Antennas, propagation, transceiver and key component designs. Design and analysis of the RF stages of modern wireless communication systems. 3 lectures. Prerequisite: EE 313, EE 414, 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 353. Concurrent: EE X440.

EE X463 Senior Project Design Laboratory (3)

Selection and completion of a project exemplifying problems that graduates must solve in their fields of employment. Project results are presented in a formal report. 3 laboratories. Prerequisite: EE 309/EE 349, EE 319/EE 359, EE 325/EE 365, EE 334, EE 460.

EE X464 Senior Project Design Laboratory (2)

Selection and completion of a project exemplifying problems that graduates must solve in their fields of employment. Project results are presented in a formal report. 2 laboratories. Prerequisite: EE X463.

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

Introduction to horticulture and crop science. 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.

EHS X382 Habitat Restoration (4)

Investigation of habitat restoration and role of horticulture in successful implementation of restoration projects, including mitigation, revegetation, and erosion control. Practical application of restoration methods and guidelines for specific California plant communities including site-specific plant production. 3 lectures, 1 laboratory. Prerequisite: EHS 381.

ENGL X103 Writing Laboratory (1) (CR/NC)

Directed practice in writing in a laboratory environment. Required of students scoring between 146 and 150 on the English Placement Test. To be taken concurrently with ENGL 114. Credit/No Credit grading only. Not for baccalaureate credit. 1 laboratory.

ENGL X251 Great Books I Online (4) GE C1

Ancient epics and classical literature of Mesopotamia, Greece, and Rome. Representative readings include *Epic of Gilgamesh, Iliad, Odyssey*, various Greek dramas, *Symposium, Aeneid, Satryicon*, and the *Golden Ass*. 4 lectures. Prerequisite: Completion of GE Area A.

ENGL X260 Children's Literature (4)

Analysis and evaluation of traditional literature, fantasy, realistic fiction, historical fiction, informational books, picture books and poetry for children in multiple subject classrooms, grades K-6. Emphasis on multicultural texts. 4 lectures. Prerequisite: ENGL 134 and ENGL 145 or ENGL 148.

ENGL X360 Adolescent Literature (4)

Analysis and evaluation of young adult literature appropriate for classroom instruction in grades 6-12 with special attention to the relationship of young adult literature to popular culture and themes relevant to adolescents. Pedagogical approaches also explored. 4 lectures. Prerequisite: ENGL 134 and ENGL 145 or ENGL 148.

ENGL X424 Teaching English in Secondary School (5)

Methods of teaching English in secondary schools with emphasis on practical approaches to teaching grammar/mechanics and the writing process in a literature based classroom. Attention to lesson and unit planning and integration of technology in the English classroom. 5 lectures. Prerequisite: ENGL 145 or ENGL 148, admission to the teacher education program, or consent of instructor.

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.

ENGL X527 Seminar in Advanced Fiction (5)

Graduate instruction in writing, revising, and evaluation fiction. Total credit limited to 10 units. 5 seminars. Prerequisite: admission to the MFA or consent of instructor.

ENGL X528 Seminar in Advanced Poetry (5)

Graduate instruction in writing, revising, and evaluation poetry. Total credit limited to 10 units. 5 seminars. Prerequisite: admission to the MFA or consent of instructor.

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 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 X481 Senior Project Design Laboratory I (2)

Selection and completion of a project by individuals or team which is typical of problems which graduates musts solve in their fields of employment, or which is representative of those encountered in professional practice. Project involves but is not limited to, physical modeling and testing of integrated design projects, cost considerations and planning. Activities include: formulation of outline, literature review, and project schedule. 2 laboratories. Prerequisite: Consent of instructor.

ENGR X482 Senior Project Design Laboratory II (2)

Continuation of ENGR X481. Research methodology: problem statement, method, results, analysis, synthesis, project design, construction (when feasible), and evaluation/conclusions. Project results are presented in formal written reports suitable for reference library and formal oral reports. 2 laboratories. Prerequisite: ENGR X481.

ENVE X450 Industrial Pollution Prevention (4)

Theory and case studies of innovative industrial and hazardous waste treatment and waste minimization through principles of pollution prevention. 3 lectures, 1 laboratory. Prerequisite: ENVE 331.

ENVE 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 X472 Water Filtration Design (3)

Design and construction of a small-scale water filtration system. Theory of slow sand filtration, activated carbon adsorption and other processes governing water filtration. 2 lectures, 1 laboratory. Prerequisite: ENVE 331.

ENVE X534 Applied Environmental Chemistry (4)

Chemistry of natural and polluted waters. Topics include chemical, kinetic, and equilibrium principles, redox reactions, gas solution and solid solution equilibria, thermodynamics, carbonate systems, coordination chemistry, interfacial phenomena. 4 lectures. Prerequisite: Graduate standing or consent of instructor.

ENVE X537 Decentralized Wastewater Management (4)

Design and management of decentralized wastewater treatment systems. Description of wastewater characteristics, process analysis, and wastewater pretreatment. Design of treatment processes for septic tank effluent. Effluent disposal, septage management, and management of decentralized systems. 4 lectures. Prerequisite: ENVE 438.

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.

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 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 X434 Wood Properties and Products (4)

Principles of wood properties and efficient use of renewable wood resources including methods for using wood as an energy source. Weekend or full-day field trips required. 3 lectures, 1 laboratory. Prerequisite: FNR 201 and FNR 260 or consent of instructor.

FORL X250 Teaching Experience in Spanish (1) (CR/NC)
(Also listed as LS X250)

Interdisciplinary course focusing on lesson planning for K-8. Theory and practice of teaching methodology. Open only to Liberal Studies majors. Credit/No Credit grading only. Prerequisite: SPAN 103 competency.

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

Introduction to horticulture and crop science. 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.

FRSC X416 Growing Quality Winegrapes (3)

Understanding the most important factors involved in growing quality winegrapes. Includes site selection with homocline approach, soil mapping, choice of variety, clone and rootstock, spacing, the management of canopy, irrigation, nutrition, pests and diseases, fruit assessment, quality assurance. 3 lectures. Prerequisite: FRSC 231, FRSC 331, or consent of instructor.

GRC X331 Color Quality Control (3)

Color sciences and quality control techniques as they relate to the printing and allied industries. Application of theory to color reproduction, color control, print inspection, process control, and quality measurement. 3 lectures. Prerequisite: GRC 320.

GRC X335 Digital Design and Production for Multiple Media (3)

In-depth understanding of design and production as it relates to print and on-line digital media for commercial use. Advanced production techniques in image editing and multimedia applications. Preparation and evaluation of computer-generated images. 2 lectures, 1 laboratory. Prerequisite: GRC 338.

GRC X433 Emerging Digital Technologies (3)

Current developments, products, processes, technologies, objectives, obstacles and opportunities in the world of digital communication for the printing and publishing industry. 3 lectures. Prerequisite: GRC 201 or GRC 301, or consent of instructor.

GSB X530 The General Manager III (8)

Business, government, and society and international business. Case and simulation experiences integrating functional areas covered in GSB X510 and GSB X520. Third course in sequence of four comprising 44 of 48-unit core course in MBA program. 5 seminars, 3 activities. Prerequisite: GSB 520.

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.

HIST X300 Taiwan and China (4)

Examination of the complicated modern relationship between Taiwan and China, during the eras of Japanese colonialism in Taiwan (1895-1945), Chinese Nationalist (KMT) rule under the Chiangs (1945-1987), and democratization (1988-present). 4 seminars. Prerequisite: HIST 110, HIST 111, HIST 207; junior standing or consent of instructor.

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 X418 Chinese Film and History (4)

Examination of 20th century Chinese history through the use of Chinese feature films. Films (all with English subtitles) will serve as main text for understanding the tremendous changes in modern Chinese history, as well

as the evolving relationship between film and Chinese society. 4 lectures. Prerequisite: Junior standing or consent of 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 X101 Public Speaking (4) GE A2
(Also listed as SCOM 101 -- *formerly SPC 201*)

Introduction to the principles of public speaking. Practical experience in the development, presentation, and critical analysis of speeches to inform, to persuade, and to actuate. Not open to students with credit in SCOM 102. 4 lectures.

