Theoretical aspects and practical applications of the principles of culinary

FSN 121 Fundamentals of Food (4)
Understanding of internal and external factors affecting vine productivity. Historical and international perspectives on grape growing. Vineyard production strategies. 3 lectures, 1 laboratory.

FSN 331 Viticulture II (4)
Factors influencing vine physiology and winegrape quality. Recent advances in irrigation strategies, canopy management, and pest control. Budgets for profitable operation and mechanized viticulture. Field trip required. 3 lectures, 1 laboratory. Prerequisite: FSN 231.

FSN 342 Citrus and Avocado Fruit Production (4)
World citrus and avocado production and marketing. Orchard management techniques. Relationship of environment to species, cultivar, and rootstock selection. Field trip to a major California production area required. 3 lectures, 1 laboratory. Prerequisite: HCS 120 or FSN 230, or consent of instructor.

FRSC 402 Enterprise Project Management (2–4) (CR/NC)
Advanced experience in production of orchards and vineyards. Development of a plan for field operations, a marketing plan, and a budget. Management decision-making. Project participation is subject to approval by the department head and the Cal Poly Corporation. Degree credit limited to 2 units. Credit/No Credit grading only. 1 lecture, variable practice. Prerequisite: FRSC 202, and consent of instructor.

FRSC 415 Grapevine Physiology (4)
Understanding of grapevine physiology, including anatomy, taxonomy, physiological growth processes, growth cycle phenology, bud break, flowering, fruit set, berry ripening. 3 lectures, 1 laboratory. Prerequisite: FRSC 231, FRSC 331 or consent of instructor.

FRSC 422 Tropical and Subtropical Crop and Fruit Production (4)
(Also listed as CRSC 422)
Production, distribution, and utilization of major agronomic, vegetable, fruit and nut crops of economic importance in tropical and subtropical areas. Weather systems, climates, soils, and cropping systems of tropical and subtropical areas. Field trip required. 3 lectures, 1 laboratory. Prerequisite: 100/200-level plant production course, or consent of instructor.

FRSC 599 Thesis in Fruit Science (1–9)
Systematic research of a significant problem in Fruit Science. Thesis will include problem identification, significance, methods, data analysis, and conclusion. Students must enroll every quarter in which facilities are used or advisement is received. Degree credit limited to 6 units. Prerequisite: Graduate standing and consent of instructor.

FSN–FOOD SCIENCE AND NUTRITION

FSN 101 Orientation to the Nutrition Major (1) (CR/NC)
Understanding the depth and breadth of the Nutrition program. Emphasis on curriculum and career planning. Nutrition students are required to complete this course within their first year in the major. Credit/No Credit grading only. 1 lecture.

FSN 121 Fundamentals of Food (4)
Theoretical aspects and practical applications of the principles of culinary science and food preparation. 3 lectures, 1 laboratory.

FSN 125 Introduction to Food Science (5)
Basic principles of food science. Chemical, physical, and microbiological properties of foods. Ingredient properties, preservation, and processing. Overview of the commercial food processing industry at state and national levels. 4 lectures, 1 laboratory.

FSN 200 Special Problems for Undergraduates (1–3) (CR/NC)
Individual investigation, research studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 3 units per quarter. Credit/No Credit grading only. Prerequisite: Consent of instructor.

FSN 201 Enterprise Project (1–4) (CR/NC)
Post-harvest processing of a high quality food product. Project participation is voluntary and subject to approval by the department head and the Cal Poly Corporation. Total degree credit for FSN 201 and FSN 401 combined limited to 12 units. Credit/No Credit grading only. Prerequisite: FSN 125 or FSN 230 or FSN 121 and consent of instructor.

FSN 204 Food Processing Operations (4)
Applied food manufacturing and processing technology emphasizing unit operations. Water removal in foods (dehydration, spray drying, vacuum concentration), heat removal (refrigeration, freezing), and osmotic preservation. Students produce processed foods in a pilot plant. 3 lectures, 1 laboratory. Prerequisite: FSN 125 or FSN 230.

FSN 210 Nutrition (4) GE B5
Introduction to the science of human nutrition. Nutrient structure, metabolism, and function in body systems. Application of nutrition science principles to promote optimal health. 4 lectures.

FSN 230 Elements of Food Processing (4)
Principles of food processing operations covering thermal processing, freezing, dehydration, fermentation and raw material handling. Overview of food technology, food quality, spoilage, packaging and label requirements. For non-Food Science majors only. Field trip may be required. 3 lectures, 1 laboratory.

FSN 244 Cereal and Bakery Science (4) Changed effective Fall 2008; see Updates

FSN 250 Food and Nutrition: Customs and Culture (4) GE D4 USCPE
Anthropological perspective of traditional and contemporary food customs and culture. Major emphasis on U.S. cultures including Native American, Hispanic American, African American, and Asian American. Past and future developments in organic foods, junk foods and industrial foods. 4 lectures.

FSN 263 Preparation for Professional Practice (2)
Understanding professional roles in nutrition and food science settings, including dietetics, the food industry, and community and service areas. Discussion of ethics and professional characteristics leading to successful employment. Development of professional portfolios. 2 seminars. Prerequisite: FSN 101, FSN 210, and sophomore standing.

FSN 264 Survey of Food Chemistry (4)
Basic application of chemistry to food products. Role of chemical components of food and beverage formulations with focus on grape, wine, fermented and distilled products as well as fruit, vegetable and cereal products. 4 lectures. Prerequisite: CHEM 111 or equivalent.

FSN 270 Food and Wine Plant Sanitation (4)
Operational management of a food and wine plant sanitation program. Chemical and physical control of insects, rodents, and birds. Microbial sanitation operations. Government and legal issues affecting operations. Chemistry of detergents, surfactants and sanitizers. Design and construction of plants. Certified organic USDA requirements. 4 lectures. Prerequisite: FSN 125 or FSN 230, or consent of instructor.

FSN 275 Principles of Food Safety and Hazard Analysis (4)
Chemical, microbiological, and physical aspects of food safety are addressed especially with regard to establishment of safety programs for the food industry. In-depth coverage of hazard analysis and critical control points (HACCP). 3 lectures, 1 activity. Prerequisite: FSN 125 or FSN 230, or consent of instructor.

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FSN 285 Certified Organic Food Processing Operations (2)  
Changed effective Fall 2008; see Updates
Certification and legal requirements for the processing of fruit, vegetable, wine, beer and distilled spirits as well as muscle foods. Basic principles of certified organic handling and process operations. 2 lectures. Prerequisite: FSN 125, FSN 230 or consent of instructor.

FSN 304 Advanced Culinary Principles and Practice (4)
Chemistry of starch, fat and proteins and its impact on texture, taste, flavor and appearance of food. Effects of microorganisms on changes of food during preparation and storage. Strong emphasis on baking technology. 3 lectures, 1 laboratory. Prerequisite: FSN 121, CHEM 111, or consent of instructor.

FSN 310 Maternal and Child Nutrition (4)  
Changed effective Fall 2008; see Updates
Nutritional needs and issues during pregnancy and lactation. Role of nutrition in normal development, from conception through adolescence. Current nutrition issues in maternal and child nutrition. 4 lectures. Prerequisite: FSN 210; sophomore standing.

FSN 311 Sensory Evaluation of Food (4)
Designed to help the food scientist solve typical sensory problems occurring in the food industry by using simple difference and scaling test designs; select appropriate panelists for specific sensory tests; and conduct such tests, analyze, interpret the results and write a report. 3 lectures, 1 laboratory. Prerequisite: STAT 218; FSN 125 or FSN 230.

FSN 315 Nutrition in Aging (4)

FSN 319 Food Technology for the Consumer (4)  
GE Area F
Overview of the science and technology used to produce the foods consumed on a daily basis. Food science, biotechnology, food law, processing, preservation, ingredient functionality, package label information, and food safety information. 3 lectures, 1 activity. Prerequisite: Completion of GE Area B, and junior standing.

FSN 321 Culinary Management: Principles and Practice (4)
Principles involved in the choice, purchase, and preparation of foods in a variety of settings. Application of culinary management principles in the use of time, energy and money. Planning, preparing, and serving meals with emphasis on nutritional, aesthetic, economic and cultural aspects of food. 3 lectures, 1 laboratory. Prerequisite: FSN 121, FSN 210, sophomore standing.

FSN 322 French Food in French (4)  
Also listed as FR 322
Blend of French language, culture, food preparation techniques, and basic food chemistry and nutrition. Total immersion in language and cooking: preparation of French food while interacting in French with classmates and instructors in lectures, discussion, and laboratory. 3 lectures, 1 laboratory. Prerequisite: FR 103 or consent of instructor.

FSN 323 Statistical Quality Control (3)
Application of statistical methods in quality control programs and evaluation of design and production in the food industry. Emphasis on role of statistical quality control in total quality management. Computer soft ware will be utilized in statistical quality control processes. 3 lectures. Prerequisite: STAT 218 for Food Science majors and FSN 230 for non-majors.

FSN 328 Advanced Nutrition I (4)  
Changed Fall 2008; see Updates
Metabolism of carbohydrates, fats and proteins as it applies to human nutrition. Integration of metabolic pathways. 4 lectures. Prerequisite: FSN 210, CHEM 313/371, BIO 111/161, junior standing.

FSN 329 Advanced Nutrition II (4)  
Changed Fall 2008; see Updates
Continuation of FSN 328. Biochemical, molecular, and physiological functions of vitamins and minerals and their interaction with other nutrients. 3 lectures, 1 laboratory. Prerequisite: FSN 328.

FSN 330 Introduction to Principles of Food Engineering (4)
Introduction to principles of food engineering and basic calculations needed for food plant operations. Unit conversions, material balance, heat balance, steam heating, psychrometry, vacuum and pressure. Field trip may be required. 3 lectures, 1 laboratory. Prerequisite: FSN 125, MATH 118 or equivalent, and PHYS 104; or consent of instructor.

FSN 334 Food Packaging (3)
Function of food packaging in food processing and preservation. Packaging materials and forms. Regulations and testing of food packaging material. Oral presentation required. 3 lectures. Prerequisite: FSN 125 and FSN 204.

FSN 335 Food Quality Assurance (4)  
Changed effective Fall 2008; see Updates
Chemical, microbiological, and physical methods of analyses of foods used in food quality assurance and product development laboratories. Organization and management of quality assurance and control programs. Development of food production standards and interpretation of specifications. Packaging and container evaluation. 3 lectures, 1 laboratory. Prerequisite: FSN 125 or FSN 230, junior standing or consent of instructor.

FSN 341 Wines and Fermented Foods (4)
Processing, manufacturing, historical and bio-technical applications of fermentation technology for the production of food products focusing on wine. Wines of the world, distilled beverages, beers, fermented dairy, vegetable and meat products important to the post-harvest economy of California. 4 lectures. Prerequisite: Junior standing and completion of GE Area B.

FSN 342 Sensory Evaluation of Wine (4)  
Also listed as WVIT 342
Evaluation of wines using the techniques in sensory evaluation. Difference and rating tests; descriptive analysis and pairing of wine and food. 3 lectures, 1 laboratory. Prerequisite: WVIT 202, STAT 218 or STAT 221, age 21 or older.

FSN 343 Institutional Foodservice I (3)
Principles of equipment selection and floor planning with emphasis on sanitation and safety. 2 lectures, 1 laboratory. Prerequisite: FSN 121 and junior standing.

FSN 344 Institutional Foodservice II (3)
Economic principles and problems involved in planning and preparing food using institutional equipment to meet specific product standards for large groups. 2 lectures, 1 laboratory. Prerequisite: FSN 321, FSN 343.

FSN 354 Packaging Function in Food Processing (3)
Basic food spoilage and preservation mechanisms. The role of food packaging in food processing. Package and food compatibility. For non-Food Science majors. 3 lectures. Prerequisite: Junior standing.

FSN 364 Food Chemistry (4)
Chemical and biochemical properties of food components. Basic principles of food enzymology and the chemical and biochemical changes occurring in food systems as a function of different food processing conditions. Mechanisms of reactions affecting food quality and nutritional value. Laboratory focus on assessment of food chemical systems. 3 lectures, 1 laboratory. Prerequisite: FSN 125 or FSN 230, CHEM 313.

FSN 365 Course Change; see FSN 464 Changed Fall 2008; see Updates
FSN 368 Food Analysis (4)
Principles of chemical and biochemical methods and techniques for measuring food protein, carbohydrates, lipids, water, vitamins, minerals and other components of foods, wine analysis. Application of AOAC approved methods for determining nutrients as they relate to nutritional labeling legal requirements. 3 lectures, 1 laboratory. Prerequisite: FSN 364.

FSN 374 Food Laws and Regulations (4)
Federal, state, and local laws and regulations affecting the production, processing, packaging, marketing, and distribution of food. Emphasis on FDA, USDA and California codes. 4 lectures. Prerequisite: FSN 125 or FSN 230.
FSN 400 Special Problems for Advanced Undergraduates (1–4)  
(CR/NC) Changed effective Fall 2008; see Updates  
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 4 units per quarter. Credit/No Credit grading. Prerequisite: Consent of instructor.

FSN 401 Advanced Enterprise Project (1–4) (CR/NC)  
Leadership responsibility on enterprise projects. Lead students, under the supervision of instructor, will be accountable for all phases of the project: scheduling times, securing raw product, record keeping, and marketing of the product. Total degree credit for FSN 201 and FSN 401 combined limited to 12 units. Credit/No Credit grading only. Prerequisite: FSN 201 and junior standing and consent of instructor.

FSN 408 Food Composition Science and Product Development (4)  
Chemical and physical properties of food ingredients. Functionality of water, carbohydrates, proteins, lipids, additives and other food ingredients used in the formulation, development, and processing of foods. Product development processes from idea generation to marketing. 3 lectures, 1 laboratory. Prerequisite: FSN 311, FSN 364, CHEM 313, senior standing or consent of instructor.

FSN 410 Nutritional Implications of Food Industry Practices (4)  
Methods for assessing nutritional quality of foods/diets. Nutrient databases for raw and processed foods. Effects of food industry practices (e.g., processing, fortification, new product development, biotechnology) on nutritional quality of foods/diets. Evolution of public policy. 4 seminars. Prerequisite: FSN 210; FSN 230 or one course in food processing; senior standing; or consent of instructor.

FSN 415 Nutrition Education and Communications (4)  
Application of appropriate behavior and learning theories to bring about positive health outcomes in population groups. Use of effective techniques and materials. Computer-based technology to augment learning activities. 4 lectures. Prerequisite: FSN 328 and senior standing, or consent of instructor.

FSN 416 Community Nutrition (4) Changed Fall 2008; see Updates  
Federal, state and local nutrition assessment activities and program services for at-risk populations. Emphasis on health promotion and disease prevention concepts. Develop skills in assessing community nutrition problems and planning service interventions. 4 lectures. Prerequisite: Senior standing, or consent of instructor. Prerequisite or concurrent: FSN 329. Recommended: FSN 310, FSN 315.

FSN 417 Nutrition Counseling (4) Changed Fall 2008; see Updates  
Communication, behavioral, and counseling theories as they relate to nutrition counseling. Emphasis on development of skills to promote healthy eating behaviors. Examination of eating disorders and obesity, including preventative and therapeutic interventions. 4 lectures. Prerequisite: FSN 415, PSY 201/202.

FSN 420 Critical Evaluation of Nutrition Research (4)  
Nutrition research terminology and methods, including the strengths and weaknesses of in vitro, animal, human observational, and human intervention studies. Critical evaluation and interpretation of nutrition research. Case studies of research supporting or refuting diet/health links. 4 seminars. Prerequisite: FSN 329, STAT 218, and senior standing; or consent of instructor.

FSN 426 Food Systems Management (4)  
Principles of successful organization and management with their application to the effective operation of food service. Administrative responsibilities of the food service manager. Management theories and practice. Labor relations. Discipline and performance appraisal. 4 lectures. Prerequisite: FSN 344, or consent of instructor.

FSN 429 Clinical Nutrition I (4)  
Application of the nutritional care process to physiological disorders which may alter nutritional requirements or require dietary modifications. Anthropometric, biochemical, clinical, and dietary assessment. GI disorders, diabetes mellitus, electrolytes, acid-base balance, hydration and enteral and parenteral nutrition. 3 lectures, 1 laboratory. Prerequisite: ZOO 331, 332 (transfer equivalent ZOO 240, 241) and senior standing. Prerequisite or concurrent: FSN 329.

FSN 430 Clinical Nutrition II (4)  
Application of the nutritional care process to physiological and metabolic disorders which may alter nutritional requirements or require dietary modifications. Respiratory diseases, burns, cancer, inborn errors of metabolism, pregnancy, cardiovascular disease, liver disease, AIDS, renal disease, and bariatric surgery. 4 lectures. Prerequisite: FSN 429.

FSN 440 Internship in Food Science or Nutrition (1–12)  
Career experience with private or public agencies. Total credit limited to 12 units. Maximum of 6 units may be applied toward degree requirements. Prerequisite: Junior standing and consent of instructor.

FSN 444 Engineering Concepts in Food Processing (4)  
Engineering concepts relevant to food processing. Heat transfer, evaporation, dehydration and refrigeration calculation principles. 4 lectures. Prerequisite: FSN 330, FSN 204; FSN 230 for non-Food Science majors.