HNRS X112 Race, Culture and Politics in the United States (4) GE D1 USCP
(Also listed as ES 112)

Introductory and interdisciplinary study of the ways that race and ethnicity are created by both historical processes and American institutional formation – specifically social, political, economic, legal and cultural institutions. Special attention paid to the interlocking systems of race, class, gender and sexuality. 4 lectures.

HNRS X132 General Physics (4) GE B3 & B4
(Also listed as PHYS 132)

Oscillations, waves in elastic media, sound waves. Temperature, heat and the first law of thermodynamics. Kinetic theory of matter, second law of thermodynamics. Geometrical and physical optics. 3 lectures, 1 laboratory. Prerequisite: PHYS 131 or HNRS 131.

HNRS X201 Survey of Economics (4) GE D2
(Also listed as ECON 201)

Basic principles of microeconomics and macroeconomics. Emphasis on applications to current national and global economic issues. For majors requiring one quarter of economics. Not open to students having previous credit in ECON 222 or equivalent. 4 lectures.

HNRS X211 Materials Science and Engineering (3)

(Also listed as MATE X211)

MATE 210 for Honors 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 X215 Comparative World History (4) GE D3
(Also listed as HIST 215)

Interaction of selected traditional and modernizing non-Western cultures with Western industrial imperialism and its attendant economic, political, and cultural forces. Within this context, evaluation of both the nature of industrial imperialism and the way in which it influenced or interfered with the host culture. 4 lectures.

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 X303 Economics of Poverty, Discrimination and Immigration (4) GE D5 USCP
(Also listed as ECON 303)

Economic analysis of the cause, extent and impact of poverty, discrimination and immigration and of the policies designed to address these socioeconomic issues. Emphasis on the experience of African-Americans, Latinos, and women in the United States. 4 lectures. Prerequisite: Completion of GE Areas A, D1, and ECON 201 or 222.

HNRS X304 Values and Technology (4) GE C4
(Also listed as HUM 303)

Humanistic investigation into the theoretical and practical applications of technology with specific reference to the social effects of technological change. For all majors. Non-technical. 4 lectures. Prerequisite: Completion of GE Area A and one course from Area C.

HNRS X315 Modern World History (4)
(Also listed as HIST 315)

Interaction of selected traditional and modernizing non-Western cultures with Western industrial imperialism and its attendant forces. Nature of industrial imperialism and the way in which it influenced or interfered with the host culture, and the emergence of nationalism. 4 lectures. Prerequisite: HIST 206 or HIST 207; POLS

112.

HNRS X320 Values, Media, and Culture (4) GE C4
(Also listed as HUM 320)

Contemporary popular culture and its relationship to the great art and literature of the past. Discussion of television, films, advertising, best sellers, popular magazines, children's stories, comics, and the great tradition of literature. 4 lectures. Prerequisite: Completion of GE Area A and one course from Area C.

HNRS X375 Technology and the Environment: Contemporary Issues (4) GE D5

Discussions on significant environmental issues (local, regional, national, or global) where technology is major cause and/or offers possible solution. Political, economic, social, legal and other factors as well as technological. 4 seminars. Prerequisite: Completion of Area A and two courses from Areas D1, D2, D3 or D4; strongly recommended completion of Area B, and approval of Honors Program director.

HNRS X490 President's Seminar: Science, Society and the University (4)
(Also listed as HUM 490)

Development of higher education in the United States; the role of science and research in the University; and the response of higher education to changing economic, political and social demands. 4 seminars. Prerequisite: Senior standing, GPA of at least 3.0, or consent of instructor.

HUM X315 London: From Roman Colony to World Capitol (4) GE D5

Selective examination of the cultural and historical legacy of London within the development of western civilization as well as its influence in the submission and eventual emergence of the non-western world in the twentieth century. An interpretive and analytical study of how London shaped the social, economic, political and legal institutions of western society. 3 lectures, 1 activity. Prerequisite: Enrollment in London Study Program; completion of two courses in GE Area D/#; junior standing or 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 X318 Culture of Spain Activities (2) (CR/NC)
(valid Fall 01 through Winter 03)

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 activities. 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 X330 Cal Poly Land: Nature, Technology and Society (4) GE Area F

A 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 case study. 4 lectures. Prerequisites: GE Area A and B.

HUM X335 Fanaticism (4) GE C4

An interdisciplinary study of thought about fanaticism in Western culture as it is expressed in philosophy, literature and film. Special attention to the metaphysical, epistemological and psychological features of fanaticism, and to its appeal as a form of passionate commitment in a sophisticated age prone to relativism and skepticism. 4 lectures. Prerequisite: Completion of GE Areas A and C2 (PHIL 230 or PHIL 231).

IME X158 Basic Electronic Manufacturing (4)

Designed to expand engineering student's practical awareness of electronic manufacturing issues and how they impact product design and production. Manufacturing engineering concepts inherent to electronic products, such as electronic CAD/CAM design, design for manufacture, documentation requirements, prototyping and production planning. Hands-on prototyping, soldering techniques, project planning, and production methods experienced through a series of projects culminating in a completed working unit with chassis. Building of working unit from raw materials to finished product within the project-oriented laboratory. 2 lectures, 2 laboratories.

IME X412 Introduction to Information Systems Engineering (4)

Computing, networking and data communications. Practical approach targeted towards the use of new and existing technologies related to the industrial engineering and manufacturing engineering industry. Computer hardware, operating systems, network hardware and software, application software and other communication technologies, covered in both theory and practice. 3 lectures, s1 laboratory. Prerequisite: IME 312.

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 X417 Supply Chain Management (3)

Principles of logistics and supply chain management. Modeling concepts. Engineering skills required to design and operate supply and distribution systems. Information management techniques for effective supply chain management. Survey of tools used in industry for supply chain optimization. 3 lectures. Prerequisite: IME 239 or IME 241, IME 301, IME 410 or consent of instructor.

IME X520 Advanced Information Systems (4)

Advanced information systems (IS) application in manufacturing and services operations. Introduction of common IS applications, such as manufacturing execution system; reporting systems; capacity planning systems; scheduling systems; customer inquiry systems. Industry-specific analysis of IS requirements and availability. 4 lectures. Prerequisite: IME 312, IME 420, 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 X406 Industrial Sales (4)

Knowledge and skills of industrial technology and marketing majors are leveraged and complemented, enabling their development and implementation of a base of competencies to succeed in industrial sales. Refinement of technical knowledge and selling skills in an industrial setting. 3 lectures, 1 activity. Prerequisite: BUS 346 and either BUS 371 or IT 407.

IT X446 Textile Product Design and Development (4)

Organization/structure of the textile and apparel industries. Creating and developing a textile product line; sourcing, pre-production, and production processes; costing. Markets, distribution channels, store and non-store retailing, quick response; quality assurance. Trade associations and professional organizations. 4 lectures. Prerequisite: IT 336 or consent of instructor.

KINE X301 Muscle Anatomy (1)

Functional organization of the human muscular system. All major muscle groups, with an emphasis on segmental motion. 1 laboratory. Prerequisite: ZOO 331.

KINE X322 Sport and Popular Culture: Film (4)

Identifying and analyzing various social themes and issues present in sport films. An exploration of the meaning, role and place of sport films in American society and culture. 4 lectures. Prerequisite: Recommended completion of GE Area A, ES 112 or consent of instructor.

KINE X323 Sport and Gender (4)

The intersections between sport and gender in American society. Historical, sociological and psychological issues that affect the sport experiences ofmales and females, especially as they relate to class, race/ethnicity, sexuality, and political movements. 4 lectures. Prerequisite: Completion of GE Area A, D1 and D3.

KINE X406 Neuroanatomy (4)

Structure and function of the human nervous system. Afferent and efferent pathways involved in perception and action. Behavioral aspects of motor control and related neurological dysfunction and pathologies. Designed for allied health professions students. 4 lectures. Prerequisite: ZOO 331, ZOO 332, ZOO 340.

KINE X423 Teaching Middle School Physical Education (3)

Techniques for teaching physical education in middle school. Emphasis on class organization, lesson plan development and evaluation, class management and control, and understanding the middle school setting. 1 seminar, 2 laboratories. Prerequisite: KINE 206, KINE 300 and KINE 421.

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 X230 Community-Based Field Experience Grades K–3 (1-2) (CR/NC)

Required field experience in primary classrooms for students pursuing careers in teaching. Travel required to local elementary schools. Credit/No Credit grading only. Total credit limited to 2 units.

LS X231 Community-Based Field Experience Grades 4–8 (1-2) (CR/NC)

Required field experience in elementary classrooms for students pursuing careers in teaching. Travel required to local elementary schools. Credit/No Credit grading only. Total credit limited to 2 units.

LS X232 Selected Community-Based Field Experience: Various Topics (1-2) (CR/NC)

Field experiences at local elementary schools for students intending to be teachers that allows them variable specialized observations in language immersion schools, science classrooms, and/or observations of art specialists and special education professionals. Travel required to local elementary schools. *Class Schedule* will list topic selected. Credit/No Credit grading only. Total credit limited to 2 units.

LS X233 Community-Based Field Experience General Track (1-3) (CR/NC)

Field experience for students not pursuing careers in teaching. Placements at local non-profits, businesses, community service agencies. Allows students opportunity to work in various professional environments and assist in career development. Travel required to placements. Credit/No Credit grading only. Total credit limited to 5 units.

LS X250 Teaching Experience in Spanish (1) (CR/NC)
(Also listed as FORL X250)

Interdisciplinary course focusing on lesson planning for K-8. Theory and practice of teaching methodology. Open only to Liberal Studies majors. Credit/No Credit grading only. Prerequisite: SPAN 103 competency.

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.

LS X461 Senior Project (3)

Selection and completion of an individual report or group project and report. For those planning careers as teachers, project will involve field experience and inquiry project focused on content area selected for emphasis area. 1 seminar, 2 activities. Prerequisite: Senior standing and Elementary Education Concentration.

LS X462 Senior Project (3)

Selection and completion of a project or report under faculty supervision. Topic must be chosen with departmental approval. Results must be in a formal, written report. Prerequisite: Senior standing, Individualized Study Concentration, and consent of Liberal Studies coordinator.

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

MATE 210 for Honors 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 X467 Senior Project Design Laboratory (1-5)

Capstone senior project design class. Involves research methodology, problem statement, method, results, analysis, synthesis, project design, construction (when feasible), materials testing and analysis, and evaluation/conclusions. Project results are presented in formal written reports suitable for reference library and formal oral reports. 1-5 laboratories (variable). Prerequisite: MATE 210.

MATE X468 Senior Project Design Laboratory (4)

Capstone senior project design class. Involves research methodology, problem statement, method, results, analysis, synthesis, project design, construction (when necessary for project), materials testing and analysis, and evaluation/conclusions. 4 laboratories. Prerequisite: MATE X467.

MATE X483 Senior Project Design Laboratory I (2)

Continuation of senior project planning. Completion of a senior project under the guidance of a faculty supervisor. Involves research methodology, experimental design, experimental work and data analysis. 2 laboratories. Prerequisite: MATE 461.

MATE X484 Senior Project Design Lab II (2)

Continuation of MATE X483. Completion of a senior project under the guidance of a faculty supervisor. Involves experimental design, experimental work and data analysis, technical communication. 2 laboratories. Prerequisite: MATE 482.

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.*

MATH X110 Beginning Algebra Review Laboratory (1) (CR/NC)

Facilitated study and discussion of the theory, problems, and applications of beginning algebra. Not for baccalaureate credit. Credit/No Credit grading only. 1 laboratory. Corequisite: Enrollment in the associated section of MATH 100.

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 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 X331 Topics in Mathematics for Teachers (1-6) (CR/NC)

Topics in mathematics for practicing credentialed teachers. Content to vary according to teaching level. *Class Schedule* will list topic selected. Total credit limited to 12 units. Credit/No Credit grading only. 1-6 activities. Prerequisite: Multiple Subject or Single Subject teaching credential, or consent of instructor.

MCRO X320 Emerging Infectious Diseases

Recent outbreaks of human diseases, interrelationships between infectious disease agents, human biology, and the environment. Infectious agents and disease processes, surveillance methods to detect, investigate, and monitor emerging pathogens. Factors involved in the accelerating emergence of diseases and bioterrorist agents. 3 lectures. Prerequisite: MCRO 221 or MCRO 224 or BIO 153.

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)
(valid Winter 03 through Summer 03)

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 X446 Hybrid Electric Vehicle Design (4)
(valid Fall 01 through Fall 02)

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. 4 lectures. Prerequisite: ME 344.

ME X460 Senior Project Laboratory (2)

Selection and progress through preliminary design for a project done under faculty supervision. An option to ME 461 offering an enhanced opportunity to work on senior projects in teams. 2 laboratories. Prerequisite: Senior standing, ME 344, ME 329 (or concurrent).

ME X464 Senior Project Laboratory (3)

Completion through an accepted report for a project done under faculty supervision. An option to ME 462 offering an enhanced opportunity to work on senior projects in teams. 3 laboratories. Prerequisite: ME 461 or equivalent.

ME X465 Senior Project (5)
(valid Winter 03 through Summer 03)

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 X465 Senior Project (5)
(valid Spring 99 through Fall 02)

Team projects geared to enhance design classes, co-op experience, professional society activities, or technical electives. Projects must be preapproved by instructor. Substitutes for ME 461 and ME 462, and conducted in structured environment. 1 lecture, 4 laboratories. Prerequisite: ME 329, senior standing, and 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 X506 Mechatronics Design (4)

Application of micro-controllers and programmable logic controllers in the design of mechatronics products and automation systems. Digital feedback motion and process control. Modern industrial mechatronics applications. Graduate-level term project. 3 lectures, 1 laboratory. Concurrent enrollment in ME 406. Prerequisite: ME 329, ME 405, and graduate standing.

ME X518 Machinery Vibrations and Rotor Dynamics (4)

Vibrations relating to rotating machinery. Modeling of structural rotordynamic phenomena induced by shaft flexibility, bearings and seals. Laboratory measurement of rotor system dynamic response and interpretation of machinery diagnostic information. Includes research project on related topic. 3 lectures, 1 laboratory. Prerequisite: ME 318 and graduate standing.

ME X523 Robotics: Fundamentals and Applications (4)

Introduction to robots and their types. Homogeneous transformations. Kinematic equations and their solutions. Motion trajectories, statics, dynamics, and control of robots. Robot programming. Actuators, sensors, vision systems, and micro processor control. Includes a research project on a related topic. 3 lectures, 1 laboratory. Corequisite: ME 423. Prerequisite: ME 422 (or concurrent) and graduate standing.

ME X541 Single Track Vehicle Design (4)

Kinematics and dynamics of single track vehicles and how they affect design decisions on controllability, utility and safety. 3 lectures, 1 laboratory. Prerequisite: ME 318, ME 326, desired ME 422, graduate standing or consent of instructor.

MU X189 Vocal Practicum (1)

Study and implementation of performing techniques used by vocalists in a recital or concert setting. 1 activity. Prerequisite: MU 150 or MU 250 or MU 350 or MU 450; or consent of instructor.

MU X259 Beginning Jazz Improvisation (2)

Development of fundamentals of jazz improvisation including scales, arpeggios, patterns, swing feel, expressiveness, and motifs through in-class performance of written materials and improvisations with play-along recordings. Facility on a musical instrument or singing ability is required. Total credit limited to 6 units. 2 activities. Prerequisite: MU 101 or consent of instructor.