FSN 461, 462 Senior Project I, II (2-3) (2-3) Changed effective Fall 2008; see Updates  
Selection and completion of research related to the student's area of interest. Project requires a formal report which must follow departmental guidelines. Minimum of 120 hours required (Nutrition majors) or 180 hours (Food Science majors). Prerequisite: Completion of GE Area A3, STAT 218, and senior standing; also prerequisite or concurrent for Nutrition majors: FSN 329.

FSN 464 Wine Chemistry and Analysis (4) Changed effective Fall 2008; see Updates  
Chemical and biochemical analysis of wines using certified methods. Comparative analysis for alcohol, ash, reducing sugars, volatile acidity, color, anthocyanin, tannins, sulfur dioxide by spectrophotometric, gas chromatography and titration methods. 3 lectures, 1 laboratory. Prerequisite: FSN 264 for non-Food Science majors; FSN 364 for Food Science majors; or consent of instructor.

FSN 470 Selected Advanced Topics (1–4)  
Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Senior standing.

FSN 471 Selected Advanced Laboratory (1–4)  
Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Senior standing.

FSN 474 Advanced Food Processing (4)  
Advanced topics in processing operations with emphasis on thermal processing. Non-traditional processing technology such as microwave, ionizing radiation, and Pascilization. Oral presentation required. 3 lectures, 1 laboratory. Prerequisite: FSN 444 and senior standing.

FSN 480 Policy Arguments in Food and Nutrition (2)  
Analysis and evaluation of law and policy in foods, nutrition, and related healthcare issues. Planning and presentation of successful arguments supporting or refuting key food and health policies. Critical assessment of advocacy processes and determination of best approaches to achieving legislative and policy goals. 2 seminars. Prerequisite: FSN 374, junior standing.

FSN 485 Cooperative Education Experience in Food Science and Nutrition (6) (CR/NC)  
Part-time work experience with an approved Food Science or Nutrition firm engaged in production or related business, industry or governmental agency. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.
FSN 495 Cooperative Education Experience in Food Science and Nutrition (12) (CR/NC)
Full time work experience with an approved Food Science or Nutrition firm engaged in production or related business, industry or governmental agency. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

FSN 500 Individual Study (1–6)
Advanced independent study planned and completed under the direction of a member of the department faculty. Total credit limited to 6 units. Prerequisite: Graduate standing, consent of supervising faculty member and graduate advisor.

FSN 501 Lipid Metabolism and Nutrition (3)
Digestion, absorption and metabolism of lipids with emphasis on lipoprotein metabolism, regulation of lipid metabolism, essential fatty acid requirements and functions. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

FSN 540 Dietetic Internship Supervised Practice (10) (CR/NC)
Supervised practice at various nutrition therapy, foodservice management, and community nutrition sites. Total credit limited to 30 units, with a maximum of 10 units per quarter. Credit/No Credit grading only. Prerequisite: Acceptance into the Cal Poly, San Luis Obispo Dietetic Internship, a special session program in Continuing Education.

FSN 541 Dietetic Internship Seminar (2) (CR/NC)
A forum for dietetic interns to make presentations and share their experiences in their supervised practice. Total credit limited to 6 units. Credit/No Credit grading only. 2 seminars. Prerequisite: Acceptance into the Cal Poly, San Luis Obispo Dietetic Internship, a special session program in Continuing Education.

FSN 542 Dietetic Internship: Current and Emerging Issues (2) (CR/NC)
Presentation of various hot topics and emerging issues in nutrition therapy, foodservice management and community nutrition for enrichment of the internship experience. Credit/No Credit grading only. 2 lectures. Total credit limited to 6 units, with a maximum of 2 units per quarter. Prerequisite: Acceptance into the Cal Poly, San Luis Obispo Dietetic Internship, a special session program in Continuing Education.

FSN 570 Selected Topics in Food Science and Nutrition (1–4)
Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 1 to 4 seminars. Prerequisite: Graduate standing or consent of instructor.

FSN 571 Selected Advanced Laboratory in Food Science and Nutrition (1–4)
Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Consent of instructor.

FSN 581 Graduate Seminar in Food Science and Nutrition (3)
Current findings and research problems in the field and their application to food science and nutrition. The Schedule of Classes will list topic selected. Total credit limited to 6 units with approval of advisor. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

FSN 599 Thesis (1–6)
Individual research in food science and nutrition under faculty supervision leading to a graduate thesis of suitable quality. Total credit limited to 6 units. Prerequisite: Graduate standing and consent of instructor.

GEOG—GEOGRAPHY

GEOG 150 Introduction to Cultural Geography (4) GE D3
The interplay of cultures, places, and environments, with emphasis on the diversity, interrelationships, and spatial features of global cultures. Topics include characteristics and patterns of population, ethnicity, agriculture, geopolitics, language, religion, urbanization, industry, and folk and popular culture. 4 lectures.

GEOG 250 Physical Geography (4) (Also listed as ERSC 250)
Addresses the origins and patterns of the earth's diverse assemblage of climates, landforms, biota and soils. A major focus on relationship between human cultures and these earthly environments. 4 lectures.

GEOG 300 Geography of the United States (4) GE D5
The population (including origin, ethnicity, migration, and distribution), land utilization, and economic development viewed against the background of the physical environment. Topically and regionally organized. Pervading themes include landscape evolution and alternation, regional cultural distinctiveness, and current problems. 4 lectures. Prerequisite: Completion of GE Areas A, D1 and D3. Social Sciences majors will not receive GE Area D5 credit.

GEOG 301 Geography of Resource Utilization (4) GE D5
A multicultural, world view of the interconnections of the following resource systems: food, energy, water, and non-fuel minerals. A pervading theme is the sustainability of these systems. 4 lectures. Prerequisite: Completion of GE Areas A, D2 and D3. Social Sciences majors will not receive GE Area D5 credit.

GEOG 308 Global Geography (4) GE D5
Examination of the major world regions such as Europe, the Middle East, Africa, Asia and Latin America. Focus on the origins and content of contemporary cultural landscapes and on their utility for understanding international differences, interactions, and current events. Particular attention to the relationship between humans and the environment. 4 lectures. Prerequisite: Completion of GE Area A and two courses from Areas D1, D2, D3, D4. Social Sciences majors will not receive GE Area D5 credit.

GEOG 317 The World of Spatial Data and Geographic Information Technology (4) GE Area F
Also listed as BIO/FNR/LA 317
Basic foundation for understanding the world through geographic information and the tools available to utilize spatial data. Application of Geographic Information Systems (GIS) and related technologies, including their scientific basis of operation. 3 lectures, 1 activity. Prerequisite: A course in computer science, completion of Area B, and junior standing.

GEOG 318 Applications in GIS (4)
ArcGIS Desktop Geographic Information System (GIS) computer software to explore environmental, natural resource, social and economic issues using spatial data. Principles of cartography and map interpretation. Development of data base and software management competencies. 2 lectures, 2 laboratories. Prerequisite: Junior standing and computer literacy, or consent of instructor.

GEOG 325 Climate and Humanity (4) (Also listed as ERSC 325)
Geographic perspective on the interrelationships between climate and human cultures. Effects of people on climate and the influence of climate and weather upon human activities and behavior. Focus on global human conditions which are responsible for the alteration of climate and in turn are vulnerable to climate change. 4 lectures. Prerequisite: Junior standing or consent of instructor.

GEOG 328 Applications in Remote Sensing (4)
Introduction to the use of satellite imagery to analyze natural and human features on the earth. Applications in geology, water, climate, vegetation, agriculture, and urban land use. Fundamentals of processing digital satellite images. Emphasis on bridging the earth and social sciences. 3 lectures, 1 activity. Prerequisite: GEOG 250 or consent of instructor.

GEOG 333 Human Impact on the Earth (4) (Also listed as ERSC 333)
Global assessment of the impact of humans on the earth's vegetation, animals, soil, water and atmosphere. Emphasis on problems stemming from the interactions of human attitudes, technologies, and population with natural resources. 4 lectures.

GEOG 340 Geography of California (4)
Geographic analysis of the land and people of California. Patterns of physical environment, natural resources, history, settlement, ethnicity,
economy, politics, and urban growth. Current issues in a national and global context. 4 lectures. Prerequisite: Junior standing.

GEOG 360 Geography of Europe (4) GE D5
The population, land utilization, and economic development viewed against the background of the physical environment. Topically and regionally organized. Pervading themes include landscape evolution and alteration, regional cultural distinctiveness, and current problems. Emphasis on Western Europe. 4 lectures. Prerequisite: Junior standing.

GEOG 370 Geography of Latin America (4) GE D5
Geographic analysis of Mexico, Central America, and South America. The patterns of physical environment, culture, economy, and development. The issues (local, regional, and global) that shape Latin America. 4 lectures. Prerequisite: Completion of two courses from GE Areas D1, D2, D3, D4. Social Sciences majors will not receive GE Area D5 credit. Corrected effective Fall 2007; see Updates.

GEOG 414 Global and Regional Climatology (4) (Also listed as ERSC 414) GE D5
The earth's pattern of climates and the physical processes that account for them. Focus on interrelationships between climate and the physical/biological and cultural environments. Special emphasis on modern climate changes and their consequences. 3 lectures, 1 laboratory. Prerequisite: GEOG 250 or consent of instructor.

GEOG 415 Applied Meteorology and Climatology (4) (Also listed as ERSC 415) GE D5
Physical processes in the atmosphere that determine regional weather, climate and climate variability. Surface and satellite systems for weather observation, and weather/climate modeling. Dynamics of weather systems, including thunderstorms and hurricanes. Emphasis on weather/climate affecting agriculture and other human activities. 3 lectures, 1 activity. Prerequisite: GEOG/ERSC 250 or consent of instructor.

GEOG 440 Geo-Social Applications in GIS (4) (Also listed as ERSC 440) GE D5
Applications in Geographic Information Systems (GIS) emphasizing research, methodologies, and career fields to geography, earth sciences, and the social sciences. 2 lectures, 2 laboratories. Prerequisite: GEOG/FNR/LA 318 or consent of instructor.

GEOG 470 Selected Advanced Topics (1–4) GE D5
Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 1–4 lectures. Prerequisite: Consent of instructor.

GEOL–GEOLOGY

GEOL 102 Introduction to Geology (4) GE B3
Processes responsible for the Earth's minerals, rocks, and structure surface features. Volcanism; mountain building; plate tectonics; weathering. Erosion and deposition by streams, glaciers, wind and waves. Geological resources, earth hazards, and interaction of man with global processes. 4 lectures.

GEOL 200 Special Problems for Undergraduates (1–2) GE B3
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisites: Consent of department chair.

GEOL 201 Physical Geology (3) GE B3
Processes responsible for the Earth's rocks, structural surface features, geologic hazards, and natural resources, with emphasis on interactions with human activities. 3 lectures. Prerequisite: MATH 119 or equivalent.

GEOL 203 Fossils and the History of Life (4) GE B5

GEOL 204 Geologic History of California (3) GE B3
Development of California through geologic time. Where and why the rocks appeared. Movement on faults, and mountain building. Geologic processes at work today and yesterday. Relationship of California geology to the rest of the world. 3 lectures. Recommended prerequisite: GEOL 102 or GEOL 201.

GEOL 205 Earthquakes (4) GE B3

GEOL 206 Geologic Excursions (1) (CR/NC)
Field trips to places of geologic interest. The Schedule of Classes will indicate destinations. Students must provide their own transportation, food, and camping equipment. May be repeated for a maximum of 3 units provided field trips are taken to different locations. Credit/No Credit grading only. 1 laboratory. Recommended prerequisite or concurrent: GEOL 102 or GEOL 201 or GEOL 204.

GEOL 241 Physical Geology Laboratory (1) GE B3
Properties and identification of minerals and rocks. Topographic maps and landform analysis. Geologic maps and interpretation of rock structure. 1 laboratory. Prerequisite or concurrent: GEOL 102 or GEOL 201.

GEOL 305 Fundamentals of Seismology (4) GE B6

GEOL 400 Special Problems for Advanced Undergraduates (1–2) GE B3
Individual investigations, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

GEOL 401 Field-Geology Methods (4) (Also listed as ERSC 401) GE B3
Collecting and interpreting field-geologic data. Description of sedimentary rocks and construction of stratigraphic columns. Mapping geologic structures in the field. Surficial geologic stratigraphy and surficial geologic mapping. Understanding geologic processes through field study. Communicating results of field study. 1 lecture, 3 activities. Prerequisite: GEOL 102 or GEOL 201, GEOL 241, SS 223, SS 323.

GEOL 402 Geologic Mapping (4) (Also listed as ERSC 402) GE B3
Bedrock geologic mapping on topographic maps and aerial photos. Surficial geologic mapping on topographic maps and aerial photos. Correlating and defining surficial geologic map units on the basis of soil development. Understanding landscape evolution using soil development 4 activities. Prerequisite: ERSC/GEOL 401.

GEOL 415 Structural Geology (4) GE B3
Recognition, interpretation, and depiction of geological structures. Understanding rock deformation through the study of faults and folds. 3 lectures, 1 laboratory. Required weekend field trips. Prerequisite: GEOL 201, GEOL 241, ERSC/SS 223.

GER–GERMAN

GER 101, 102, 103 Elementary German I, II, III (4) (4) (4)
For beginners. Class practice in pronunciation, sentence structure, reading, writing and basic conversation using the communicative approach. Laboratory drill required. Language taught in its cultural context. To be taken in numerical sequence. 3 lectures, 1 activity.

GER 121, 122 Intermediate German I, II (4) (4)
Review of German grammar and practice in writing and oral expression within a cultural context. To be taken in numerical sequence. 3 lectures, 1 activity. Prerequisite: GER 103 or consent of instructor.

GER 233 Critical Reading in German Literature (4) GE C1
Selected readings from major German authors that show the German literary tradition from the Middle Ages to the present in Germany, Austria,
Switzerland, and or foreign writers in Germany. 4 lectures. Prerequisite: Completion of GE Area A, and GER 122.

**GRC 301 Advanced German Composition and Grammar (4)**
Oral and written development of structural grammar, syntax and complex components of German. Vocabulary expansion and idiomatic construction. Written compositions. Translations to examine linguistic and semantic differences. 4 lectures. Prerequisite: Consent of instructor.

**GRC 302 Advanced German Conversation and Grammar (4)**
Topics focus on culture and selected grammar points. Individual and group presentations and interaction using videos. 4 lectures. Prerequisite: Consent of instructor.

**GER 305 Significant Writers in German (4) GE C4**
Critical analysis and oral discussion of poetry, essays, novels, and plays. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 lectures. Prerequisite: Completion of GE Area A, and GER 233. Modern Languages and Literatures majors will not receive GE C4 credit.

**GER 350 German Literature in English Translation (4) GE C4**
Selected works to be read by students in English translation. Critical analysis, interpretation, and comparison of individual works by outstanding German, Austrian and Swiss writers. Lecture in English. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 lectures. Prerequisite: Completion of GE Area A, and GER 233. Modern Languages and Literatures majors will not receive GE C4 credit.

**GRC 203 Electronic Prepress (3)**
Applied problems focusing on typographic structure and file preparation. Advanced typographic principles relating to print and electronic media. 2 lectures, 1 laboratory. Prerequisite: GRC 101 and either GRC 201 or GRC 377.

**GRC 204 Introduction to Contemporary Print Management and Manufacturing (4)**
Analysis and comparison of print and digital media manufacturing methods to current world-class techniques practiced in industry. Principles and concepts of lean manufacturing applied to print for improved profitability. 4 lectures. Prerequisite: GRC 101.

**GRC 211 Substrates, Inks and Toners (4)**
Technical aspects of paper, other substrates, inks and toners used in the printing industry. Manufacture, application and interaction of these materials are examined in relation to particular processes and end use requirements. Hands-on use of computerized densitometers, spectrophotometers and performance testing equipment. 3 lectures, 1 laboratory. Prerequisite: GRC 101.

**GRC 212 Substrates, Inks and Toners: Theory (3)**
Technical aspects of paper, other substrates, inks and toners used in the printing industry. Manufacture, application, and interaction of these materials are examined in relation to particular processes and end use requirements. Credit not allowed for GRC majors. 3 lectures. Prerequisite: GRC 101.

**GRC 218 Digital Typography (4)**
History, development and application of typography in relation to electronic file preparation for cross media publishing. In-depth study of communication principles and visual organization utilizing page layout software. Font technology and management for the creative, print and publishing industries. 3 lectures, 1 laboratory. Prerequisite: GRC 203 or GRC 377.

**GRC 260 Introduction to Research Methods in Graphic Communication (3)**
Introduction to research methods for preparing scholarly and defensible papers and projects, and in conducting qualitative and quantitative evaluations, testing and research in graphic communication. Methods covered include the Scientific Method, historical and descriptive research, questionnaires, Elite and Specialized Interviewing, content analysis, and sampling. Design of research projects for each method taught. 2 lectures, 1 activity. Prerequisite: GRC 101

**GRC 316 Flexographic Printing Technology (3)**
Analysis of flexographic printing technology for flexible packaging, label printing, folding and corrugated cartons. Applications of computers to the management and technical function of flexographic printing technology. 2 lectures, 1 laboratory. Prerequisite: GRC 211.