MU X260 Intermediate Jazz Improvisation (2)

Further development of fundamentals of jazz improvisation including alternate scales, arpeggios, embellishments, expressiveness, and motifs through in-class performance of written materials and improvisations with play-along recordings. Successful completion of MU X259 or experience in jazz improvisation (with instructor approval) required. Total credit limited to 6 units. 2 activities. Prerequisite: MU 101 or consent of instructor.

MU X315 Music Fundamentals in the Classroom (4)

Music skills and concepts for non-musicians developed through "learn-by-doing" music education pedagogies. Methodologies and state standards for teaching classroom music; performance skills (singing, recorder, accompanying instruments, body percussion). 3 lectures, 1 activity. Prerequisite: Completion of GE Area A.

MU X389 Vocal Practicum (1)

Study and implementation of performing techniques used by vocalists in a recital or concert setting. 1 activity. Prerequisite: MU 150 or MU 250 or MU 350 or MU 450; or consent of instructor.

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.

PEM/PEW X195 Golf (2)

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

PHYS X107 Introduction to Meteorology (4) GE B3

Physics of Earth’s atmosphere. Topics include the physical basis for temperature, wind generation, atmospheric circulation, humidity, adiabatic processes, cloud formation, cyclone development, precipitation, and storm growth. Other topics include the variety of storms and their effects, satellite imaging, and air pollution and its possible effect on global temperature change. 4 lectures. Prerequisite: Appropriate score on the ELM examination for MATH 116 eligibility, or an ELM exemption, or MATH 104.

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 X417 Nonlinear Dynamical Systems (4)

Theoretical and experimental dynamical systems arising in physics, chemistry, biology, and mathematics. Geometric, qualitative, and visual methods of analysis. 3 lectures, 1 laboratory. Prerequisite: MATH 242 or MATH 143 and a 300-level course in science or engineering.

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 X320 Egg and Poultry Meat Processing (4)

Science, technology and merchandising of egg and poultry meat products. Quality assurance, product formulation and further processing. practical experience formulating, manufacturing and evaluating selected products. 3 lectures, 1 laboratory. Prerequisite: PM 145 or FSN 209 or FSN 211, or consent of instructor.

POLS X285 Model United Nations (4)

Introduction to the United Nations and major issues that confront it. Preparation for participation in collegiate Model United Nations conferences. Rules of procedure and debate, preparation of country position papers, and resolution writing. 4 lectures.

POLS 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 GE Area B.

PPSC X110 People, Pests and Plagues (4) GE B2 & B4

Introduction to the science of entomology, focusing on insect and small arthropod biology, the largest group of terrestrial life forms on the planet. Insect pest and beneficial species, and their role in shaping how we live, work and eat. Not open to students majoring in CRSC, FRSC, EHS nor PPSC. 3 lectures, 1 activity.

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 X451 Applied Entomology: Monitoring (4)

Hands-on approach to applied entomology that includes extensive field work in insect pest identification, sampling, population estimation, population prediction, and control options/IPM decision-making. 2 lectures, 2 activities. Prerequisite: PPSC 311; PPSC 431 or consent of instructor.

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.

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.

REC X414 Organization and Development of Commercial Leisure Services (4)

Historical and contemporary development of the domains of commercial recreation and related services. Role of entrepreneurial activity. Procedures for creating and managing a socially responsible commercial leisure service. 4 lectures. Prerequisite: BUS 212, BUS 346, REC 210 with C- or better and senior standing.

REC X417 Special Event Management (4)

Major trends and successful business practices in festival and event management. Emphasis on creation, organization, sponsorship, marketing, and management of small to large scale community events. Event management field as a profession. 3 lectures, 1 laboratory. Prerequisite: REC 210, BUS 346, or consent of instructor.

REC X420 Special Event Management (4)

Major trends and successful business practices in festival and event management. Emphasis on creation, organization, sponsorship, marketing, and management of small to large scale community events. Event management field as a profession. 3 lectures, 1 laboratory. Prerequisite: REC 210, BUS 346 or consent of instructor.

SCM X320 Biosphere 2: Earth, Moon and Planets (4)

Course offered in partnership with Columbia University at Biosphere 2. Overall structure of the Solar System. Motions of the celestial sphere. Time and the calendar. Major plants, the Earth-Moon system, minor planets, comets. Life in the Solar System and beyond. 4 lectures. Prerequisite: Consent of instructor.

SCM X321 Biosphere 2: Beyond the Solar System (4)

Course offered in partnership with Columbia University at Biosphere 2. Survey course in stars, galaxies, and cosmology. Fundamental properties of nearby stars; nucleosynthesis and stellar evolution; novae and supernovae; galaxies. Structure of the universe and theories of its origin, evolution and ultimate fate. 4 lectures. Prerequisite: Consent of instructor.

SCM X322 Biosphere 2: Seminar on Puzzles in Our Universe (1)

Course offered in partnership with Columbia University at Biosphere 2. Astrobiology, the discovery of extrasolar planets, and the SETI search. 1 seminar. Prerequisite: Consent of instructor.

SCM X323 Biosphere 2: Stellar Astrophysics (4)

Course offered in partnership with Columbia University at Biosphere 2. Physics of stellar interiors and atmospheres; energy generation and nucleosynthesis; novae and supernovae; stellar necrology; interacting binary stars. 4 lectures. Prerequisite: One year of physics or astronomy and consent of instructor.

SCM X324 Biosphere 2: Galactic and Extragalactic Astrophysics (4)

Course offered in partnership with Columbia University at Biosphere 2. Structure of our galaxy; interstellar medium star clusters; properties of external galaxies; clusters of galaxies; active galactic nuclei; and cosmology. 4 lectures. Prerequisite: One year of physics or astronomy and consent of instructor.

SCM X325 Biosphere 2: Waves, Optics and Modern Physics (4)

Course offered in partnership with Columbia University at Biosphere 2. Classical waves and wave equation; geometric optics; interference and diffraction; Fourier series and integrals; normal modes; wave-particle duality; the uncertainty principle; basic principles of quantum mechanics; energy levels; reflection and transmission coefficients; and the harmonic oscillator. 4 lectures. Prerequisite: One year of physics or astronomy and consent of instructor.

SCM X326 Biosphere 2: Astrophysics of the Solar System (4)

Course offered in partnership with Columbia University at Biosphere 2. Planetary dynamics; celestial mechanics; geophysics; atmospheres and interiors; and solar system minor bodies. 4 lectures. Prerequisite: Consent of instructor.

SCM X327 Biosphere 2: Observational Astronomy (4)

Course offered in partnership with Columbia University at Biosphere 2. Individual research projects in small teams. Techniques of optical and radio astronomy; asteroid searches; light curves of variable stars; identification of radio and X-ray source optical counterparts; studies of periodic and quasi-periodic signals in stars. 4 lectures. Prerequisite: Consent of instructor.

SCM X328 Biosphere 2: Independent Research Projects (3)

Course offered in partnership with Columbia University at Biosphere 2. Individual research projects in small teams. Observational, theoretical, and experimental work in galactic and extragalactic astronomy and cosmology. 3 laboratories. Prerequisite: Consent of instructor.

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.

TH X250 Costume and Craft Construction (4)

Basic costume and craft construction techniques used in the entertainment industry. Building of all costumes and special crafts projects for main stage theatre productions, and serving on costume crew during technical rehearsals and department production each term. Total credit limited to 12 units. 4 laboratories.

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.

TH X430 Advanced Digital Filmmaking (4)

Advanced digital filmmaking skills and processes, including casting, script writing, story boarding, cinematography and editing. Production of dramatic, documentary or animated short films. 4 laboratories. Prerequisite: TH 210; TH X410; prior film experience and consent of instructor.

WS X450 Feminist Theory (4)

History and evolution of ideas about gender, race/ethnicity and identity. Special attention to considering how social, historical, and idealogical forces, organized by the central, intertwined concepts of gender and race, shape both our critical thinking and our lives. 4 lectures. Prerequisite: WS 301.

MS POLYMERS and COATINGS SCIENCE – 2001-03 Catalog

Chemistry & Biochemistry Department
Faculty Offices East Bldg. (25), Room 125B
(805) 756-2693

Note: This program was approved after the 2001-03 Catalog went to print.

General Characteristics

A five-year pilot program, effective Fall 2002, the MS in Polymers and Coatings Science offers a unique, focused program closely tied to industry. Students gain academic preparation in polymers and coatings science through lecture and laboratory courses, then undertake a rigorous industrial internship. While on the internship students specialize and develop advanced skills through directed study in areas related to their internship work. The program is designed to prepare students for challenging careers in the polymers and coatings industry. The program also provides excellent background for doctoral studies in areas related to polymer and coatings science. This program is unique in California and relies on the close relationship between the department and the polymers and coatings industry for its success.

Prerequisites

Students entering the program must have a bachelor's degree from an accredited institution with a minimum grade point average of 2.5 in the last 90 quarter units attempted. Applicants with majors in chemistry, biochemistry, materials engineering, chemical engineering or related fields will generally meet the prerequisites for courses in the program. Applicants with degrees in other areas may need to take supplemental courses in organic and physical chemistry and can be admitted conditionally. For information concerning additional departmental requirements, the student should contact the Graduate Advisor in the Chemistry and Biochemistry Department.

Advancement to candidacy requires completion of 12 units of an approved study plan with a minimum grade point average of 3.0.

Blended BS + MS Program in Chemistry or Bio-chemistry (BS) and Polymers and Coatings Science (MS)

The blended program provides motivated students with an accelerated route to the MS in Polymers and Coatings Science, with simultaneous conferring of both bachelor's and master's degrees. Students in the blended program are provided with a seamless process whereby they can progress from undergraduate to graduate status.

Eligibility

Students majoring in Chemistry or Biochemistry may be eligible to pursue the blended program toward the MS in Polymers and Coatings Science. Participation in the program is based on prior academic performance and other measures of professional promise, with a minimum GPA of 2.5 required (3.0 recommended). Students are generally selected for the blended program by a faculty committee during the junior year. Please see the catalog description on Blended Programs for eligibility criteria.

The blended program follows the same general study plan as the non-blended program but allows the student to earn graduate credit for several of their senior electives, effectively decreasing the summed unit requirements for both degrees. Students may begin taking the required graduate courses in either their junior or senior year depending on their preparation. Students may not pursue both the Concentration in Polymers and Coatings and the MS in Polymers and Coatings Science. Students pursuing the concentration take the

400-level Polymers and Coatings Courses while those pursuing the MS degree take the 500-level Polymers and Coatings Courses. Students cannot receive credit for both 400 and 500-level courses in the same topic.

Students in the blended program are eligible to apply for the Graduate Internship upon completion of the required graduate-level chemistry courses.

Curriculum for MS Polymers and Coatings Science

Core Courses.....	33
CHEM 544 Polymer Physical Chemistry and Analysis (3)	
CHEM 545 Polymer Synthesis and Mechanisms (3)	
CHEM 547 Polymer Characterization and Analysis Laboratory (2)	
CHEM 548 Polymer Synthesis Laboratory (2)	
CHEM 550 Coatings Formulation Principles (3)	
CHEM 551 Coatings Formulation Laboratory (2)	
CHEM 570 Directed Graduate Study (3 units per quarter for 3 quarters)	
CHEM 598 Graduate Internship (3 units per quarter for 3 quarters)	
STAT 512 Statistical Methods *or* STAT 513 Applied Experimental Design and Regression Models (4)	
Restricted electives.....	12
12 units approved electives (400-500 level) chosen from: CHEM, MATE, Bioengineering, STAT 513.	
Examples of courses satisfying the elective requirement include:	
CHEM 405 Advanced Physical Chemistry (3)	
CHEM 420 Advanced Organic Chemistry (3)	
CHEM 439 Instrumental Analysis (5)	
CHEM 446 Surface Chemistry of Materials (3)	
CHEM 470 Selected Advanced Topics (1-4)	
MATE 530 Biomaterials (4)	
MATE 560 Thin Film Processing (3)	
ENGR 450 Special Topics in Bioengineering (4)	
IME 556 Technological Project Management (4) or other approved management course	
Satisfactorily complete the comprehensive examinations.	
	45

General Education

www.calpoly.edu/~acadprog/gened

Cal Poly's GE Program has undergone significant changes effective with the 2001-03 Catalog. If you are following a prior catalog, you should consult with your academic advisor, refer to page 83 of this catalog, and refer to the GE web site.

Program Goals

Consistent with E.O. 595, Cal Poly's General Education Program is designed to assure graduates have made noteworthy progress toward becoming truly educated persons and to provide means whereby graduates will have

- The ability to think clearly and logically, to find information and examine it critically, to communicate orally and in writing, and to reason quantitatively;
- Appreciable knowledge about their own bodies and minds, about how human society has developed and how it now functions, about the physical world in which they live, about the other forms of life with which they share the world, and about the cultural endeavors and legacies of their civilizations;
- An understanding and appreciation of the principles, methodologies, value systems, and thought processes employed in human inquiries.

Advising

Students should consult academic advisers and curriculum displays for specific courses which may be required in their degree program.

Foundational Courses

Students are encouraged to complete foundational courses as early as possible. Lower-division coursework in Areas A-D has been designed to give students the knowledge and skills to move to more complex materials.

Technology Elective (Area F)

The elective is integrative in nature, requiring the application and generalization of basic scientific and mathematical knowledge along with the study of particular technologies with critical examination from multiple perspectives.

Double-Counting

Courses from the student's Major department may not be used to fulfill upper-division electives in Areas C4, D5 or F.

Transfer Credit

Transfer students' General Education-Breadth certifications will be accepted from California institutions. The certification determines the completion of all lower division GE Area A-E Requirements. Many Cal Poly programs require specific GE courses in the Major and/or Support; these courses must be met with equivalencies. Students must complete 12 units of upper division GE courses and 12 units of GE courses in residence.

Chart 3

GE 2001 REQUIREMENTS

www.calpoly.edu/~acadprog/gened/

Most Majors=Colleges of Agriculture, Architecture & Environmental Design, Business, Science & Mathematics, and Computer Science Program. **CLA**=College of Liberal Arts. **ENGR**=Engineering Titled Programs.

Some programs indicate specific GE courses to fulfill Major and Support course requirements.

Courses from student's Major may not be used to fulfill Areas C4, D5 or F.

✓ non-unit requirement

All GE courses are 4 units unless otherwise indicated.

	Most Majors	CLA only	ENGR only
GE Units Taken in Residence	12	12	12
GE Upper Division Units Required	12	12	8
AREA A COMMUNICATION	12	12	12
A1 Expository Writing	4	4	4
A2 Oral Communication	4	4	4
A3 Reasoning, Argumentation, and Writing	4	4	4
AREA B SCIENCE & MATH	16	20	28
B1 Mathematics/Statistics	8	8	8
B2 Life Science	4	4	4
B3 Physical Science	4	4	4
B4 One lab taken with B2 or B3 course	✓	✓	✓
B5 elective *(for CLA students only)*			
CLA students: *(One from B1-B5)*		4	
B6 Upper-division *(Engineering)*			4
Engineering: Additional Area B			8
AREA C ARTS AND HUMANITIES	20	16	16
C1 Literature	4	4	4
C2 Philosophy	4	4	4
C3 Fine and Performing Arts	4	4	4
C4 Upper-division elective	4	4	4
Area C Elective *(One from C1-C4)*	4	0	0
AREA D/E SOCIETY/INDIVIDUAL	20	20	16
D1 The American Experience *(40404)*	4	4	4
D2 Political Economy	4	4	4
D3 Comparative Social Institutions	4	4	4
D4 Self Development *(CSU Area E)*	4	4	4
D5 Upper-division elective	4	4	0
AREA F TECHNOLOGY (upper-div)	4	4	0
TOTAL GE UNITS	72	72	72