**GRC 320 Managing Quality in the Graphic Arts (4)**
Theory and practices of quality systems in the graphic arts industry. Emphasis on Deming Systems Thinking, Lean Manufacturing, Six Sigma, ISO, and Malcolm Baldrige. Quantifying customer expectations, specifications, standard operating procedures, SPC tools, and employee empowerment in the graphic arts. 3 lectures, 1 laboratory. Prerequisite: GRC 315 or GRC 328, and STAT 217.

**GRC 322 Advanced Digital Typography (3)**
Advanced typographic principles relating to print and electronic media. Page layout and font management with consideration for multiple media. Applied problems focusing on typographic structure and file preparation. 2 lectures, 1 laboratory. Prerequisite: GRC 218 and GRC 338.

**GRC 324 Binding, Finishing, and Distribution Processes (3)**
Imposition techniques, cutting, and folding. Stitch, case and perfect binding techniques and applications. Operational and aesthetic uses of die cutting, scoring, creasing, foil stamping and embossing techniques. Fulfillment and mailing operations. Applications of computers to the management and technical function of binding; finishing and distribution. 2 lectures, 1 laboratory. Prerequisite: GRC 101.

**GRC 325 Binding and Finishing Processes: Theory (2)**
Imposition techniques, cutting, folding, book and publication binding. Stitch, case and adhesive binding techniques and applications. Technology and aesthetic uses of die cutting, scoring, creasing, foil stamping and embossing. Fulfillment and mailing operations. Applications of computers...
GRC 328 Sheetfed Printing Technology (4)
Theory, practice and application of sheetfed printing and plate technology for commercial, book, advertising, catalog, packaging and reprographic segments of the printing industry. Press configurations, materials, computerized press controls, workflow, pressroom management, coating and quality control. Plate types, quality and new technologies for sheetfed printing. 3 lectures, 1 laboratory. Prerequisite: GRC 211.

GRC 329 Web Offset and Gravure Printing Technologies (3)
Introduction to web offset and gravure printing for newspapers, packaging, magazines, books, catalogs and commercial products. Application of technology to the management and production of web offset and gravure printing. Preparation and use of gravure cylinders. 2 lectures, 1 laboratory. Prerequisite: GRC 328.

GRC 331 Color Management and Quality Analysis (4)
Color management, perception, psychology, and measurement for print and digital media. Application of systems engineering concepts to color workflow to maximize overall quality in the digital imaging and printing industry. Development of print quality assessment skills. 3 lectures, 1 activity. Prerequisite: GRC 202 and PSC 101.

GRC 337 Consumer Packaging (3)
Problem-solving strategies for package printing that integrate concepts from marketing, design and technology. Package manufacturing, function, quality, visual appeal, and economics are addressed. 2 lectures, 1 laboratory. Prerequisite: Junior standing or consent of instructor.

GRC 338 Digital Content Management and Variable Data Printing (4) Changed effective Summer 2007; see Updates
Advanced application of type arrangement, digital illustration, image capture and page layout. Digital content management strategies for print and electronic media including file management, database principles, archiving, document formats, variable data publishing, workflow analysis and repurposing. Technical and creative problem-solving for content production and management in print and web publishing. 3 lectures, 1 laboratory. Prerequisite: GRC 203.

GRC 339 Digital Design and Production for Multiple Media (4)
In-depth understanding of design and production as it relates to print and on-line digital media. Advanced production techniques in image editing and multimedia applications. Preparation and evaluation of computer-generated images. 3 lectures, 1 laboratory. Prerequisite: GRC 338.

GRC 357 Specialty Printing Technologies (3)
Specialty printing technologies used in garment decorating, signage, point of purchase displays, decals, security printing and various forms of packaging. Digital file preparation and printing using special processes including screen printing, pad printing, sublimation printing and wide-format printing. 2 lectures, 1 laboratory. Prerequisite: GRC 201 or GRC 377.

GRC 361 Marketing and Sales Management for Print and Digital Media (4)
Identification and development of target markets for products and services in the graphic communication industry. Deployment of strategies in pricing, promotion and distribution management. Application of customer relationship management techniques for personal selling, forecasting and planning. 3 lectures, 1 laboratory. Prerequisite: GRC 101.

GRC 377 Web and Print Publishing (4) GE Area F
Web and print publishing technology and its impact on society. The technologies of scanning, typography, graphics, layout, and design for print and web publishing including decision-making considerations. The application of scientific and mathematical principles to web and print publishing technologies. 3 lectures, 1 laboratory. Prerequisite: Completion of Area B and junior standing. Graphic Communication majors will not receive GE Area F credit.

GRC 400 Special Problems for Advanced Undergraduates (1–2)
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

GRC 402 Digital Printing and Emerging Technologies in Graphic Communication (3) Changed effective Summer 2007; see Updates
Application of digital printing including the study of marking engines, RIPs, and related technologies. Emerging graphic communication technologies that are impacting the methods and procedures of producing and distributing print media. Technological transitions and how to manage technological change. 2 lectures, 1 activity. Prerequisite: GRC 201.

GRC 403 Estimating for Print and Digital Media (4)
Estimating the cost of various kinds of print and digital products and services. Development of budgeted hour costs and production standards. Cost estimating methods for Print on Demand, VDP, sheetfed lithography, web site development, and wide-format output. Analysis of material, labor and other cost factors. 3 lectures, 1 laboratory. Prerequisite: GRC 315 or GRC 328.

GRC 411 Strategic Trends and Costing Issues in Print and Digital Media (4)
Graphic communication industry market trends. Strategies for profitably positioning graphic communication companies. Costing methodology and practices for graphic communication companies. Company profitability using ratio analysis. Innovative management practices in the graphic communication industry. 3 lectures, 1 activity. Prerequisite: GRC 403.

GRC 421 Production Management for Print and Digital Media (4)
Management principles and production control methodologies for print and digitally-imaged products. Organization analysis, decision-making, equipment and inventory planning, resource optimization, and the application of contemporary quality management initiatives. 3 lectures, 1 activity. Prerequisite: GRC 315 or GRC 328, and MATH 117, MATH 118, or MATH 120.

GRC 422 Human Resource Management Issues for Print and Digital Media (4)
Human resource management integrated into the success of graphic communication companies. A comprehensive management approach is utilized emphasizing policy development, training, safety, motivation, facilitation skills, team building and empowerment, ethical and legal issues in the printing industry. 3 lectures, 1 laboratory. Prerequisite: GRC 421.

GRC 429 Digital Media (3)

GRC 431 Printing Plant Layout Analysis (3)
Elements of printing plant site selections, equipment planning, inventory planning, and workflow optimization. Design and layout of printing plants for effective space utilization. Organization of plant services. 2 lectures, 1 activity. Prerequisite: GRC 421.

GRC 432 Imaging Systems Management (4)
Management issues associated with the introduction and use of computerized electronic prepress systems. Strategic, technical, marketing, financial, production, operational, and personnel aspects of color prepress work in a capital-intensive environment. 4 lectures. Prerequisite: GRC 338.

GRC 439 Book Design Technology (4)
Advanced creative problem-solving strategies associated with the technologies used in book design and production. Advanced techniques in page layout, design, typography, type specification and image manipulation as they relate to output technology. Content, format and distribution of print and electronic books. 3 lectures, 1 laboratory. Prerequisite: Senior standing, GRC 218 and GRC 338.

GRC 440 Magazine and Newspaper Design Technology (4)
Concept development of magazine and newspaper design technology. Design and technical considerations as they relate to output and rendering.
technology. Application of organizational structures such as grids, formatting and sequential design. Advanced techniques in digital information and image manipulation. Content, format and distribution of print and electronic magazines and newspapers. 3 lectures, 1 laboratory. Prerequisite: Senior standing, GRC 218 and GRC 338.

GRC 451 Management Topics in Graphic Communication (3)
Current trends and practices in select graphic communication management topics. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 3 lectures. Prerequisite: GRC 101 and GRC 201.

GRC 452 Emerging Digital Topics in Graphic Communication (3)
Current trends and practices in select graphic communication emerging digital topics. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 3 lectures. Prerequisite: GRC 101 and GRC 201.

GRC 453 Design Reproduction Topics in Graphic Communication (3)
Current trends and practices in select graphic communication design reproduction topics. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 3 lectures. Prerequisite: GRC 101 and GRC 201.

GRC 460 Research Methods in Graphic Communication (2)
Research methods for preparing scholarly and defensible papers and senior projects, and in conducting qualitative and quantitative evaluations, testing, and research in graphic communication. Methods covered include statistical, historical, descriptive, questionnaires, interviewing, and sampling. 1 lecture, 1 activity. Prerequisite: Senior standing and STAT 217.

GRC 461 Senior Project (3)
Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in formal report. Minimum 90 hours total time. Prerequisite: GRC 460.

GRC 470 Selected Advanced Topics (1–4)
Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

GRC 472 Applied Graphic Communication Practices (2)
Application of theories and practices to University Graphic Systems as they apply to commercial printing, publication printing, digital media and newspaper industries. Major credit limited to 4 units; total credit limited to 18 units. 2 lectures. Prerequisite: GRC 101.

GRC 473 Applied Graphic Communication Management Practices (2)
Management theories and practices in the graphic communication industry. Application of theories and practices to University Graphic Systems as they apply to commercial printing, publication printing, digital media and newspaper industries. Major credit limited to 6 units; total credit limited to 18 units. 2 lectures. Prerequisite: GRC 472 and consent of instructor.

GRC 485 Cooperative Education Experience (6) (CR/NC)
Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

GRC 495 Cooperative Education Experience (12) (CR/NC)
Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

GRC 500 Special Problems in Document Systems Management for Graduate Students (2)
Investigation, research, studies of problems in document systems management. Repeated course over four quarters working with University Graphic Systems, the Graphic Communication Institute at Cal Poly, and with individual faculty. Total credit limited to 8 units. Prerequisite: Second year MBA student, GRC 101 and GRC 201 or advisor approval.

GSA–GRADUATE STUDIES–ACCOUNTING

GSA 535 Legal Aspects of Commercial Transactions (4)
Relation of the legal, regulatory, and ethical environment to commercial transactions. Examination of the law of competitive torts and unfair competition, property, sales, commercial paper, secured transactions, bankruptcy, securities regulation, and environmental regulation, with an emphasis on the Uniform Commercial Code. Case studies. 4 seminars. Prerequisite: Graduate standing or approval from the program director.

GSA 536 Taxation of Trusts, Estates, and Transfer Taxes (4)
Income taxation of trusts and estates as flow-through entities; transfer taxation of gifts and estates, including generation-skipping transfers. 4 lectures. Prerequisite: Graduate standing or approval from the program director.

GSA 537 State and Local Taxation (4)
Multi-state income and franchise taxation; property taxes; sales and use taxes; and the constitutional authority for the imposition of state taxes. 4 lectures. Prerequisite: Graduate standing or approval from the program director.

GSA 538 Current Developments in Taxation (4)
Current developments in income taxation of individuals, trusts and estates and business entities; transfer taxation of gifts and estates; and ethics and professional responsibility in taxation. 4 lectures. Prerequisite: Graduate standing or approval from the program director.

GSA 539 Internship (9) Changed effective Winter 2007; see Updates
Accounting internship that allows graduate level accounting students the opportunity to apply skills and competencies to an employment opportunity. Placement in a full-time supervised work experience at a public accounting firm or in an accounting or internal audit department of a private enterprise or government agency. Prerequisite: Graduate standing in Specialization in Tax, MS Accounting program.

GSA 540 Taxation of Corporations and Partnerships (4)
Comparative study of the taxation of C corporations and flow-through tax entities, including S corporations, partnerships and limited liability companies. Not open to students with credit in BUS 417. 4 lectures. Prerequisite: Graduate standing or approval from the program director.

GSA 541 Advanced Financial Reporting Issues I (4)
Comprehensive coverage of selected advanced financial accounting and reporting topics. Topics include software costs, compensation plans, earnings per share, leases, pensions and post-retirement plans, income taxes, dollar value LIFO inventories. 4 seminars. Prerequisite: BUS 321 and BUS 322 or consent of instructor.

GSA 542 Auditing (4)
Survey of the ethical, regulatory and legal environment in which audits occur. An appreciation of how audit risk is assessed, how auditors evaluate clients' internal control structures, the role of evidence in an audit, and the audit reporting requirements. 4 seminars. Prerequisite: BUS 321, BUS 322, graduate standing.

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GSA 543 Advanced Financial Reporting Issues II (4)
Comprehensive coverage of selected advanced financial accounting and reporting topics. Topics include restructuring charges, segments, foreign currency transactions and derivatives, interim accounting disclosures, and advanced consolidated statement topics. 4 seminars. Prerequisite: GSA 541.

GSA 544 Advanced Enterprise Wide Business Processes (4)
Study of various transactions in order to understand the underlying business processes and information flows between various business units, in order for a transaction to occur and be properly reported, and the information determined that is critical for the information system to capture. Emphasis of role of information systems in controlling the authorization of transactions, access to information, access to assets, preparation of accounting records and reports. 3 seminars, 1 activity. Prerequisite: BUS 429.

GSA 545 Applied Research and Communications (4)
Advanced use of authoritative accounting and auditing data bases and actual filings by public companies. Frequent writing and speaking exercises. Real world accounting and auditing issues facing public and private enterprises. In-depth coverage of federal and state regulation of securities transactions. Prerequisite: BUS 543.

GSA 546 Tax Research and Administrative Procedures (4)
Research techniques applicable to tax issues including the communication of research results. Administrative procedures necessary for tax compliance with the various tax jurisdictions with primary emphasis on IRS practices. 2 seminars, 2 activities. Prerequisite: Graduate standing or approval from the program director.

GSA 547 Corporate Taxation (4)
Income tax treatment of regular C corporations and their shareholders. The creation, operation, and liquidation of such organizations. 4 seminars. Prerequisite: GSA 546.

GSA 548 Advanced Individual Taxation and Tax Planning (4)
Advanced concepts concerning the impact of taxes on individuals. Introduction to transfer taxes imposed on individuals. Financial, estate and compensation tax planning issues. 4 seminars. Prerequisite: Graduate standing or approval from the program director.

GSA 549 Advanced Taxation of Flow-Through Entities (4)
Advanced and special topics related to the income tax treatment of partnerships, limited liability companies, trusts and S corporations and their owners and beneficiaries. Creation, operation, liquidation and sale of such organizations. Culminating experience for Taxation Specialization. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSA 550 Advanced Corporate Taxation (4)
Advanced and special topics related to the income tax treatment of regular corporations and their shareholders. Mergers and acquisitions, tax accounting methods and periods, cross-boundary topics, and current issues. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB–GRADUATE STUDIES–BUSINESS

GSB 500 Independent Study (1–4)
Advanced study planned and completed under the direction of the Director of Graduate Programs. Open only to graduate students who have demonstrated ability to do independent work. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. Prerequisite: Graduate standing and formal petition with approval from the Associate Dean of OCOB Graduate Programs.

GSB 501 Individual Research (1–4)
Advanced individual research planned and completed under the direction of a member of the college faculty. Designed to meet the needs of qualified students who wish to pursue investigations which cannot be followed effectively in regularly offered elective courses. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. Prerequisite: Graduate standing and formal petition with approval from the Associate Dean of OCOB Graduate Programs.

GSB 503 Collaborative Industry Project (1-8)
Collaborative business project with a client organization that allows graduate level students the opportunity to apply knowledge, skills and competencies to address a business problem. Small teams work in collaboration with a client organization and a faculty advisor. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. The project may last up to one year. Prerequisite: Graduate standing and formal petition with approval from the Associate Dean of OCOB Graduate Programs.

GSB 511 Accounting for Managers (4)
Emphasis on development of the ability to read and interpret public and internal financial reports. Public reporting responsibilities of companies and management’s responsibilities for developing and maintaining effective internal control systems. 3 lectures, 1 activity. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 512 Quantitative Analysis (4)
Focus on a variety of statistical techniques that help to transform data into useful information that can be used to make informed business predictions and decisions. 3 seminars, 1 laboratory. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 513 Organizational Behavior (4)
Application of behavioral, social and organizational science concepts to management. Individual, team and organizational levels of analysis, including such topics as expectations, perception, motivation, communications, creativity, leadership, cultural and ethical behavior, group dynamics, team effectiveness, work design, organization change and development. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 514 The Legal and Regulatory Environment of Business (4)
Legal and regulatory environment in which business operates. Consideration of historical, societal, and global perspectives reflecting political, social and/or economic beliefs and values. Strong emphasis on fundamental concepts of law and analytical tools to understand interaction between law, ethics and management decisions. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 522 Advanced Management Information Systems (4)
Set of tools to ensure understanding of the strategies, tactics, and operations employed by managers to assimilate technology across their firms. Critical topics include alignment, partnership, technology, human resources, governance, communications, and metrics. 3 lectures, 1 activity. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 523 Managerial Economics (4)
Managerial economics, or microeconomics, focuses on private markets. Choices made by firms and consumers within topics that include demand, supply, efficiency, marketing structure, and government intervention. Development of an analytical framework for analyzing how these topics are important for managers. 4 lectures. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 524 Marketing Management (4)
Introduction to marketing management. Concepts and principles necessary to plan, direct and control the product, promotion, distribution and pricing strategies of the firm. 4 lectures. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 525 Project Management (4)
Focus on project management tools and processes required to establish priorities for and management of projects within normal and abnormal scope, money and time constraints. Planning, organizational and resource challenges common to a variety of project types. Product life cycle, normal operational, new product introduction and profit oriented product family
projects reviewed in service and production environments. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 526 Knowledge Management and Business Intelligence (4)**

Relationships among knowledge management (KM), knowledge organizations and knowledge workers. Mapping of the field of knowledge management and exploration of the nature and key features of KM. Discussion of knowledge management and business intelligence central themes using case studies; alternative ways to design, implement and improve KM systems in organizations; business intelligence, decision support systems and data warehousing. Integration of querying, reporting, OLAP, data mining and data warehousing functions. 3 lectures, 1 activity. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 527 Management of Information Security (4)**

Topics of information security and the need for security from a managerial perspective. Legal, ethical and professional information security issues. Planning for security and contingency considerations. Business policies and programs for organizational security. Risk management and control as mechanisms for protection. Examples of information security issues and practices implemented in today’s business environment. 3 lectures, 1 activity. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 528 Commercial Development of Innovative Technologies (4)**

Conceptual business frameworks for commercialization of new and innovative products and technologies. Business aspects of innovative technologies as they relate to core functional areas such as finance, accounting, marketing, operations, and business and intellectual property law. 4 lectures. Prerequisite: OCOB graduate standing or approval from the OCOB Associate Dean of Graduate Programs.

**GSB 529 Effective Communication Skills for Managers (4)**

Enhancement of business writing and oral presentation skills, organized around two areas: 1) preparing written business documents and reports, and 2) professional oral presentation skills. Preparation of a variety of business reports and documents. Multiple business presentations. 4 lectures. Prerequisite: OCOB graduate standing or approval from the OCOB Associate Dean of Graduate Programs.

**GSB 530 Managerial Finance (4)**

Theories, practices and tools of corporate financial decision making. Topics include valuation of fixed income securities and stocks, capital budgeting, capital structure, dividends, and an overview of financial markets and institutions. Introduction to valuation of derivatives securities, market efficiency, and agency costs. 4 lectures. Prerequisite: GSB 511 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 531 Strategic Information Systems (4)**

Overview of information technology trends and implications. Information systems (IS) functions and organization. Strategic planning for information systems. Integration of IS plan with corporate strategy. IS administration and control. Management of IS development and computer operations. IS issues in a multinational environment. 3 lectures, 1 activity. Prerequisite: GSB 522 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 532 Aggregate Economics Analysis and Policy (4)**

Development of the theoretical and empirical framework of the macroeconomy in which businesses must operate. Topics include GDP, inflation, unemployment, interest rates and monetary and fiscal policies. The dynamics of the macroeconomic environment over time. 4 lectures. Prerequisite: GSB 523 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 534 Production and Operations Management (4)**

Introduction to the operations function and its interaction with other areas in an organization. Emphasis on strategic and tactical decisions to achieve competitive advantage in cost, delivery speed and reliability, quality, flexibility, and product innovation through manufacturing and services. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 535 Advanced Accounting Process Analysis and Risk Assessment (4)**

Contemporary topics associated with documenting and assisting risk, controls, and business processes. Topics include business objectives and organizational performance, risk identification and assessment, application of assessment techniques, and the role of accounting information systems in controlling transaction authorization. 3 seminars, 1 activity. Prerequisite: GSB 511 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 536 Advanced Financial Reporting Issues (4)**

Comprehensive coverage of selected advanced financial accounting and reporting topics. Topics include restructuring charges, accounting for income taxes, pensions, leases, accounting charges, and consolidated statement topics. 4 seminars. Prerequisite: GSB 511 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 537 Corporate Governance in Ethical Organizations (4)**

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

**GSB 538 Emerging Issues in Business (4)**

Focus on one or more developing, cutting-edge issues facing contemporary managers within a specific business discipline. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 seminars. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 539 Graduate Internship in Business (2-8) (CR/NC)**

Correlation of experience and academic knowledge. Placement in a supervised business or public organization. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. Credit/No Credit grading only. Prerequisite: Graduate standing and formal petition with approval from the Associate Dean of OCOB Graduate Programs.

**GSB 541 Federal Income Tax for Business (4)**

An introduction to the principles of business taxation. Emphasis of the role taxes play in financial and managerial decision making and how taxes motivate people and institutions to engage in certain transactions and activities. 4 lectures. Prerequisite: GSB 511 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 552 Negotiation for Managers (4)**

Negotiation concepts and practice in two-party and multiple-party situations faced by practicing managers. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 556 Entrepreneurship and Small Business Management (4)**

Exploration of entrepreneurship with emphasis on the formation and management of new business ventures. Analysis of typical operating problems of these firms and application of appropriate techniques for their solution. 4 seminars. Prerequisite: Graduate standing or approval from the OCOB Graduate Programs Director.

**GSB 557 Organizational Theory and Design (4)**

Open systems theory and macro dimensions of organizations including environment, mission, goals, structure, technology, and managerial processes. Alternative redesign processes, and business results through cases and exercises. Role of management in designing the organization to achieve balanced outcomes. 4 seminars. Prerequisite: Graduate standing or approval from the OCOB Graduate Programs Director.

**GSB 560 Derivative Markets and Instruments (4)**

Introduction to derivative markets and their key instruments. Application of financial theory to the problems of valuing derivative securities and the
management of business risks with derivative instruments. Principal securities considered include forwards, futures, options, and swaps. 4 lectures. Prerequisite: GSB 531 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 562 Seminar in General Management and Strategy (4)
Application of interdisciplinary skills to business and corporate strategy formulation and implementation. Analysis of interdependence between external environments and internal systems. Focus on responsibilities, tasks, and skills of general managers. Case studies, group problem solving. Integrating course of MBA core curriculum. Course satisfies comprehensive examination requirement. 4 seminars. Prerequisite: Graduate standing and GSB 511, GSB 513, GSB 523, GSB 524, GSB 531, GSB 533 and either GSB 512 or IME 503 and either GSB 534 or IME 580 or approval from the Associate Dean of OCOB Graduate Programs.

GSB 563 International Business Tour (4)
Business tour exposure to different management systems and their operating environments. Pre-trip and on-the-road meetings, readings, case studies and discussions. Tours of firms, government offices, ministries, etc; inter-views of managers and government officials. Conducted in English. Passport required. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 2 seminars, 2 activities. Prerequisite: OCOB graduate standing or approval from the OCOB Associate Dean of Graduate Programs.

GSB 564 Entrepreneurial Finance (4)
The process of financing new and fast-growing firms. Preparation of pro forma financial statements for a new venture. Readings on the venture capital process, from seed capital through the initial public offering (IPO). Valuation of firms seeking venture capital, and those planning their IPO. Valuing convertible securities. Real options valuation. 4 lectures. Prerequisite: GSB 531 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 565 Services Marketing (4)
Service organizations such as financial services firms, professional services firms, and health care organizations. The distinctive approaches required for marketing strategies unique to service organizations and other business entities which define themselves from a services perspective. 4 seminars. Prerequisite: GSB 524 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 566 Product Management (4)
Issues which confront brand/product managers: includes content needed to design new product/brand marketing development programs. Appropriate for students pursuing product career paths in consumer/business/service sectors. 4 seminars. Prerequisite: GSB 524 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 567 Advanced Seminar in International Business Management (4)
Integration of management concepts within complex multinational organizations. Interdisciplinary approach to identifying and assessing multinational and global competitive environments and strategies; structuring and managing interdependent multinational operations; addressing conflicts between domestic and international policies and practices in multinational enterprises. Case studies, simulations, group analysis and problem solving. Course satisfies the culminating experience through the comprehensive examination option. 4 seminars. Prerequisite: Graduate standing and GSB 511, GSB 513, GSB 523, GSB 524, GSB 531, GSB 533 and either GSB 512 or IME 503 and either GSB 534 or IME 580 or approval from the Associate Dean of OCOB Graduate Programs.

GSB 569 Managing Technology in the International Legal Environment (4)
Practical legal decisions required to conduct business for or with high technology companies. Methods to protect high technology developments in international markets, including copyrights, patents, trade secrets, trademarks and contracts. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 570 Selected Advanced Topics (1-4)
Directed group study of selected topics for advanced students. Total credit limited to 8 units. The Schedule of Classes will list topic selected. 1-4 seminars. Prerequisite: OCOB graduate standing or approval from the OCOB Associate Dean of Graduate Programs.

GSB 573 Market Research and Planning (4)
The steps in the marketing research process which include formulation of the research problem, situation analysis, qualitative data collection, questionnaire design, data collection and data analysis. 4 seminars. Prerequisite: GSB 524 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 574 Seminar in Labor-Management Relations (4)
The impact of unionized labor on management practice. Three challenges to management; namely, the organizing challenge, the negotiation challenge, and the grievance/arbitration challenge. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 576 Seminar in Quality and Performance Management (4)
Principles and techniques of quality and performance management as applied to organizations in the private and public sector. Emphasis on competitive implications, integration of fundamental management techniques, quality management tools, and new management technologies focused on continuous organizational improvement. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 577 Advanced Quantitative Business Analysis (4)
The necessary conceptual framework of operations research techniques for solving key problems encountered while managing an enterprise. Concepts of linear programming, simulations, network models, inventory models, PERT/CPM, and forecasting techniques. 3 seminars, 1 laboratory. Prerequisite: GSB 512 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 578 International Business Management (4)
Managerial concepts and techniques appropriate for analysis and decision making within international businesses. Environmental and organizational factors influencing multinational operations. Assessing international market opportunities and entry modes. Complexities of multinational management strategy, structure and systems. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 579 Manufacturing Strategy (4)
Strategic role of manufacturing in the overall corporate competitive strategy. Matching manufacturing capabilities and marketing needs, capacity planning, matching process technology with product requirements. Developing flexible capabilities, central to developing and implementing an effective manufacturing strategy. 4 seminars. Prerequisite: GSB 534 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 581 Advanced Marketing Seminar (4)
Product, branding, and pricing strategies: an in-depth understanding of new product development processes and strategy; analysis of the strategies and policies pursued by firms to build and sustain successful brands; an integrative framework for pricing decisions. 4 seminars. Prerequisite: GSB 524 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 582 High-Technology Marketing (4)
Marketing as applied to high technology products, and the impact of high technology on the marketing effort. 4 seminars. Prerequisite: GSB 524 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

GSB 583 Management of Human Resources (4)
An overview of the major functional and support activities in the personnel/human resource field, including strategic human resource planning, job analysis, recruitment, selection, performance appraisal,
compensation, employee rights, and employee safety and health. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 584 Corporate Financial Policy (4)**
An overview of the factors that affect corporate financial decisions, including firms’ financing, investment and hedging policies. Factors included: taxes, transaction costs, contracting (between managers and shareholders, and between shareholders and other claimholders such as bondholders), and asymmetric information. 3 seminars, 1 activity. Prerequisite: GSB 531 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 585 Investments and Portfolio Management (4)**
The application of financial theory to the problems of investment management. Topics cover the valuation of basic financial instruments, portfolio optimization, risk management, asset allocation, the CAPM, and market efficiency. Required use of optimization software and writing spreadsheet programs. 4 seminars. Prerequisite: GSB 531 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 586 Financial Markets and Instruments (4)**
The form and function of major types of financial institutions and markets. Exposure of financial institutions to a wide variety of risks, the successful management of which is important for the growth and survival of these institutions (liquidity risk, interest rate risk, market risk, credit risk, off-balance-sheet risk, and operating risk). In-depth exploration of the measurement and management of these risks. 4 seminars. Prerequisite: GSB 531 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 587 International Financial Management (4)**
The international aspects of corporate finance and investing. Balance of payments, foreign exchange with emphasis on exchange rate determination, exchange rate risk, hedging, and interest arbitrage, international money and capital markets, international financing, and international banking. 4 seminars. Prerequisite: GSB 531 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 589 Accounting Policy (4)**
The role of management in establishing and directing accounting policy. Coverage includes the impact of management decisions on external reporting and taxes and the impact of financial reporting requirements on management decisions. 4 seminars. Prerequisite: GSB 511 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 590 Designing and Managing Sociotechnical Systems (4)**
Sociotechnical Systems (STS) thinking and methods, which examine the fit between the technical systems used by an organization and its human (social) system. Techniques for analyzing work in both routine and non-routine business systems. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 595 Managing Change (4)**
The knowledge and the elementary skills/competencies needed to intervene in an organization in order to improve its effectiveness. Design and use of action to improve organizational effectiveness. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 596 Economic Forecasting (4)**
Applications to business planning of selected economic forecasting techniques. Classical time series analysis, Box-Jenkins (ARIMA) models, leading indicators and input-output analysis. 3 seminars, 1 laboratory. Prerequisite: GSB 523, 533 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**GSB 597 Seminar in Selected Economic Problems (4)**
Selected economic problems analyzed at an advanced level in a particular field, such as international trade, public finance, urban, industrial organization or transportation. 4 seminars. Prerequisite: GSB 533 and graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**HCS–HORTICULTURE AND CROP SCIENCE**

**HCS 110 Orientation to Horticulture and Crop Science (2) (CR/NC)**
Understanding the depth and breadth of horticultural and field crops, and plant protection. Examination of curricula within the department, including potential career opportunities. Introduction to both student and professional organizations and affiliations. Agricultural equipment and chemical safety. Required of all Horticulture and Crop Science students. Credit/No Credit grading only. 2 activities.

**HCS 120 Principles of Horticulture and Crop Science (4)**
Introduction to horticulture and crop science. Basic plant processes, classification, anatomy, physiology, and biotechnology. Effect of environment on plants and how we control it. Introduction to plant growth including propagation, media, irrigation, nutrition, management, harvest, and post harvest handling. People’s use of plants. Field trip required. 3 lectures, 1 laboratory.

**HCS 124 Plant Propagation (4)**
Plant propagation practices with emphasis on understanding why practices are used, how they work, and how they are applied in commercial horticulture. Field trip required. 3 lectures, 1 laboratory. Prerequisite: HCS 110, HCS 120, and BOT 121.

**HCS 200 Special Problems for Undergraduates (1–4)**
Individual investigation, research, studies, or surveys of selected problems. Total graduation credit limited to 4 units, with a maximum of 4 units per quarter. Report required. Prerequisite: Consent of department head.

**HCS 231 Commercial Seed Production (4)**
Production of field and vegetable seed. Seed technology, germination, quality control, seed enhancement, storage and handling of seed, and seed laws. Field trip to a seed conditioning/seed enhancement facility required. 3 lectures, 1 laboratory. Prerequisite: HCS 120, CRSC 230 or VGSC 230, or consent of instructor.

**HCS 304 Plant Breeding (4)**
Principles and techniques used to develop new plant varieties. Sexual reproduction, inheritance, selection and biotechnology methods useful in breeding of plants. Field trip required. 3 lectures, 1 laboratory. Prerequisite: HCS 120, EHS 123, HCS 124, EHS 231, EHS 232, BOT 121, CHEM 111, SS 121.

**HCS 327 Abiotic Plant Problems (3)**
Diagnosis of physiological disorders associated with environmental and nutritional factors. Particular emphasis on the systematic inquiry process. Case histories, multimedia use. 2 lectures, 1 laboratory. Prerequisite: HCS 120, EHS 123, HCS 124, EHS 231, EHS 232, BOT 121, CHEM 111, SS 121.

**HCS 329 Plants, Food and Biotechnology (4)  GE Area F**
(Also listed as BOT 329)
Agriculture as applied biology and its impact on civilization. Application of technology to increase the efficiency of food production. Genetics and biotechnology; culminating in an assessment of genetically engineered foods, the myths, the controversy, the science. 3 lectures, 1 laboratory. Prerequisite: Junior standing, completion of GE Area B, and one of the following: BIO 111, BIO 161, BOT 121, HCS 120.

**HCS 339 Internship in Horticulture and Crop Science (1–12) (CR/NC)**
Selected Horticulture and Crop Science students will spend up to 12 weeks with an approved agricultural/horticultural firm engaged in production or related business. Time will be spent applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Degree credit limited to 6 units. Credit/No Credit grading only. Prerequisite: Consent of internship instructor prior to initiation of internship.

**HCS 400 Special Problems for Advanced Undergraduates (1–4)**
Individual investigation, research, studies, or surveys of selected problems. Total degree credit limited to 4 units, with a maximum of 4 units per quarter. Report required. Prerequisite: Junior status or consent of department head.
HCS 410 Crop Physiology (4)
Ecological and physiological interactions associated with the production of crop plants. Physiological and biochemical processes that elucidate the mechanism of whole plant performance and responses to the environment. 3 lectures, 1 laboratory. Prerequisite: HCS 120; BOT 121, or BIO 162; and CHEM 312 or consent of instructor.

HCS 421 Postharvest Technology of Horticultural Crops (4)
Respiration, ethylene, ripening and senescence; modified atmosphere packaging, controlled atmosphere storage, packinghouses and transportation; survey of postharvest techniques to maximize commodity shelf-life. Field trip required. 3 lectures, 1 laboratory. Prerequisite: One production class in fruits, vegetables or ornamentals, or consent of instructor.

HCS 450 Plant Biotechnology Laboratory (2) (Also listed as BOT 450)
Application of genetic engineering technology to plants; methods of plant tissue culture and transformation. 2 laboratories. Prerequisite: BIO 303 or BIO 351 or CHEM 373.