Chart 1

GE Requirements for Catalogs Prior to 2001-03

Minimum Requirements:
Total of 72 units of GE courses.
3 GE courses shall be earned in residence.
3 GE courses must be at the 300-400 level.
Courses from student's Major may not be used to fulfill C3 or D4b.
You may need to select courses from the ***equivalent GE 2001 Areas, as indicated in parentheses below.***

Consult Advising Charts at
www.calpoly.edu/~acadprog/gened

AREA A Communication (minimum 11 units)

Take one course from A1 and one course from A3:
A1 Expository Writing *(Area A1)*
A3 Speech *(Area A2)*
Take a minimum of one course from either A2 or A4:
A2 Critical Thinking *(Area A3)*
A4 Argumentative Writing *(Area A3)*

AREA B Science and Mathematics (minimum 15 units)

Take one course from B1a & one from B1b; one with lab (B4):
B1a Physical Science *(Area B3)*
B1b Life Science *(Area B2)*
Take two courses from B2 MATH and/or STAT.
B2 Mathematics and/or Statistics *(Area B1)*
If less than 15, take one additional course from B1 or B2.

AREA C Arts and Humanities (minimum 15 units)

Take one course from each Area C category:
C1a Literature *(Area C1)*
C1b Philosophy *(Area C2)*
C2 Fine/Performing Arts *(Area C3)*
C3 Lit/Phil/Arts (300-400 level) *(Area C4)*
If less than 15, take one additional course from C1, C2, C3

AREA D Social, Political, Economic Inst. (min. 15 units)

Take a minimum of one course from either D1a or D1b (Area D1):
D1a American institutions (History) *(Area D1)*
D1b American institutions (Government) *(Area D1)*
Take one course from three of the following four categories: D2, D3, D4a, D4b:
D2 History *(HIST 315 or Area D5 HIST course)*
D3 Economic institutions *(Area D2)*
D4a Social institutions elective *(Area D3)*
D4b Social institutions elec (300-400 level) *(Area D5)*

AREA E Life Understanding (minimum 3 units)

Take one course from E1 or E2:
E1 Psychology *(Area D4)*
E2 Life understanding elective *(Area D4)*

AREA F Technology (minimum 2 units)

Non-technical programs. Colleges of Business (except BS Industrial Technology); Liberal Arts; Science & Mathematics.
Take one course from F1 or F2:
F1 Computer literacy *(Area F)*
F2 Technology elective *(Area F)*

Technical programs. Colleges of Agriculture; Arch &Env Design; Engineering; & BS Industrial Technology program
Take one course from F1:
F1 Computer literacy *(Area F)*

Additional GE Courses

To complete 72-unit requirement, select additional courses from Areas A, B, C, D, E. No more than one additional course per Area.

Chart 2

Advising Information for Students Changing to the 2001-2003 Catalog

Most Majors=Colleges of Agriculture, Architecture & Environ Design, Business, Science & Mathematics, and Computer Science Program.
CLA=College of Liberal Arts. **ENGR**=Engineering Titled Programs.

Some programs require specific GE courses in the Major and/or Support.

GE Certification *may* affect the following Area minimums.

✓ non-unit requirement

Courses from student's Major may not be used to fulfill C4, D5 or F

Consult Advising Charts at
www.calpoly.edu/~acadprog/gened

	Most Majors	CLA only	ENGR only
GE Units Taken in Residence	**12**	**12**	**12**
GE Upper Division Units Required	**12**	**12**	**8**
Students must satisfy *both* the minimum number of units *and* courses.	**Minimum Units** (*Minimum # Courses*)		
AREA A COMMUNICATION	**11**	**11**	**11**
A1 Expository Writing	*(1 course)*		
A2 Oral Communication	*(1 course)*		
A3 Reasoning, Argumentation, Writing	*(1 course)*		
AREA B SCIENCE & MATH	**15**	**18**	**26**
B1 Mathematics/Statistics	*(2 courses)*		
B2 Life Science	*(1 course)*		
B3 Physical Science	*(1 course)*		
B4 One lab taken with B2 or B3 course	✓	✓	✓
B5 elective *(for CLA students only)*	--	--	--
CLA students: *(1 course from B1-B5)*	*0*	*(1)*	*0*
B6 Upper-division *(Engineering)*	*0*	*0*	*(1)*
Engineering: Additional Area B	*0*	*0*	*(2)*
AREA C ARTS AND HUMANITIES	**18**	**15**	**16**
C1 Literature	*(1 course)*		
C2 Philosophy	*(1 course)*		
C3 Fine and Performing Arts	*(1 course)*		
C4 Upper-division elective	*(1 course)*		
Area C Elective *(1 course from C1-C4)*	*(1)*	*0*	*0*
AREA D/E SOCIETY/INDIVIDUAL	**18**	**18**	**16**
D1 The American Experience	*(1 course)*		
D2 Political Economy	*(1 course)*		
D3 Comparative Social Institutions	*(1 course)*		
D4 Self Development	*(1 course)*		
D5 Upper-division elective	*(1)*	*(1)*	*0*
AREA F TECHNOLOGY(upper div)	**3**	**3**	**0**
ADDITIONAL GE (if needed to complete 72-unit requirement)			
TOTAL GE UNITS	**72**	**72**	**72**

GE 2001 REQUIREMENTS

www.calpoly.edu/~acadprog/gened/

Most Majors=Colleges of Agriculture, Architecture & Environmental Design, Business, Science & Mathematics, and Computer Science Program. **CLA**=College of Liberal Arts. **ENGR**=Engineering Titled Programs.

Some programs indicate specific GE courses to fulfill Major and Support course requirements.

✓ non-unit requirement

All GE courses are 4 units unless otherwise indicated.

	Most Majors	CLA only	ENGR only
Total GE Units Required	72	72	72
GE Units Taken in Residence	12	12	12
GE Upper Division Units Required	12	12	8
AREA A: COMMUNICATION	12	12	12
A1 Expository Writing	4	4	4
ENGL 133 Writing: Exposition for ESL Students ENGL 134 Writing: Exposition			
A2 Oral Communication	4	4	4
SCOM 101 Public Speaking SCOM 102 Principles of Speech Communication			
A3 Reasoning, Argumentation, and Writing	4	4	4
ENGL 145 Reasoning, Argumentation, and Writing ENGL 148 Reasoning, Argumentation, and Technical Writing ENGL 149 Technical Writing for Engineers HNRS 145 Reasoning, Argumentation, and Writing HNRS 148 Reasoning, Argumentation, and Technical Writing HNRS 149 Technical Writing for Engineers PHIL 126 Logic and Argumentative Writing SCOM 126 Argument & Advocacy SCOM 145 Reasoning, Argumentation and Writing			

AREA B: SCIENCE & MATH	16	20	28
B1 Mathematics/Statistics	8	8	8
HNRS 141 Calculus I HNRS 142 Calculus II HNRS 143 Calculus III MATH 112 Nature of Modern Math MATH 117 Pre-Calculus Algebra II MATH 118 Pre-Calculus Algebra MATH 119 Pre-Calculus Trigonometry MATH 120 Pre-Calculus Algebra & Trigonometry (5) MATH 141 Calculus I MATH 142 Calculus II MATH 143 Calculus III MATH 161 Calculus for the Life Sciences I MATH 162 Calculus for the Life Sciences II MATH 221 Calculus for Business and Economics STAT 130 Intro Statistical Reasoning STAT 217 Intro to Statistical Concepts and Methods STAT 218 Applied Statistics for the Life Sciences STAT 221 Intro Probability and Statistics STAT 251 Statistical Inference for Management I (5) STAT 252 Statistical Inference for Management II (5) STAT 313 Applied Experimental Design & Regression Models			