HCS 461 Senior Project I (2)
Selection of a project under faculty advisor approval. Initial research and data gathering period for project information. Projects typical of problems which graduates must solve in their fields of study or employment. Project results are presented in a formal written report completed in HCS 462. Contract drawn up with approval of advisor. Minimum 60 hours. Prerequisite: All 100-200 level courses in curriculum; 135 units; ENGL 134, completion of GE Area A.

HCS 462 Senior Project II (2)
Continuation of Senior Project development. Write-up of rough draft and formal draft of project. Completion of formal written report under advisor supervision. Minimum 60 hours. Prerequisite: Completion of HCS 461 with a grade of C or better.

HCS 463 Senior Seminar (1)
Oral presentations by students on their senior projects, critical thinking assignment. Preparation for entry into the business world. Guest speakers. 1 activity. Prerequisite: HCS 461.

HCS 470 Selected Advanced Topics (1–4)
Directed group study of selected topics for advanced students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

HCS 471 Selected Advanced Laboratory (1–4)
Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

HCS 500 Individual Study in Horticulture and Crop Science (1–6)
Advanced independent study planned and completed under the direction of a member of the Horticulture and Crop Science faculty. Total credit limited to 6 units; may be repeated in same term. Prerequisite: Consent of department head, graduate advisor and supervising faculty member.

HCS 511 Ecological Biometrics (4) (Also listed as PPSC 511)
General survey of current analytical methodology available to ecological researchers to evaluate effects and assess the underlying mechanisms that drive natural and cultivated ecosystems. Methodology includes general linear models, ordination, survival analysis, multivariate analyses, and computer simulations. Student research used as a basis for instruction. Total credit limited to 8 units. 3 seminars, 1 activity. Prerequisite: Any one of the following statistical methods courses: CRSC 411, STAT 212, STAT 218, STAT 313, STAT 512, STAT 513 or consent of instructor.

HCS 539 Graduate Internship in Horticulture and Crop Science (1–9)
Application of theory to the solution of problems of agricultural production or related business in the fields of horticulture and crop science. Analyze specific management problems and perform general management assignments in a contract between the student, the firm or organization, and the faculty advisor before the internship commences. Degree credit limited to 6 units. Prerequisite: Consent of internship instructor.

HCS 570 Selected Topics in Horticulture and Crop Science (1–4)
Directed group study of selected topics for advanced students. The Schedule of Classes will list topic selected. Total credit limited to 12 units; may be repeated in same term. 1–4 seminars. Prerequisite: Graduate standing or consent of instructor.

HCS 571 Selected Topics Laboratory in Horticulture and Crop Science (1–4)
Directed group laboratory of selected topics for advanced students. The Schedule of Classes will list topic selected. Total credit limited to 12 units; may be repeated in same term. 1–4 laboratories. Prerequisite: Graduate standing or consent of instructor.

HCS 575 Postharvest Instrumentation and Experimentation (3)
Hands-on instruction in the instrumentation available to conduct postharvest research, including discussions of the scientific methods and typical postharvest studies. Implementation and dissemination of a personalized postharvest experiment required, both as a slide presentation and a poster. Independent research. 3 laboratories Prerequisite: STAT 218 and senior or graduate standing.

HIST–HISTORY

HIST 110 Western Civilization: Ancient to Renaissance (4)
Beginnings of western civilization from the river valley societies of the Middle East, circa 3,000 BCE to the Renaissance in Western Europe to 1550 CE. Political, economic, social, intellectual, and artistic development of that period. 4 lectures.

HIST 111 Western Civilization: Reformation to Twentieth Century (5)
Development of western civilization from 1550 CE to 1900 CE. Comparison of liberal modernization of the West with the retarded, conservative modernization in Central, East and Southeast Europe. Political, economic, social, intellectual, and artistic developments of that period. Particular attention to understanding dynamics that produce pluralistic mass societies in the West and authoritarian mass societies elsewhere. 5 lectures.

HIST 200 Special Problems for Undergraduates (1–4)
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department chair.

HIST 206 American Cultures (4) GE D1 USCP
The social, cultural, constitutional, and political history of African American, Asian American, Native American, European American, and Latino/a men and women. 4 lectures.

HIST 207 Freedom and Equality in American History (4) Changed effective Fall 2008; see Updates GE D1 USCP
The multiple and conflicting ways in which various Americans (defined in terms of race, class and gender) have struggled to formulate and promote their own understandings of freedom and equality, from the pre-conquest era to the present. 4 lectures.

HIST 208 Survey of California History (4) Changed effective Spring 2009; see Updates GE D3
Survey of California history from the pre-Columbian period to the present. Native American culture, Spanish imperialism, the Mexican War, gold rush, immigration, dominance of the Southern Pacific Railroad, progressivism, growth of Los Angeles, and California's impact on national and world economy and politics. 4 lectures.

HIST 210 World History I (4) GE D3
Global history from the beginnings of organized agriculture to the Industrial Revolution. Focus on causation, using geography and cultural creation to highlight economic, political, social, and intellectual developments of the major civilizations of earth. 4 lectures. Open to History or Liberal Studies majors only.
HIST 213 Modern Political Economy (4) GE D2
The relationship between states and economies in the modern period. Themes of modernization, industrialization, and colonial expansion. The major theories of political economy, especially liberalism and socialism. 4 lectures.

HIST 214 Political Economy of Latin America and the Middle East (4) GE D2
Comparative examination of socio-economic structures of the Middle East and Latin America in the framework of global economy. Analysis of the historical context of integration of these two regions in the international economic system and the local reactions to the effects of global forces on national structures. 4 lectures.

HIST 215 World History II (4) GE D3
Comparative history of Western and non-Western societies in global perspective. The history of cross-cultural exchange, interaction, and conflict in the making of the modern world, concentrating on the economic, political, and cultural transformations that facilitated and emerged from imperialism. 4 lectures.

HIST 300 Junior Seminar (4)
Historical analysis of selected problems and topics for undergraduates. Seminar format, intense discussion of readings and issues. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 seminars. Prerequisite: Completion of GE Area A. Completion of two courses in lower-division Area D (preferably D2 and D3). Junior standing or consent of instructor.

HIST 303 Research and Writing Seminar in History (5)
Designed to develop student's ability to research and write an interpretive paper on a specific topic. Seminar participants practice the skills of library research, historical and historiographical analysis, and writing and revising. Paper in lieu of final examination. The Schedule of Classes will list topic selected. 4 lectures and research project. Prerequisite: Completion of GE Areas A1 and A3, and junior standing or consent of instructor.

HIST 304 Historiography (4)
Theoretical approaches used to study the past, including scholarship on history and memory, the influence of interdisciplinary studies, the significance of race and gender as categories of analysis, and the place of history and the historian in contemporary society. 3 seminar meetings and research project. Prerequisite: HIST 303; junior standing or consent of instructor; and History major.

HIST 306 The Witch-Hunt in Europe, 1400-1800 (4) GE D5
A history of the development of witchcraft ideas, persecutions, and skepticism in the western world from 1400 to 1800, focusing on the legal, economic, social, and intellectual currents that produced, fired, and eventually ended the phenomenon. 4 lectures. Prerequisite: Completion of GE Area A and two courses from Areas D1, D2, D3, D4. History majors will not receive GE Area D5 credit.

HIST 307 European Thought, 1800-2000 (4) GE D5
Intellectual and cultural history of Europe from the nineteenth century to the present. Liberalism, radical thought, feminism, evolutionary theory, psychoanalysis, structuralism, existentialism, and postmodernism. 4 lectures. Prerequisite: Completion of GE Area A and two courses from Areas D1, D2, D3, D4. History majors will not receive GE Area D5 credit.

HIST 308 The Trans-Atlantic Slave Trade (4) GE D5
The African, Islam and Euro-American dimensions of the trans-Atlantic slave trade, with focus on its varying roots, organization and impact on cross-cultural and global levels. 4 lectures. Prerequisite: Completion of GE Area A and two courses from Areas D1, D2, D3. History majors will not receive GE Area D5 credit.

HIST 309 Cultures of West Africa and the African Diaspora (4) GE D5
The cultures of West African and the African Diaspora, with special attention to the intersection of Animist, Islamic and Western cultures, and the survival of African cultures in the Americas as manifested in the artistic, religious, literary, and other humanistic legacies of the African Diaspora. 4 lectures. Prerequisite: Completion of GE Areas A, D1 and D3. History majors will not receive GE Area D5 credit.

HIST 310 East Asian Culture and Civilization (4) GE D5
The pre-modern and modern histories of China and Japan. Focus on the traditional era, the transition to modernity, cultural uniqueness within East Asian civilization, and western images of Asia. 4 lectures. Prerequisite: Completion of GE Area A and two courses from Areas D1, D2, D3, D4. History majors will not receive GE Area D5 credit.

HIST 314 The Middle East (4)
Political, social, and economic development of the Middle Eastern countries in the context of regional history and international politics since the birth of Islam. Particular attention to the resurgence of religious movements and their connection with nationalism and anti-colonialism in the region. 3 lectures and research project. Prerequisite: Junior standing.

HIST 315 Modern South and Southeast Asia (4) GE D5
Modern histories of South and Southeast Asia: traditional empires and cultures, spread of modern capitalism, Western and Japanese colonialism, decolonization and independence, ethnic and religious tensions, roles in contemporary economy and geopolitics. 4 lectures. Prerequisite: Completion of GE Area A. Completion of two courses in lower-division Area D (preferably D2 and D3), or consent of instructor. History majors will not receive GE Area D5 credit.

HIST 316 Modern East Asia (4) GE D5
Modern histories of China, Japan and Korea: great disruptions of modernity that have transformed these societies, common characteristics of modernity in East Asia, great differences between Chinese, Japanese and Korean histories, and the mutually constitutive nature of these East Asian histories. 4 lectures. Prerequisite: Completion of GE Area A. Completion of two courses in lower-division Area A (preferably D2 and D3), or consent of instructor. History majors will not receive GE Area D5 credit.

HIST 320 Colonial and Revolutionary America (4) GE D5
Settlement and evolution of British America, background to the imperial dispute, events leading to the Revolution, Articles of Confederation, Constitution, the national economy, roles of and impact on African-Americans, women, Native Americans and Loyalists. 4 lectures. Prerequisite: Completion of GE Area A, D1 and one course from D2, D3, or D4. History majors will not receive GE Area D5 credit.

HIST 321 Civil War America (4) GE D5
The experiences of nineteenth-century Americans. Focus on industrialization, antebellum reform, slavery, the Civil War battlefield and homefront, Reconstruction, and the creation of a New South. 4 lectures. Prerequisite: Completion of GE Area A, D1 and one course from D2, D3, or D4. History majors will not receive GE Area D5 credit.

HIST 322 Modern America (4) GE D5
Modern America Changed effective Summer 2007; see Updates
American history since 1900. Focus on domestic and foreign policy interactions, struggle of disenfranchised groups for social and political equality, and changes in culture and identity. 4 lectures. Prerequisite: Completion of GE Area A1 and completion of Area D2, Area D3, or Area D4. History majors will not receive GE Area D5 credit.

HIST 323 Versions of the Past: Novels, Comics and Movies (4) GE D5
An introduction to historical novels, comics, movies, memoirs and autobiographies as forms of historical representation in the contemporary U.S. Exploration of the vision of American history that each work presents and the truth-claims made for that particular vision. 4 lectures. Prerequisite: Completion of GE Area A, D1 and one course from D2, D3, or D4; junior standing or consent of instructor. History majors will not receive GE Area D5 credit.

HIST 324 The Historical Novel in the United States, 1960s to the Present (4) GE D5
An introduction to the historical novel as it has developed in the United States since the 1960s. Exploration of how historical novels typically represent the past and the ways in which they change our notion of what counts as “history.” 4 lectures. Prerequisite: GE D1 and any other lower-division Area D course. History majors will not receive GE Area D5 credit.
HIST 336 Britain at War: The British, the Americans and the Struggle for Freedom, 1939-1945 (4)  GE D5
Historical examination of Great Britain’s challenge to its sovereignty and freedom by the regime of Nazi Germany from 1939-1945. An account of how Britain formed an alliance with the United States, and how that partnership forged a successful campaign that culminated in the survival of Britain and destruction of the Nazi regime. 3 lectures, 1 activity. Prerequisite: Limited to London Study students; completion of GE Area A; completion of two courses in lower-division Area D courses; junior standing or permission of the instructor. History majors will not receive GE Area D5 credit.

HIST 339 History of Colonial Latin America (4)
Survey of Latin American history in the colonial period from 1492 to the early nineteenth century. Special attention to the indigenous cultures, the Iberian civilization, and the evolving relationship between them. 3 lectures and research project. Prerequisite: Junior standing.

HIST 340 History of Modern Latin America (4)
Social and political history of South America, Mexico, and Cuba during the nineteenth and twentieth centuries. Historical development of economic structure and the political and cultural institutions in the region. 3 lectures and research project. Prerequisite: Junior standing.

HIST 341 History of Modern Central America (4)
Political, social, and economic development of Central American countries in the context of regional history and international politics during the nineteenth and twentieth Centuries. 3 lectures and research project. Prerequisite: Junior standing or consent of instructor.

HIST 354 History of Network Technology (4)  GE Area F
History of computer network technology from the Cold War to the present. Origins of the Internet, development of TCP/IP, growth of network democracy, encryption, race and gender in cyberspace, Usenet and hypertext. 4 lectures. Prerequisite: Completion of GE Area B and junior standing.

HIST 358 Cloning (4)  GE Area F
An integrative and multidisciplinary approach to the study of cloning, to better understand its history, scientific techniques, and their applications. The ethical, social, legal and other issues raised by cloning will also be discussed. 4 lectures. Prerequisite: Completion of GE Area B and junior standing.

HIST 359 Living in a Material World (4)  (Also listed as MATE 359)  GE Area F
Evolution of materials (ceramics, metals, polymers, composites, semiconductors) in the context of history. Traces the link between historical and technological developments enabled by materials from the Stone Age to the Electronic Age. 4 lectures. Prerequisite: Completion of GE Area B and junior standing.

HIST 400 Special Problems for Advanced Undergraduates (1–4)
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department chair.

HIST 401 Early America (4)
Age of exploration. European powers in eastern North America. English settlements, development of the English colonies, with emphasis on Virginia and Massachusetts. Proprietary interests, growth of internal control, and colonial conflicts. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

HIST 402 American Revolution and the New Nation (4)
Background to the imperial dispute, events leading to the Revolution, Articles of Confederation, Constitution, impact on the national economy, women, African-Americans, Loyalists, Native Americans. The Schedule of Classes will list topic selected. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

HIST 404 The Era of Civil War and Reconstruction (4)
Exploration of the different patterns of life in the United States, in order to comprehend the emergence of sectionalism, the violent struggle of the Civil War, and the readjustments of the Reconstruction years. Emphasis on the experiences of ordinary Americans. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

HIST 405 African-American History to 1865 (4) (formerly HIST 332)
History of African Americans from the colonial period to the Civil War, roughly 1619-1865. The slave trade, slavery in the colonies, plantation slavery, the Black West, and free Black culture and institutions. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 406 African-American History from 1865 (4)  USCP
History of African-Americans from the Civil War to the present. Reconstruction, racial segregation, the Harlem Renaissance, the Great Migration, the Civil Rights Movement, Black Feminism and Black Power. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 408 The Age of Roosevelt: Depression and World War, 1929-50 (4)
Principle forces affecting the nation’s political, social and economic life during the Age of Franklin Roosevelt. Included are the politics of the New Deal, government regulation of the economy and response to the Depression, the rise of the modern presidency, racial and ethnic conflict, the politics of class and gender, the home front at war and post-war tension. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

HIST 409 Vietnam War at Home and Abroad (4)
Interaction of revolutionary Vietnamese nationalism with U.S. foreign policy. Analysis of the conduct of the war. Assessment of the impact of the war on U.S. society. 3 lectures and research project. Prerequisite: HIST 303; junior standing.

HIST 410 Recent America Since 1950: Shattering of the American Consensus (4)
Political, social and economic forces that have shaped American life since 1950. Subjects included are the Red Scare, suburbanization, the civil rights movement, the Great Society, the politics and culture of protest, recasting the welfare state, and de-industrialization. Emphasis on racial, ethnic and gender issues in the collapse of the American Consensus. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

HIST 411 History of United States Foreign Relations (4) (formerly HIST 387)
History of American foreign policy from 1900 to the present. Emergence of the United States as a world power early in the century, the retreat following the Great War, Franklin Roosevelt’s diplomacy leading to and through the Second World War, atomic diplomacy and the Cold War, four decades of Containment and the search for a new post-Cold War strategy. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

HIST 412 American Presidency (4) (formerly HIST 390)
Examination of the American presidency with emphasis on its role in American society since the beginning of the twentieth century. From the era of congressional government through the Imperial Presidency of the post-World War II period, and beyond, using presidential biography as a historical source. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 414 The Fall of Imperial China (4)
History of China’s last dynasty, the Qing (1644-1912). Origins of Manchus, High Qing era of expansion and prosperity, creation of uniquely Manchu dynasty, new contact with Western imperialism, internal rebellions, modern reform policies, and revolution. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

HIST 416 Modern Japan (4)
Japan's development as a modern state (1800-2000 CE). Themes include Japan’s engagement with modernity and nationalism, the emperor system, Japanese imperialist expansion, and postwar reconstruction of Japanese
HIST 417 Modern China (4)
Chinese history in the twentieth century: the fall of the Qing Dynasty and founding of Republic of China in 1912, problems of imperialism and modernity, Chinese Communist Party and People's Republic of China since 1949. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

HIST 418 Chinese Film and History (4)
Examination of 20th century Chinese history through the use of Chinese feature films. Films (with English subtitles) serve as main texts for understanding the tremendous changes in modern Chinese history, and the evolving relationships between film and Chinese society. 4 lectures. Prerequisite: HIST 303; junior standing or consent of instructor.

HIST 419 Modern Southeast Asia (4)
Modern history of mainland and maritime Southeast Asia, focusing on the development of political institutions and changing political and cultural identities. Early empires, expansion of capitalism, colonial rule and wars through era of independence. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 420 History of Modern South Asia (4)
History of modern South Asia from the beginnings of British colonization to independence. Themes include relations between religious groups, the economic impact of British colonialism, political development, the role of indigenous nationalist movements, and the shape of independence. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 421 Organizing and Teaching History (4)
Organization, selection, presentation, application, and interpretation of subject matter in history in secondary schools. 4 seminars. Prerequisite: Admission to teacher education program or valid teaching credential.

HIST 425 Social Sciences Teaching Practicum (1) (CR/NC)
Practicum for part-time and full-time student teachers in the Social Science Credential Program. Teaching techniques and strategies useful for addressing a wide range of issues that arise in grades 6-12 social science classrooms. Credit/No Credit grading only. 1 seminar. Prerequisite: HIST 424; concurrent: EDUC 469 or EDUC 479. Changed effective Spring 2008; see Updates.

HIST 426 Imperial Russia (4)
Political, social, intellectual and economic roots of Russian Absolutism. Emergence of Russia as an imperial power, reform, reaction and revolution - 1689-1914. 3 lectures and research project. Prerequisite: HIST 303; junior standing.

HIST 427 Soviet Russia (4)
Transformation of Russian autocracy from tsarist to Bolshevik under the impact of World War I and the Revolution of 1917. The formative force of Marxism-Leninism; Civil War; the “experimental” 20s; forced collectivization and industrialization; the Purges; “engineering” a new Soviet Woman and Man for a new communist world; War; Second and Cold. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

HIST 429 Precolonial African History (4) (formerly HIST 381)
Survey of African history from earliest times. Ancient African civilizations, Moslem penetration, the rise of indigenous kingdoms and the continuous impact of Atlantic slave trade. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 430 Modern African History (4) (formerly HIST 382)
Survey of African in the 19th and 20th centuries including European colonialism, African resistance, the rise of African nationalism and problems since independence. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 431 South Africa to 1900 (4)
History of South Africa prior to white rule including the African societies populating the area, their history prior to European contact, the nature of early white settlement, and the impact of mineral discoveries in the 19th century. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 432 Twentieth Century South Africa (4)
History of South Africa in the 20th century focusing on the rise and fall of the apartheid state and including Afrikaans nationalism, apartheid legislation, industrial development, and the growth of effective African resistance leading to full democracy. 3 lectures and research project. Prerequisite: One of the following: HIST 303, junior standing or consent of instructor.

HIST 434 American Women's History to 1870 (4)
(Also listed as WS 434)
Female ideology and experience from the colonial period through the American Civil War. Use of a variety of sources, including women’s own writing, in order to understand the history of women as it both reflects and shapes American culture and society. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

HIST 435 American Women's History from 1870 (4)
(Also listed as WS 435)
USCP
The female past in the modern period of U.S. history. Considers how transformations in gender roles are reflective of other significant changes in American culture and society. Emphasis on class, race, and ethnic variations in women's experience. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

HIST 436 History of American Thought (4) (formerly HIST 383)
Thought and culture in America since the Puritans. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 437 Nazi Germany (4)
Changed effective Fall 2008; see Updates
Background of German Romantic Nationalism; national unification and defeat in World War I; the failure of Weimar Democracy and political radicalization; the Nazi political, economic, and social revolution 1933-1939. 3 lectures and 1 activity. Prerequisite: HIST 303; junior standing.

HIST 438 History of American Agriculture (4) (formerly HIST 305)
Agricultural development with emphasis upon economic, political and social implications. 3 lectures and research project. Prerequisite: HIST 303, junior standing, or consent of instructor.

HIST 439 Topics in California History (4) (formerly HIST 385)
In-depth analysis of selected political, economic, and social issues involved in the development of California from the earliest times to the present. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 440 Topics and Issues in the History of the United States (4)
Selected topics and issues in United States history. Descriptive subtitles assigned to each course. The Schedule of Classes will list topic selected. May be repeated to 8 units. 3 lectures and a research project. Prerequisite: HIST 303; junior standing or consent of instructor.

HIST 441 Topics and Issues in European History (4)
Selected topics and issues in European history. Descriptive subtitles assigned to each course. The Schedule of Classes will list topic selected. May be repeated to 8 units. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.

HIST 442 Topics and Issues in Latin American History (4)
Selected topics and issues in Latin American history. Descriptive subtitles will be assigned to each course. The Schedule of Classes will list topic selected. May be repeated to 8 units. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor, and either HIST 340 or HIST 341.

HIST 443 Topics and Issues in Asian History (4)
Selected topics and issues in Asian history. Descriptive subtitles will be assigned to each course. The Schedule of Classes will list topic selected. May be repeated to 8 units. 3 lectures and research project. Prerequisite: HIST 303; junior standing or consent of instructor.
HIST 455 Europe in the Age of Reaction and Revolution, 1871-1919 (4)
(formerly HIST 352)
Maturation of industrialization, socialism and nationalism. Imperialist competition of nation states for world hegemony. Explosion of the First World War. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 456 Europe in the Age of Fascism (4) (formerly HIST 353)
Democracy in crisis and the fascist alternatives. Second World War and the recovery of Europe in a bipolar world to the fall of the Berlin Wall, German reunification and the disintegration of Yugoslavia. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 457 Gender and Sexuality in Modern Europe (4)
Social, economic, political, and cultural effects of changing gender systems in modern Europe, particularly but not exclusively with regard to sex and sexuality. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 448 Modern Britain: Industry, Empire and War (4)
(formerly HIST 313)
History of the British Isles from the reconstruction of Celtic history to the end of the Medieval epoch. 3 lectures and research project. Prerequisite: HIST 303, junior standing, or consent of instructor.

HIST 449 Medieval Europe from the fall of Rome to the plague (400-1350 CE), with topics including the Barbarian Kingdoms, the early Church, Charlemagne, medieval art and Gothic architecture, Church fathers and Scholasticism, medieval philosophy, agricultural and commercial revolutions, and the Great Plague. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 450 Renaissance and Reformation Europe (4)
(formerly HIST 347)
Europe from 1348 to 1620 CE, with topics including the urban milieu, Renaissance philosophy and artistic expression, the new prince, the educational revolution, the Renaissance Church, Martin Luther, Jean Calvin, and the monumental economic, social, and political changes of the sixteenth century. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 451 Religious Wars and Absolutism (4) (formerly HIST 348)
Europe from 1559 to 1715 CE, focusing on the Catholic-Protestant conflict, the rise of the Absolutist state (especially Louis XIV), the “Crisis of the Seventeenth Century,” the Thirty Years War, the English Civil War and Cromwell, and the Newtonian Paradigm. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 452 The Age of Revolution and Napoleon (4)
(formerly HIST 349)
Europe from the death of Louis XIV (1715) to the settlement of the Congress of Vienna (1815). International politics, continental and global warfare, the Enlightenment, “Enlightened Absolutism,” the French and Industrial Revolutions, and Napoleon. Political, intellectual, economic, and social developments in the eighteenth century. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.

HIST 453 Europe in the Age of Reaction and Revolution, 1815-1871 (4) (formerly HIST 351)
Reaction to the French Revolution. Industrialization. Liberal socialist and nationalist revolts against the conservative order of 1815. 3 lectures and research project. Prerequisite: HIST 303, junior standing or consent of instructor.
HIST 504 Graduate Study in History (4)
Weekly reading and discussion course on practical methods and theoretical approaches to the study and writing of history. 4 seminars. Prerequisite: Graduate standing in History and consent of instructor.

HIST 505 Graduate Seminar in United States History (4)
Intensive study of selected topics in United States history. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing in History and consent of instructor.

HIST 506 Graduate Seminar in European History (4)
Intensive study of selected topics in modern European history. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing in History and consent of instructor.

HIST 507 Graduate Seminar in East Asian History (4)
Intensive study of selected topics in East Asian history. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing in History and consent of instructor.

HIST 508 Graduate Seminar in Latin American History (4)
Intensive study of selected topics in Latin American history. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing in History and consent of instructor.

HIST 509 Graduate Seminar in African History (4)
Intensive study of selected topics in African history. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing in History and consent of instructor.

HIST 512 Supervised Reading for Comprehensive Exams (2)
Directed supervision of reading for MA comprehensive exams. Regular consultation between advisor and student. Total credit limited to 4 units. 2 seminars. Prerequisite: HIST 504 and 12 units of graduate study.

HIST 599 Thesis (3)
Directed supervision of MA thesis. Regular consultation between advisor and student. Course to be taken three times over three separate quarters; total credit limited to 9 units.

HNRS--HONORS

HNRC 100 Orientation to the University Honors Program (2) (CR/NC)
Introduction to the Honors Program and overview of the University. Topics include the role of higher education, development of leadership skills, career advising, and guest speakers from the Cal Poly community. For University Honors Program students only. Credit/No Credit grading only. 1 lecture, 1 activity.

HNRS 101 Public Speaking (4) (Also listed as COMS 101) GE A2
Introduction to the principles of public speaking. Practical experience in the development, presentation, and critical analysis of speeches to inform, to persuade, and to actuate. Not open to students with credit in COMS 102. 4 lectures.

HNRS 112 Race, Culture and Politics in the United States (4) (Also listed as ES 112) GE D1 USCP
Introductory and interdisciplinary study of the ways that race and ethnicity are created by both historical processes and American institutional formation – specifically social, political, economic, legal and cultural institutions. Special attention paid to the interlocking systems of race, class, gender and sexuality. 4 lectures.

HNRS 131 General Physics I (4) (Also listed as PHYS 131) GE B3 & B4
Fundamental principles of mechanics. Vectors, particle kinematics. Equilibrium of a rigid body. Work and energy, linear momentum, rotational kinematics and dynamics. Primarily for engineering students, and for students majoring in the physical sciences. Not open to students with credit in PHYS 141. 3 lectures, 1 laboratory. Prerequisite: MATH 141 with grade C- or better and MATH 142 or MATH 182 (or concurrent enrollment). Recommended: high school physics. For ME and AERO students only.

HNRS 132 General Physics II (4) (Also listed as PHYS 132) GE B3 & B4
Oscillations, waves in elastic media, sound waves. Temperature, heat and the first law of thermodynamics. Kinetic theory of matter, second law of thermodynamics. Geometrical and physical optics. 3 lectures, 1 laboratory. Prerequisite: PHYS 131, PHYS 141 or HNRS 131.

HNRS 134 General Physics IA (4) (Also listed as PHYS 141) GE B3
Fundamental principles of mechanics. Vectors, particle kinematics. Equilibrium of a rigid body. Work and energy, linear momentum, rotational kinematics and dynamics. Primarily for engineering and science students. Not open to students with credit in HNRS/PHYS 131. 4 lectures. Prerequisite: MATH 141 with grade C- or better and MATH 142 or MATH 182 (or concurrent enrollment). Recommended: High school physics.

HNRS 141, 142, 143 Calculus I, II, III (4) (4) (4) GE B1
(Also listed as MATH 141, 142, 143)
Limits, continuity, differentiation, integration. Techniques of integration, applications to physics, transcendental functions. Infinite sequences and series, vector algebra, curves. 4 lectures. 141 prerequisite: ELM requirement and passing score on Mathematics Placement Examination, or MATH 118 and MATH 119 or equivalent; and consent of Honors Program. 142 prerequisite: HNRS/MATH 141 with a grade of C- or better consent of instructor.

HNRS 145 Reasoning, Argumentation, and Writing (4) (Also listed as ENGL/COMS 145) GE A3
The principles of reasoning in argumentation. Examination of rhetorical principles and responsible rhetorical behavior. Application of these principles to written and oral communications. Effective use of research methods and sources. 4 lectures. Prerequisite: Completion of GE Areas A1 and A2.
HNRS 148 Reasoning, Argumentation and Professional Writing (4)  
(Also listed as ENGL 148)  GE A3

The principles of reasoning in technical writing. Discussion and application of rhetorical principles, both oral and written, in technical environments. Study of methods, resources and common formats used in corporate or research writing. 4 lectures. Prerequisite: Completion of GE Areas A1 and A2.

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

The principles of technical writing. Discussion and application of rhetorical principles in technical environments. Study of methods, resources and common formats used in corporate or research writing. 4 lectures. Prerequisite: Completion of GE Areas A1 and A2. For Engineering students only.

HNRS 200 Special Problems for Undergraduates (1–2)  (CR/NC)

Individual investigation, research, projects, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Credit/No Credit grading only. Prerequisite: Consent of instructor and Honors Program.

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

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

HNRS 207 New Course (crosslisted) effective Fall 2008; see Updates

HNRS 212 Global Origins of United States Cultures (4)  
(Also listed as ES 212)  GE D3  USCP

How the global dispersal of Europeans, Asians, and Africans, the hemispheric dispersal of Latin Americans, and the forced internal migration of Native Americans have contributed to American cultural heritage and the struggles for ethnic, class and gender equality, and justice. 4 lectures.

HNRS 215 World History II (4)  (Also listed as HIST 215)  GE D3

Comparative history of Western and non-Western societies in global perspective. The history of cross-cultural exchange, interaction, and conflict in the making of the modern world, concentrating on the economic, political, and cultural transformations that facilitated and emerged from imperialism. 4 lectures.

HNRS 230 Philosophical Classics: Metaphysics and Epistemology (4)  (Also listed as PHIL 230)  GE C2

Study of several classic works from the history of philosophy on issues in metaphysics and epistemology. At least one will be from the Ancient period, and at least one from the Modern era. No more than one from the twentieth century. 4 lectures. Prerequisite: Completion of GE Area A.

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

Readings from primary philosophical texts, from the ancient and modern periods, with focus on the identification and evaluation of the central ethical and political themes and arguments presented in them. 4 lectures. Prerequisite: Completion of GE Area A.

HNRS 232 New course (crosslisted) – Effective Spring 2009; see Updates

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

Partial derivatives, multiple integrals, introduction to vector analysis. 4 lectures. Prerequisite: MATH 143.

HNRS 244 Linear Analysis I (4)  (Also listed as MATH 244)

Separable and linear ordinary differential equations with selected applications; numerical and analytical solutions. Linear algebra: vectors in n-space, matrices, linear transformations, eigenvalues, eigenvectors, diagonalization; applications to the study of systems of linear differential equations. 4 lectures. Prerequisite: MATH/HNRS 143 or consent of instructor.

HNRS 251 Great Books I: The Ancient and Classical World–From Myth to Reason (4)  (Also listed as ENGL 251)  GE C1


HNRS 299 Honors Group Seminar (1)  (CR/NC)

Students in the Honors Program are required to take at least eight courses for honors credit before graduation. Taking an Honors course may not be possible due to scheduling conflicts or unavailability of courses. This course allows students to engage in honors-level work in a standard, non-honors course on a group basis. Credit/No Credit grading only. Total credit limited to 4 units, repeatable in same term. Must achieve a B or better in the related standard course. 1 seminar.

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

Economic analysis of the cause, extent and impact of poverty, discrimination and immigration and of the policies designed to address these socioeconomic issues. Emphasis on the experience of African-Americans, Latinos, and women in the United States. 4 lectures. Prerequisite: Completion of GE Areas A, D1, and either ECON 221 and ECON 222, or ECON 201. Economics majors will not receive GE Area D5 credit.

HNRS 304 Values and Technology (4)  (Also listed as HUM 304)  GE C4

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

HNRS 310 Air and Space (4)  (Also listed as AERO 310)  GE Area F

Technological innovations that have led to modern aircraft and spacecraft as viewed from an historical perspective. Development of aerodynamics, propulsion systems, light-weight structures, and control systems. How aviation has affected, and been affected by, history. Impact of aviation on society, including civil and military aircraft/spacecraft. Federal regulation of aviation, including air traffic control and airlines. Future developments in air and space technology. 4 lectures. Prerequisite: Completion of GE Area B, junior standing.

HNRS 311 New course (crosslisted) – Effective Winter 2008; see Updates

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

Scope and nature of “ecology” in modern society, including resource terminology and classifications systems; dynamics of natural systems (energy exchange and cycles); man’s role as a principle agent of change; environmental impacts; historical perspective including people (ethnicity); and the future environment. 3 lectures, 1 laboratory. Prerequisite: Completion of GE Area B.

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

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

HNRS 321 New course (crosslisted) – Effective Winter 2009; see Updates

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

Interdisciplinary exploration of significant environmental issues (local, regional, national, or global) where technology is a major cause and/or offers a possible solution. 4 seminars. Prerequisite: Completion of GE Area A and two courses from Areas D1, D2, D3. Honors Program membership or nomination by CRP department head.