	Most Majors	CLA only	ENGR only
B2 Life Science *(B2&4=lab course)*	4	4	4
ANT 250 Biological Anthropology BIO 111 General Biology (B2&4) BIO 113 Animal Diversity and Ecology (B2&4) BIO 114 Plant Diversity and Ecology (B2&4) BIO 115 Animal/Human Structure and Function (B2&4) BIO 151 Intro to Biology (5) (B2&4) BIO 227 Wildlife Conservation Bio BOT 121 General Botany (B2&4) MCRO 221 Surv Microbiology (B2&4) MCRO 224 Gen Microbio I (5) (B2&4) *For Engineering students only; concurrent enrollment required:* BIO 213 Life Science for Engineers (2) *and* ENGR/BRAE 213 Bioengineering Fundamentals (2)			
B3 Physical Science *(B3&4=lab course)*	4	4	4
ASTR 101 Intro to the Solar System ASTR 102 Intro to Stars & Galaxies CHEM 110 World of Chemistry (B3&4) CHEM 111 Survey of Chemistry (5) (B3&4) CHEM 124 General Chemistry for Engineers (B3&4) CHEM 125 General Chemistry for Engineers (B3&4) CHEM 127 General Chemistry (B3&4) GEOL 102 Introduction to Geology GEOL 205 Earthquakes HNRS 131 General Physics (B3&4) PHYS 104 Introductory Physics PHYS 121 College Physics (B3&4) PHYS 131 General Physics (B3&4) PHYS 132 General Physics (B3&4) PHYS 133 General Physics (B3&4) PSC 101 Physical Environment: Matter & Energy (B3&4) PSC 103 Physical Environment: Earth & Universe			
B4 One lab taken with B2 or B3 course	✓	✓	✓
B5 elective *(GE option for College of Liberal Arts students only).*	--	--	--
BIO 112 Environmental Biology & Conservation BIO 302 Human Genetics FNR 319 Natural Resource Ecology, Theories &Applications FSN 210 Nutrition GEOL 203 Fossils and History of Life PSC 201 Intro to Physical Oceanography PSY 340 Biopsychology SS 121 Intro to Soil Science			
CLA students: *(Select one from B1-B5)*	0	4	0

	Most Majors	CLA only	ENGR only
B6 Upper-division Area B *(ENGR only)*	**0**	**0**	**4**
CSC 341 Numerical Engineering Analysis GEOL 305 Fundamentals Seismology MATH 317 Topics in Engineering Mathematics MATH 318 Advanced Engineering Mathematics STAT 312 Statistical Methods for Engineers STAT 321 Probability & Statistics for Engineers and Scientists			
Engineering: Additional Area B	**0**	**0**	**8**

AREA C: ARTS AND HUMANITIES	**20**	**16**	**16**
C1 Literature	**4**	**4**	**4**
ENGL 230 Masterworks British Literature through 18th Century ENGL 231 Masterworks British Lit: Late 18th Century - Present ENGL 240 American Tradition in Literature ENGL 251 Great Books I: Ancient & Classical World ENGL 252 Great Books II: Emergence of Europe ENGL 253 Great Books III: Age of Revolution FR 233 Critical Readings in French Literature GER 233 Critical Readings in German Literature HNRS 251 Great Books I: Ancient & Classical World SPAN 233 Introduction to Hispanic Readings			
C2 Philosophy	**4**	**4**	**4**
PHIL 230 Philosophical Classics: Metaphysics & Epistemology PHIL 231 Philosophical Classics: Social & Political Philosophy			
C3 Fine and Performing Arts	**4**	**4**	**4**
ARCH 217 History of Architecture ARCH 218 History of Architecture ARCH 219 History of Architecture ART 101 Fundamentals of Art ART 111 Introduction to Art ART 112 Survey of Western Art ART 148 Sculpture DANC 221 Dance Appreciation MU 101 Introduction to Music Theory MU 120 Music Appreciation MU 221 Jazz Styles *(USCP)* MU 229 Music of the 60's: War and Peace *(USCP)* SCOM 208 Performance of Literature TH 210 Introduction to Theatre TH 227 Theatre History: Classical TH 228 Theatre History: 18th Century to Contemporary			
C4 Upper-division elective	**4**	**4**	**4**
ARCH 320 History of Asian Arch & the Built Environment ART 314 History of Photography ART 318 Asian Art: National, Religion & Intel Movements DANC 311 Dance in American Musical Theatre DANC 321 Cultural Influences on Dance in America *(USCP)* ENGL 330 Brit Lit: Age of Belief to1485 ENGL 331 Brit Lit: Age of Discovery, 1485-1600 ENGL 332 Brit Lit: Age of Enlightenment, 1660-1798 ENGL 333 Brit Lit: Age of Romanticism, 1798-1832 ENGL 334 Brit Lit: Age of Industrialism, 1832-1914			

ENGL 335 Brit Lit: Age of Modernism: 1914-Present
ENGL 338 Intro Shakespeare: London
ENGL 339 Intro Shakespeare
ENGL 340 Literary Sources American Character: 1600-1865
ENGL 341 Literary Sources American Character: 1865-1914
ENGL 342 Literary Sources American Character: 1914-1956
ENGL 343 Multiple Voices Contemp Amer Lit: 1956 - Present
ENGL 345 Women Writers of 20th Century *(USCP)*
ENGL 346 Ethnic American Lit *(USCP)*
ENGL 347 African American Literature *(USCP)*
ENGL 349 Gender in 20th-Century Literature *(USCP)*
ENGL 350 Modern Novel
ENGL 351 Modern Poetry
ENGL 352 Modern Drama
ENGL 353 Drama in London
ENGL 354 Bible as Literature and in Literature and the Arts
ENGL 370 World Cinema
ENGL 371 Film Styles and Genres
ENGL 372 Film Directors
ENGL 380 Literary Themes
ENGL 381 Diversity in 20th-Century American Lit *(USCP)*
ENGL 386 Creative Nonfiction
ENGL 387 Creative Writing: Fiction
ENGL 388 Creative Writing: Poetry
ES 300 Chicano/a Non-Fiction Literature *(USCP)*
ES 321 Native American Cultural Images *(USCP)*
ES 360 Ethnicity & Land *(USCP)*
FNR 360 Ethnicity & Land *(USCP)*
FR 305 Significant Writers in French
GER 305 Significant Writers in German
GER 350 German Literature-English Translation
HUM 303 Values and Technology
HUM 310 World Cultures
HUM 312 Chicano/a Culture *(USCP)*
HUM 320 Values, Media, Culture
HUM 340 Content of Our Character
MU 324 Music and Society
MU 328 Women in Music
PHIL 311 Greek Philosophy
PHIL 312 Medieval Philosophy
PHIL 313 Continental Philosophy: Descartes to Leibniz
PHIL 314 British Philosophy: Bacon to Mill
PHIL 315 German Philosophy: Kant to Nietzsche
PHIL 316 Contemporary European Philosophy
PHIL 317 Contemporary British & American Philosophy
PHIL 320 Asian Philosophy
PHIL 321 Philosophy of Science
PHIL 331 Ethics
PHIL 332 History of Ethics
PHIL 333 Political Philosophy
PHIL 334 Philosophy of Law
PHIL 335 Social Ethics *(USCP)*
PHIL 337 Business Ethics
PHIL 338 Ethics and Education
PHIL 339 Biomedical Ethics
PHIL 340 Environmental Ethics

PHIL 342 Philosophy of Religion
PHIL 350 Aesthetics
RELS 304 Judaism
RELS 305 Christian Origins
RELS 306 Hinduism
RELS 307 Buddhism
RELS 336 Religion, Gender and Society *(USCP)*
SCOM 308 Group Performance of Literature
SPAN 305 Significant Writers in Spanish
SPAN 340 Chicano/a Authors *(USCP)*
SPAN 350 Hispanic Literature in English Translation
SPAN 351 Latino/a Writers in U. S. *(USCP)*
TH 310 Women's Theatre
TH 320 Black Theatre *(USCP)*
WS 336 Religion, Gender and Society *(USCP)*