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

Literature selected according to a particular theme. Emphasis on critical interpretation, aesthetic appreciation, and historical and cultural contexts. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 lectures. Prerequisite: Completion of GE Areas A and C1. English majors will not receive GE C4 credit.

HNRS 391 New course (crosslisted) – Effective Fall 2008; see Updates

HNRS 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of Honors Program Director.
HNRS 411 New Media Arts I (4) (Also listed as ENGL 411) 
Advanced-level presentation of new media theory, design and practice. 
Topics covered include, but are not limited to, interactivity theory, user- 
centered system design, cognitive psychology, media analysis, and basic 
web design theory. Total credit limited to 8 units. 4 lectures. Prerequisite: 
Advanced skills in writing and/or graphics, and/or computer programming; 
upper-division standing, ENGL 148 or ENGL 149 and consent of instructor. 

HNRS 412 New Media Arts II (4) (Also listed as ENGL 412) 
Advanced level of work with the primary technologies and design/critique 
theories currently at use in the professional creation of new media works. 
Lectures and readings expand upon material presented in HNRS/ENGL 
411. 4 lectures. Prerequisite: HNRS/ENGL 411 and consent of instructor. 

HNRS 475 Sustainable Forest and Environmental Practices (15) 
(Also listed as FNR 475) 
Typical modules related to sustainable resource management: ecosystem 
sampling and inventory methods, photo interpretation, hydrologic resources, 
road condition, project impact analysis, best management practices. Topics 
covered vary from term to term depending on the priority for learning 
modules. Residency at Swanton Pacific and extended field trips required. 10 
lectures, 5 activities. Prerequisite: Completion of Area B and consent of 
instructor. 

HNRS 490 President's Seminar: Science, Society and 
the University (4) (Also listed as HUM 490) 
Development of higher education in the United States; the role of science 
and research in the University; and the response of higher education to 
changing economic, political and social demands. 4 seminars. Prereq- 
quisite: Senior standing, GPA of at least 3.0, or consent of instructor. 

HNRS 499 Honors Group Seminar (1) (CR/NC) 
Students in the Honors Program are required to take at least eight courses 
for honors credit before graduation. Taking an Honors course may not be 
possible due to scheduling conflicts or unavailability of courses. This 
course allows students to engage in honors-level work in a standard, non- 
honors course on a group basis. Credit/No Credit grading only. Total credit 
limited to 4 units, repeatable in same term. Must achieve a B or better in 
the related standard course. 1 seminar. 

HUM–HUMANITIES 

HUM 302 Human Values in Agriculture (4) GE Area F 
Technical aspects of controversial agricultural issues. Identification of 
value conflicts, comparison of potential impacts, and use of relevant 
ethical principles. Weighing risks and benefits to resolve the issue. 
Extensive participation in interacting with oral presentations, role 
playing, and arguing in public forums. 3 lectures, 1 activity. Prerequisite: 
Completion of GE Area B and junior standing. 

HUM 303 Values and Technology (4) (Also listed as HNRS 304) GE C4 
Humanistic investigation into the theoretical and practical applications of 
technology with specific reference to the social effects of technological 
change. For all majors. Non-technical. 4 lectures. Prerequisite: Completion 
of GE Area A and one course from Area C. 

HUM 310 Humanities in World Cultures (4) GE C4 
Interdisciplinary examination of the humanities in a selected culture. 
Special focus on the arts, literature, philosophy and language in that 
culture. The Schedule of Classes will list topic selected. Repeatable to 12 
units with different course titles. 4 lectures. Prerequisite: Completion of 
GE Area A and one course from Area C. 

HUM 312 Humanities in Chicano/a Culture (4) GE C4 USCP 
Interdisciplinary examination of humanities in Chicano culture. Special 
focus on the arts, literature, social situations, and the monolingual and 
bilingual language aspects in Chicano culture. 4 lectures. Prerequisite: 
Completion of GE Area A and one course from Area C. 

HUM 316 London: From Roman Colony to World 
Capitol (4) GE D5 
Selective examination of the historical and cultural legacy of London 
within the development of Western civilization as well as its influence on 
the submission and eventual emergence of the non-Western world in the 
twentieth century. An analytical and interpretive study of how London 
shaped the social, economic, political and legal institutions of Western 
society. 4 lectures. Prerequisite: Enrollment in London Study; completion 
of GE Area A; completion of two courses in GE Area D/E; junior standing 
or consent of instructor. Co-requisite: Enrollment in HUM 319. 

HUM 318 Culture of Spain: Activities (2) (CR/NC) 
Examination and experience of Spanish culture via participant observation 
in Spain. An introductory exploration of the development of Spanish 
architecture, art, literature, music, theatre and popular culture as 
experienced in Valladolid, Spain. Credit/No Credit grading only. 2 
activities. Prerequisite: Limited to Valladolid, Spain Fall program. Co- 
requirement: HUM 310. 

HUM 319 London Activities (2) (CR/NC) 
Analytical and interpretive survey of the principal center of the English 
speaking world. The development of London from Roman administrative 
capital to modern cultural, financial and political colossus. Credit/No 
Credit grading only. 2 activities. Prerequisite: Limited to London Study 
students. 

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

(Also listed as AG/UNIV 330) GE Area F 
Scientific investigation of the natural features of the Cal Poly landscape and 
their transformations by land management technology. Analysis of the 
environmental, economic, social, and political effects of agricultural, 
resource extraction and construction technology on that landscape. 
Emphasis on the educational, land-use and long term planning issues of 
technology presented by this case study. 4 lectures. Prerequisite: 
Completion of GE Areas A and B, and junior standing. 

HUM 350 The Global Environment (4) GE Area F 
(Also listed as AG/BUS/EDES/ENGR/SCM/UNIV 350) 
Interdisciplinary investigation of how human activities impact the Earth's 
environment on a global scale. Examination of population, resource use, 
climate change, and biodiversity from scientific/technical and 
social/economic/historical/political perspectives. Use of remote sensing 
maps. Sustainable solutions. 3 lectures, 1 activity. Prerequisite: 
Completion of GE Areas A and B and junior standing. 

HUM 361 Modernism (4) (Also listed as UNIV 361) GE C4 
Interdisciplinary survey of the eighteenth, nineteenth and twentieth-century 
concepts and cultural movements known as modernism throughout Europe, 
North America and Latin America. Disciplines may include architecture, 
drama, literature, music, philosophy, and photography. 4 lectures. 
Prerequisite: Completion of GE Area A and one class from Area C. 

HUM 400 Independent Study Project (1–2) 
Independent study project focusing more than one discipline on a problem in 
the Humanities. May involve travel and/or independent research. 
Bibliography and study plan submitted in advance. 1–2 activities. 
Prerequisite: Junior standing and consent of instructor. 

HUM 450 Summer Internship in London (12) (CR/NC) 
Extensive work experience in London. Administration, orientation, and 
supervision of independent work by the service provider. Intensive two-
week orientation, eight-week full-time work assignment. Evaluation by 
instructor, internship supervisor, and employer. Credit/No Credit grading 
only. 4 lectures, 8 units of independent study. Prerequisite: Junior standing 
and consent of the Director of London Study. 

HUM 470 Selected Advanced Topics (2–4) 
Focused interdisciplinary study of a problem in the Humanities combining 
the insight and expertise of more than one discipline, such as history, 
literature, religious studies, philosophy, fine arts and the sciences. The 
Schedule of Classes will list topic selected. 2–4 lectures. Prerequisite: 
Completion of GE Area A and junior standing. 

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

IME—INDUSTRIAL and MANUFACTURING ENGINEERING
IME 101 Introduction to Industrial and Manufacturing Engineering (1)
Introduction of major topics in industrial and manufacturing engineering. Time management, study skills and class scheduling necessary for academic success. University services. Professional ethics. Career opportunities review. 1 laboratory.

IME 130 Technical Foundations (2) (CR/NC)
Introduction to visualization, sketching, and drafting. Basic hand-tools, shop practices, and materials. Clearances and fits, threads and fasteners. Safety. Open to all majors. Credit/No Credit grading only. 1 lecture, 1 laboratory.

IME 140 CAD and Modeling (2)
CAD/CAM on UNIX workstations using parameter-driven, surface-bounded solid modeling with total bi-directional associativity between design, drafting, and manufacturing tools. Introduction to Computer-Aided Engineering (CAE) as driven by the CAD solid model. 1 lecture, 1 laboratory. Prerequisite: IME 130 or high school drafting.

IME 141 Manufacturing Processes: Net Shape (1)
Metal casting as a net shape process in manufacturing. Properties of molding materials and methods of casting. Introduction to rapid prototyping. Pattern and casting design principles. 1 laboratory.

IME 142 Manufacturing Processes: Materials Joining (2)
Theory and application of metal cutting and welding processes. Includes shielded metal arc, flux cored arc, submerged arc, gas metal arc, gas tungsten arc, brazing, resistance, and oxy-acetylene processes. Bonding theory, joint design, codes and testing. Introduction to adhesive bonding. Open to all majors. 1 lecture, 1 laboratory.

IME 143 Manufacturing Processes: Material Removal (2)
Uses, capabilities, and theoretical and operational characteristics of lathe and milling machine tools, including conventional, automatic and numerical control. Cutting tool characteristics, machining parameters, quality control, and production methods. Design considerations for manufacturing. Introduction to robotics and automation. Open to all majors. 1 lecture, 1 laboratory.

IME 144 Introduction to Design and Manufacturing (4)
CAD/CAM on Unix workstations using parameter-driven, surface-bounded solid modeling with integration between design, drafting, and manufacturing tools. Introduction to conventional machining processes on lathes and mills, computer numerical control, cutting tool design, machining parameters, quality control, production methods, and design for manufacturing. Open to all majors. 2 lectures, 2 laboratories. Prerequisite: IME 130 or high school drafting.

IME 156 Basic Electronics Manufacturing (2)
Practical electronics manufacturing knowledge expanded through concepts such as CAD/CAM design, Design for Manufacture (DFM), documentation requirements, prototyping and production planning. Hands-on techniques learned for project planning, soldering, automation, hand tool usage and production methods. 1 lecture, 1 laboratory.

IME 157 Electronics Manufacturing (4)
Printed circuit board assembly; printed circuit board fabrication process; electronics packaging; overview of semiconductor manufacturing; design, documentation and fabrication of electronic units with emphasis on CAD/CAM. Open to all majors. 2 lectures, 2 laboratories.

IME 200 Special Problems for Undergraduates (1–2)
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

IME 223 Work Design and Measurement (4)
Principles of work simplification and motion analysis. Recording of work flow and methods. Work measurement and standards, time study, synthetic data, predetermined time systems and work sampling. Allowances and performance rating, productivity measures. Work design improvement. 3 lectures, 1 laboratory. Prerequisite: MATH 141. Recommended: IME 101.

IME 239 Industrial Costs and Controls (3)
Estimation of manufacturing costs for production planning, cost analysis, and cost control. Planning, budgeting and control processes. Costs, accounting data and analysis of variances for managerial control, inventory valuation and decision making. Techniques of forecasting, pricing, cost estimating and cost reduction. 3 lectures. Prerequisite: IME 223.

IME 240 Additional Engineering Laboratory (1–2)
Total credit limited to 4 units, with a maximum of 2 units per quarter. 1 or 2 laboratories.

IME 241 Manufacturing Process Design I (4)
Economic and engineering analysis of manufacturing processes. Cost estimation for production planning, analysis, and control. Analysis of machining process inputs and mechanisms as an example process. Test report writing, documentation, and inspection methods. Field trips to manufacturing centers. 3 lectures, 1 laboratory. Prerequisite: IME 143 or IME 144, PHYS 131.

IME 251 Introduction to Manufacturing Engineering Analysis (4)
State of the art methods and processes in mechanical and electronic manufacturing. Selection of materials for manufacturing. Product design and manufacturability. Specifications and metrology in manufacturing. Continuous improvement strategies, such as automation, group technology, value analysis, and flexible system design. 2 lectures, 2 laboratories. Prerequisite: IME 143 or IME 144, PHYS 131, CHEM 124.

IME 301 Operations Research I (4)
Introduction to operations research, matrix theory, linear programming formulation and solution. Simplex method, sensitivity analysis, transportation and assignment algorithms. Introduction to linear networks and goal programming. Existing computer programs utilized. 4 lectures. Prerequisite: MATH 244.

IME 303 Project Organization and Management (4)
Design, analysis and implementation of a major industrial/business systems problem. Emphasis on situations requiring resolutions and management decisions by groups representing various elements of an enterprise. Resource leveling and management under constraints. 3 lectures, 1 laboratory. Prerequisite: Junior standing. IME 314 or equivalent.

IME 312 Data Management and System Design (4)
Design and management of industrial databases and reporting systems. Relationships of financial accounting databases and production systems. Efficient data entry and reports, queries, macro function, and Internet based database applications. 3 lectures, 1 laboratory. Prerequisite: CSC 232.

IME 313 Introduction to Information Systems Engineering (4)
Practical approach to use of new and existing data communications technologies related to industrial and manufacturing engineering. Use of hardware, operating systems, networks and application software, covered in both theory and practice. 3 lectures, 1 laboratory. Prerequisite: IME 312.

IME 314 Engineering Economics (3)

IME 319 Human Factors Engineering (3)
Analysis of factors influencing the efficiency of human work. Data on the physical and mental capacities of persons, the physical environment, work organization, and the problem of aging. Design of machines, operations, human computer interface and work environment to match human capacities and limitations, including the handicapped. Multidisciplinary team project.
3 lectures. Prerequisite: PSY 201 or PSY 202 or consent of instructor, and junior standing.

**IME 320 Human Factors and Technology (4)**
Analysis of cognitive, sensory and physical limitations and capabilities of operators and users of technology, both hardware and software, in working and living environments. Analysis of pertinent databases for a proactive approach to designing user-centered industrial products/systems, consumer products, and work environment. 4 lectures. Prerequisite: Junior standing and completion of GE Area B requirements.

**IME 326 Engineering Test Design and Analysis (4)**
Data gathering and statistical testing applied to industrial engineering and manufacturing fields. Experimental methods for product and process evaluation and comparisons; interpretation of engineering data. Engineering experimental design, linear and nonlinear regression, ANOVA, and multifactored ANOVA. Utilization of existing computer software. 4 lectures. Prerequisite: STAT 321 with a grade of C- or better.

**IME 330 CAD/CAM (3)**
Identification and study of the individual techniques of CAD/CAM as being practiced in modern industry. 2 lectures, 1 laboratory. Prerequisite: IME 144.

**IME 335 Computer-Aided Manufacturing I (4)**
Manufacturing systems overview; design dimensioning and tolerancing; numerical control (NC) programming; process planning and computer-aided process planning; use of CAD/CAM software; CAD/CAM data exchange format. 3 lectures, 1 laboratory. Prerequisite: IME 144, CSC 232, or consent of instructor.

**IME 336 Computer-Aided Manufacturing II (4)**
Automated production of parts: computerized part programming, post-processor generation and use, and CNC machining center operation. Introduction to flexible manufacturing systems and robotics. 3 lectures, 1 laboratory. Prerequisite: IME 335 or consent of instructor.

**IME 341 Tool Engineering (4)**
Design and engineering of tool for workholding cutting and forming. Material selection. Design projects. 3 lectures, 1 laboratory. Prerequisite: IME 241, CE 204, MATH 244, PHYS 133, MATE 210.

**IME 342 Manufacturing Systems Integration (3)**
Coverage of simulation, and production control, to provide engineering majors tools for the analysis and design of production control systems. 3 lectures. Prerequisite: IME 223, MATH 241. Recommended: STAT 321.

**IME 351 Advanced Material Removal Process Design (4)**
Advanced turning and milling processes; grinding and non-traditional processes. Thread and gear manufacturing, producibility, machinability, part and tool materials, cutting fluids, and tool life testing. Finishes and measurement of surface roughness. Process design projects. 2 lectures, 2 laborator-tories. Prerequisite: IME 241, MATE 210 and MATE 215, and CE 204.

**IME 352 Manufacturing Process Design II (4)**
Advanced engineering analysis of material shaping processes, surface processing and assembly operations with emphasis on optimizing process parameters, equipment, and operational sequence. Process design projects. 2 lectures, 2 laboratories. Prerequisite: IME 141, IME 142, IME 241, MATE 210/215, CE 204.

**IME 356 Manufacturing Automation (4)**
Computers in the factory automation environment. Basic control theory including feedback. Programming and use of programmable logic controllers (PLC), human-machine interface (HMI), and industrial control systems. Interfacing of electro-mechanical systems; analog and digital inputs, output; programmable controllers. Computer process control. 3 lectures, 1 laboratory. Prerequisite: EE 321.

**IME 400 Special Problems for Advanced Undergraduates (1–2)**
Individual investigation, research, studies, or surveys of selected problems. Total credit limit to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

**IME 401 Sales Engineering (2)**
Concepts and principles of engineering in sales. Role of the professional engineer in the analysis, design, development, production, and final application of a product or system required by the buyer. 2 seminars. Prerequisite: Senior standing in engineering, or consent of instructor.