Area C Elective (*one course from C1-C4)*	**4**	**0**	**0**

	Most Majors	CLA only	ENGR only
AREA D/E: SOCIETY & INDIVIDUAL	**20**	**20**	**16**
D1 The American Experience (*40404)*	**4**	**4**	**4**
ES 112 Race, Culture, Politics in the U.S. *(USCP)*			
HIST 206 American Cultures: Early Republic-Present *(USCP)*			
HIST 207 Freedom and Equality in American History *(USCP)*			
POLS 112 American and California Government			
D2 Political Economy	**4**	**4**	**4**
ECON 201 Survey of Economics			
ECON 222 Macroeconomics			
HIST 213 Modern Political Economy			
HIST 214 Political Economy of Latin America & Middle East			
SOC 218 International Political Economy			
D3 Comparative Social Institutions	**4**	**4**	**4**
ANT 201 Cultural Anthropology			
ES 212 Global Origins of U.S. Cultures *(USCP)*			
GEOG 150 Intro to Cultural Geography			
HIST 215 Comparative World History			
SOC 110 Comparative Societies			
D4 Self Development *(CSU Area E)*	**4**	**4**	**4**
FSN 250 Food and Nutrition: Customs & Culture *(USCP)*			
KINE 250 Healthy Living			
KINE 255 Personal Health: Multi-cultural Approach *(USCP)*			
PSY 201 Intro to Psychology			
PSY 202 Intro to Psychology			
D5 Upper-division elective	**4**	**4**	**0**
ANT 325 Precolumbian Mesoamerica			
ANT 344 Sex, Death & Human Nature			
ANT 360 Human Cultural Adaptations			
BUS 311 Managing Technology International Legal Envirn			
CRP 334 Cities in Globalizing World			
ECON 303 Econ of Poverty Discrimination Immigration *(USCP)*			
ECON 304 Comparative Econ Systems			
ECON 322 Economic History of the Advanced World			
ES 308 Fire and Society			
ES 320 African American Cultural Images *(USCP)*			
ES 322 Asian American Cultural Images *(USCP)*			
ES 323 Mexican American Cultural Images *(USCP)*			
ES 330 Chinese American Experience *(USCP)*			
FNR 308 Fire and Society			
FNR 323 Human Dimensions Natural Resource Management			
GEOG 300 Geography of United States			
GEOG 301 Geography of Resource Utilization			
GEOG 308 Global Geography			
HIST 306 The Witch-Hunt in Europe			
HIST 307 European Thought, 1800-2000			
HIST 308 Trans-Atlantic Slave Trade			
HIST 309 Cultures of West Africa & African Diaspora			
HIST 310 East Asian Culture & Civilization			
HIST 320 Colonial & Revolutionary America			
HIST 321 Civil War America			
HIST 322 Modern America			
POLS 325 Global Political Issues			
POLS 338 Critical Issues American Politics			
POLS 339 Comparative Political Systems			
POLS 384 Citizenship, Society and Self			
PSY 352 Conflict Resolution: Violent & Nonviolent			
SOC 315 Global Race Relations			
SOC 326 Sociology of the Life Cycle			
SOC 377 Sociology of Religion			
WS 311 Women in Cross Cultural Perspectives			

AREA F: TECHNOLOGY ELECTIVE (upper division)	**4**	**4**	**0**
AERO 310 Air and Space			
BIO 348 Bioinformatics			
BRAE 340 Irrigation Water Mgmt			
BRAE 348 Energy for a Sustainable Society			
CHEM 348 Bioinformatics			
CSC 302 Computers & Society			
CSC 310 Computers for Poets			
CSC 348 Bioinformatics			
ENGR 302 Transportation & Manufacturing in 21st Century			
ENVE 324 Intro Air Pollution			
FNR 312 Technology of Wildland Fire Management			
FNR 321 Water Systems Technology, Issues and Impacts			
FSN 319 Food Technology/Customer			
GRC 377 Desktop Publishing for Print and World Wide Web			
HIST 354 History Network Technology			
HIST 358 Cloning			
HIST 359 Living in a Material World			
HNRS 310 Air and Space			
HUM 302 Human Values in Agriculture			
IME 320 Human Factors & Technology			
IT 341 Plastics Processes & Applications			
MATE 359 Living in the Material World			
ME 321 Solar Energy			
PSC 307 Nuclear Weapons in Post-Soviet World			
PSC 320 Energy & Environment for New Millennium			
SCM 320 Technology in London			
SCM 325 Genetic Engineering Technology			

Total GE Units	**72**	**72**	**72**

MS INDUSTRIAL ENGINEERING – 2001-03 Catalog

Industrial & Manufacturing Engineering Department
Graphic Arts Bldg. (26), Room 100
(805) 756-2341

Note: This program was approved after the 2001-03 Catalog went to print.

General Characteristics

The Master of Science program in Industrial Engineering has the following objectives:

- To help California industries in meeting their needs with respect to processes of design, optimization, and re-engineering and in competing globally, by educating and training engineers with advanced practical knowledge in the field of Industrial Engineering.
- To attract undergraduate engineers of all majors and provide education in the planning, engineering, optimization, and management of processes using the appropriate tools of Industrial Engineering.
- To further the mission and goals of the College of Engineering at Cal Poly with respect to graduate engineering education by maintaining a balance between undergraduate and graduate educational opportunities in engineering that optimally supports the health of California industry.

Each student is strongly encouraged to work with a particular faculty member in selecting a thesis topic which is of personal interest to the student and the faculty member, and to choose a substantial number of elective courses that will support the issues addressed in the thesis or project.

Prerequisites

Students with earned undergraduate degrees in any engineering major are eligible for admission. A minimum grade point average of 3.0 in the last 90-quarter units (60 semester units) is required for admission.

All candidates seeking admission to the MSIE program are required to secure a minimum score in the GRE - General Test, as prescribed by the IME Department.

Program of Study

Graduate students must file a formal study plan with their adviser, department, college and the university graduate studies office by no later than the end of the quarter in which the 12th unit of approved courses is completed. The formal program of study must include a minimum of 45 units, of which a) at least 23 units must be at the 500 level; b) at least 24 units must be in the degree major with at least 18 units at the 500 level.

The broad curriculum requirements for the program are:

- a core of 12 units
- a comprehensive written examination (non-thesis option) or an oral defense examination (theses option)
- a minimum of 24 units of adviser approved electives

Curriculum for MS Industrial Engineering

Core Courses..... 21

IME 503 Applied Statistical Methods in Industrial Engineering (4)
IME 541 Advanced Operations Research (4)
IME 545 Advanced Topics in Simulation (4)

IME 599 Design Project (Thesis) (9) *or* additional 9 units of adviser approved electives (non-thesis option) and Comprehensive Examination

Adviser approved electives..... 24

Potential electives include:

BUS 412 Advanced Managerial Accounting (4)
IME 409 Economic Decision Systems (3)
IME 411 Production Systems Analysis (3)
IME 418 Product-Process Design (4)
IME 427 Process Optimization through Designed Experiments (4)
IME 431 Supplier Quality Engineering (4)
IME 500 Individual Study (1-3)
(up to a maximum of 6 units)
IME 516 Mechatronics Systems Analysis (4)
IME 520 Advanced Information Systems for Operations (4)
IME 526 Advanced Topics in Manufacturing System Design (4)
IME 542 Reliability Engineering II (4)
IME 543 Advanced Human Factors (4)
IME 544 Advanced Topics in Engineering Economy (4)
IME 555 Computer-Integrated Manufacturing (4)
IME 556 Technological Project Management (4)
IME 559 Engineering Research and Development (4)
IME 560 Quality Engineering (4)
IME 570 Selected Advanced Topics (1-3)
IME 580 Manufacturing Systems (4)

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