**IME 404 Engineering Economic Decision Management (3)**
Quantitative approaches to engineering and management problems. Time value concepts, break-even and replacement analysis, optimization techniques for scheduling. Project cost estimation, resource management and risk analysis. Use of computer software packages. For non-majors only. 3 lectures. Prerequisite: Junior standing.

**IME 405 Operations Research II (4)**
Queueing models, dynamic programming and inventory models, Markovian processes, simulation modeling, computer programming in solution of problems. 3 lectures, 1 activity. Prerequisite: IME 301 or consent of instructor.

**IME 407 Operations Research III (4)**
Advanced linear programming as applied to problems in industrial systems. Integer and goal programming. Application of nonlinear, quadratic, dynamic programming concepts. Case studies of current topics in industrial engineering. 3 lectures, 1 activity. Prerequisite: IME 301 or consent of instructor.

**IME 408 Systems Engineering (3)**

**IME 409 Economic Decision Systems (3)**
Economic evaluation of information for complex decisions. Analysis of risks and uncertainties. Bayes theory and models. Decision theory, sequential decisions, and value of information applied to financial evaluation and control. Major project justification procedures. 3 lectures. Prerequisite: IME 239, IME 314, and IME 405, or consent of instructor.

**IME 410 Inventory Control Systems (4)**
Inventory planning and control systems. Implementation of manufacturing resource planning (MRP II) including demand forecasting, production planning, master scheduling, bill-of-material, and inventory master file. Capacity requirements planning and shop floor control. JIT approach to inventory control through pull production system. 3 lectures, 1 laboratory. Prerequisite: IME 405 or IME 342, IME 312.

**IME 411 Production Systems Analysis (3)**
Systems analysis for production control. Design of computer integrated planning and control systems for scheduling manufacturing orders, monitoring operating costs and control system performance evaluation. Development of computer-aided decision making framework. Interactive decision making using simulation modeling. 2 lectures, 1 laboratory. Prerequisite: IME 410, or equivalent.

**IME 413 Flexible Manufacturing Systems (3)**

**IME 416 Automation of Industrial Systems (3)**
Automation in manufacturing and warehousing. Economic selection of automation systems. Projects in automation. 2 lectures, 1 laboratory. Prerequisite: IME 356 or equivalent.

**IME 417 Supply Chain and Logistics Management (4)**
Overview of key logistics and supply chain management concepts. Models and solution methods for the design, control, operation, and management of supply chains. Techniques that are used to analyze supply chains. Team
IME 418 Product-Process Design (4)
Strategic engineering management of product design and manufacturing competitiveness; concurrent engineering. Study of manufacturability constraints in terms of prototyping, designing, testing, pre-production support, processing, quality, delivery, and customer satisfaction. Industrial design projects. Application of project management. Examination of relevant environmental and ethical problems. 3 lectures, 1 laboratory. Prerequisite: IME 341, IME 356 or consent of instructor.

IME 420 Simulation (4)
Design and analysis of manufacturing and service systems by simulation. System modeling. Random number and function generators, programming, and characteristics of simulation languages. Design projects using real world problems. Introduction to rule-based expert systems. 3 lectures, 1 laboratory. Prerequisite: IME 326.

IME 421 Manufacturing Organizations (3)
Theory and principles for manufacturing organizations. Competitive advantage. Strategic planning and operations management for organizations and teams in a rapidly changing environment. Engineering management concepts and practices. Team-based projects and cases. 3 seminars. Prerequisite: IME 314, PSY 201/PSY 202, or consent of instructor.

IME 422 Manufacturability Engineering (4)
Manufacturability constraints in terms of issues related to prototyping, designing, testing, preproduction support, processing, quality, delivery, and customer satisfaction. Hands-on projects to discuss the experimental results in dealing with the process of casting, machining, plastic modeling, and electronic board manufacturing. 3 lectures, 1 laboratory. Prerequisite: IME 341, IME 326. Recommended: IME 342.

IME 427 Process Optimization through Designed Experiments (4)
Experiments for optimization of industrial processes: process variables, response, measurements, analysis and interpretations. Statistical principles in design. Design approaches: conventional methods, response surface methodology, and Taguchi methods. Type of experiments: factorial, fractional factorial, mixture, and orthogonal arrays. Design projects using real world problems. 3 lectures, 1 laboratory. Prerequisite: IME 326 or consent of instructor.

IME 428 Engineering Metrology (4)
Measurement of attributes and variables; standards, accuracy and precision; mechanical, electronic and optical/laser measurement systems. Contact and non-contact measurement; straightness, flatness and squareness; GDT (Geometric Dimensioning and Tolerancing); CMM (Coordinate Measure-ment Machines); surface roughness; metrology for electronic products. 3 lectures, 1 laboratory. Prerequisite: IME 335 or consent of instructor.

IME 429 Ergonomics Laboratory (1)
Investigation of various physiological, sensory, and cognitive capabilities and limitations of people in work and living environments through laboratory data collection, design of experiments and statistical analysis. 1 laboratory. Prerequisite: IME 319, IME 326.

IME 430 Quality Engineering (4)
Quality control, reliability, maintainability, and integrated logistic support. Statistical theory of process control and sampling inspection. Risks associated with decisions based on operating characteristics of control charts and sampling plans. Reliability and life testing methods. Economics of statistical QC. Specifications and standards. 4 lectures. Prerequisite: IME 326 or equivalent.

IME 431 Supplier Quality Engineering (4)

IME 433 Advanced Work Measurement (3)
Predetermined time systems. Time formulas. Standard data systems. Use of statistical methods. Standard data systems applied to clerical, manufacturing, and micro assembly. Developing and maintaining computerized systems. Course will be administered with project orientation. 2 lectures, 1 laboratory. Prerequisite: IME 223, IME 326 or equivalent.

IME 435 Reliability Engineering I (3)
Reliability concepts and mathematical models, mechanical device reliability, electrical device reliability, systems reliability and maintainability, reliability data, assurance program elements. 3 lectures. Prerequisite: IME 326.

IME 437 Advanced Human Factors Engineering (3)
Team-based approach to human factors assessment of consumer and industrial products, systems, and information technology. Team building principles and techniques; performance measurements and monitoring. Usability analysis and ergonomics auditing through experimental methods. 2 lectures, 1 laboratory. Prerequisite: IME 319, IME 326 or equivalent.

IME 440 Quality Process Management (4)
Quantitative approaches to engineering and management of quality. Statistical process control, quality assurance concepts. Variability loss and off-line QC. Tolerance design and experimental design. Human factors and managerial dimensions influencing quality. For non-majors only. 4 lectures. Prerequisite: Junior standing or consent of instructor.

IME 441, 442 Engineering Supervision I, II (1,1)
Theory and principles of supervision. Application of fundamental concepts and techniques of supervision provided by assignment in engineering laboratories. 1 laboratory each. Prerequisite: IME 141, IME 334 or IME 335, and senior standing. Recommended: concurrent enrollment in IME 421.

IME 443 Facilities Planning and Design (4)
Design concepts and input requirements in planning and design of new or renovation of existing manufacturing systems. Product, process, and flow and activity analysis techniques. Flow lines and buffering techniques. Computer-aided layout design and evaluation. Design of handling systems. Math models of location problems. Multidisciplinary team project. 3 lectures, 1 laboratory. Prerequisite: IME 144, IME 223, IME 405 or IME 342, IME 314, or equivalent. Recommended: IME 319, IME 420.

IME 455 Manufacturing Design and Implementation I (3)
A mix of industry and in-house structured group projects. Projects progress through a complete cycle from design through implementation. Application of project management methods. Examination of relevant economical and safety issues. 3 laboratories. Prerequisite: IME 418.

IME 457 Advanced Electronic Manufacturing (4)
Design and fabrication of commercial electronic products; PCB layout design, bill of material analysis and component purchasing, production planning and scheduling, programming automated surface-mount assembly line, marketing of products. Multidisciplinary project teams exposed to real-world challenges of electronics manufacturers. 2 lectures, 2 laboratories. Prerequisite: IME 156 or IME 157.

IME 458 Microelectronics and Electronics Packaging (4)
Materials, processes, and reliability of microelectronics and electronics packaging, surface mount assembly and printed circuit board fabrication. Overview of semiconductor manufacturing and optoelectronics packaging. 3 lectures, 1 laboratory. Prerequisite: MATE 210 and PHYS 133 or consent of instructor. Changed effective Spring 2009; see Updates.

IME 461, 462 Senior Project I, II (2) (3)
Faculty supervised projects typical of problems which graduates encounter in their professions and which involve costs, planning, scheduling and research. Formal written report, suitable for reference library, discussing

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Methods, results and conclusions. Minimum 150 hours total time. 461: 2 laboratories. 462: 3 laboratories. Prerequisite: Senior standing (within 3 quarters of graduation), IME 314, IME 443, or IME 418.

IME 470 Selected Advanced Topics (1–4)
Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

IME 471 Selected Advanced Laboratory (1–4)
Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1 to 4 laboratories. Prerequisite: Consent of instructor.

IME 481 Senior Project Design Laboratory I (2)
Selection and completion of a project by individuals or teams which is typical of problems which IE or MfgE graduates must solve in their fields of employment, which is representative of those encountered in professional practice. Project typically involves system design, modeling, analysis and testing. Project method includes costs, planning, scheduling, and appropriate research methodology. Formulation of project outline, literature review, project activity scheduling and regular progress reviews by instructor are required. Prerequisite: Senior standing in major and consent of instructor. Note: Although IME 481 substitutes for IME 461, students may not use as repeat credit.

IME 482 Senior Project Design Laboratory II (3)
Continuation of IME 481. Involves research methodology: problem statement, method, results, analysis, synthesis, project design, construction (when feasible), and evaluation/conclusions. Project results are presented in formal written reports suitable for reference library and formal oral reports, 3 laboratories. Prerequisite: IME 481. Note: Although IME 482 substitutes for IME 462, students may not use as repeat credit.

IME 493 Cooperative Education Experience (2) (CR/NC)
Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. Total credit limited to 6 units. Prerequisite: Sophomore standing and consent of instructor.

IME 494 Cooperative Education Experience (6) (CR/NC)
Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. Total credit limited to 18 units. Prerequisite: Sophomore standing and consent of instructor.

IME 495 Cooperative Education Experience (12) (CR/NC)
Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. Total credit limited to 24 units. Prerequisite: Sophomore standing and consent of instructor.

IME 500 Individual Study (1–4)
Advanced study planned and completed under the direction of a member of the department faculty. Open only to students who have demonstrated ability to do independent work. Total credit limited to 4 units. Prerequisite: Consent of department chair and supervising faculty member.

IME 501 Graduate Survey I (4)
Survey of traditional industrial engineering applications in industrial systems, work methods, measurements and analysis. Facilities design, automation and logistics of industrial operations. Human factors and cost estimation of industrial applications. 3 seminars, 1 activity. Prerequisite: Graduate standing.

IME 502 Graduate Survey II (4)
Survey of current issues in data analysis and mathematical modeling of industrial systems, Queuing theory, Markov chains quality control and supply chain issues. 4 lectures. Prerequisite: Graduate standing and consent of instructor.

IME 503 Applied Statistical Methods in Engineering (4)
Application of hypothesis testing, regression models, and ANOVA models to forecasting, process optimization, cost estimation, work measurement, inventory control, scheduling, and ergonomics. Probability distributions of process outputs in industries and service systems such as Normal, exponential, Uniform, Hypergeometric, Binomial, and Poisson. Applications in queuing, reliability, Markov chains. Expectations of random variables. Measures of central tendency and variation. Population and a random sample. Central limit theorem and its application in simulation of processes. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

IME 507 Graduate Seminar (2)
Selected topics of interest to industrial engineering, integrated technology management, and engineering management graduate students. The Schedule of Classes will list topic selected. Total credit limited to 4 units, with a maximum of 2 units per quarter. 1 seminar, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

IME 510 Systems Engineering I (4) (Also listed as AERO 510)
Project management. Scheduling and budgeting. Queuing theory. Process control and life-cycle cost analysis. Contracts and negotiation. 4 lectures. Prerequisite: Graduate standing or consent of instructor.

IME 511 Systems Engineering II (4) (Also listed as AERO 511)
Risk management. Design strategies to meet system/mission requirements. Design for supportability, manufacturability, reliability, etc. Quality function development and quality control concepts. 4 lectures. Prerequisite: AERO 510 or IME 510, graduate standing or consent of instructor.

IME 516 Mechatronics Systems Analysis (4)
Overview of smart products and intelligent manufacturing systems. Tools and technologies utilized in the design, manufacturing, and operations of such products and systems. Artificial Intelligence Technologies and Fuzzy Logic. Design of smart products and intelligent systems. Case studies. Team projects and formal presentations. 3 seminars, 1 laboratory. Prerequisite: IME 416 or ME 405 or equivalent.

IME 520 Advanced Information Systems for Operations (4)
Advanced information systems (IS) applications in manufacturing and service operations. Introduction of common IS applications, such as manufacturing execution systems; reporting systems; capacity planning systems; scheduling systems; and customer inquiry systems. Industry-specific analysis of IS requirements and availability. 4 seminars. Prerequisite: IME 410 or consent of instructor.

IME 526 Advanced Topics in Manufacturing System Design (4)
Modeling and analysis of manufacturing systems. Advanced topics in manufacturing system design to support development of complex systems: Virtual Reality, discrete event simulation, system architectures, systems integration, scheduling and control of manufacturing systems. Total credit limited to 12 units. 3 seminars, 1 laboratory. Prerequisite: IME 410 or equivalent.

IME 541 Advanced Operations Research (4)
Operations Research approach to model building. Linear programming and sensitivity analysis. Network flow models. Integer programming, large scale linear programming. Goal programming and multi-attribute decision making. Dynamic programming. Nonlinear programming and search methods. Applications in model building and computer solutions in planning, resource allocation, scheduling, and other industrial and service operations. 3 lectures, 1 laboratory. Prerequisite: Graduate standing and consent of instructor.

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IME 542 Reliability Engineering II (4)
Reliability engineering terminology and definitions. Reliability mathematics; probability plotting; load-strength interference and safety margin. Failure distributions and failure rate models. Weibull analysis; bath tub curve; reliability of parts. Reliability of systems; redundancy; reliability allocation. Maintainability and availability. Failure modes and effects analysis. Fault tree analysis. Failure data analysis; reliability testing; reliability growth testing. Electronic system, mechanical and software reliability. Safety and human reliability; reliability management. 3 lectures, 1 laboratory. Prerequisite: IME 503.

IME 543 Advanced Human Factors (4)
Theory and application of man-machine relations and system design. Concepts of mathematical models, human information input channels, decision making based on capability of human operator. 3 seminars, 1 laboratory. Prerequisite: IME 319 or equivalent, IME 326 or equivalent and graduate standing.

IME 544 Advanced Topics in Engineering Economy (4)

IME 545 Advanced Topics in Simulation (4)
Validation of simulation models. Statistical techniques for variance reduction. Experimental design and optimization. Comparison of attributes of simulation languages. Review of current manufacturing and service industry applications. Case studies. 3 lectures, 1 laboratory. Prerequisite: IME 420 and graduate standing.

IME 548 Engineering Decision Making (4)
Principles, concepts, models, and case studies of decision making, both quantitative and nonquantitative. Emphasizes commonly used techniques when quantitative models do not exist, do not cover all key factors, or when sufficient data are not available. 3 lectures, 1 laboratory. Prerequisite: IME 301, IME 314, STAT 321 or equivalent and graduate standing.

IME 555 Computer-Integrated Manufacturing (4)
CIM and concurrent engineering concepts. Systems analysis methodologies and functional specifications. Technological and managerial strategies for system integration. Analysis of contemporary CIM frameworks. Information networks and protocols for integrated manufacturing systems. Implementation strategies for CIM and concurrent engineering. 3 seminars, 1 laboratory. Prerequisite: IME 335, IME 411 or equivalent, graduate standing.

IME 556 Technological Project Management (4)
Projects in industrial organizations and enterprises. Emerging technologies and project management. Relationship to strategic plans and managing change in organizations. Formulating, selecting, structuring, and planning projects. Project organization and control. Overcoming barriers. Application of project management software. 3 seminars, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

IME 557 Technological Assessment and Planning (4)
Assessing likely future technological environments, speed of change in competitive environments, relationship to business, strategic, and technology plans of firms. Past, present and technological evolution and operational changes. Technological and competitive impact assessment and business/technology strategy development. Use of case studies and company experiences. 4 seminars. Prerequisite: IME 503 or equivalent, and graduate standing.

IME 558 Executive Seminars (4)
Culminating overview of major issues facing organizations as they meet the challenge to sustain a competitive advantage in a business environment characterized by rapid and pervasive change. Topics include project management, virtual organizations, the service sector, manufacturing futures, and information technology. 2 seminars, 2 supervision. Prerequisite: Advanced graduate program status or consent of instructor.

IME 559 Engineering Research and Development (4)
Principles, approaches and practices for effective engineering innovation, design, research and development (R&D) in business and industry. Relationship of R&D with corporate strategy and technology base. R&D objectives through implementation. Integration of creativity, evaluation, design, and ongoing operations. Case studies. 4 seminars. Prerequisite: IME 314 or equivalent and graduate standing.

IME 560 Quality Engineering II (4)

IME 570 Selected Advanced Topics (1–4)
Directed group study of selected topics for advanced students. Open to graduate students and selected seniors. The Schedule of Classes will list topic selected. 1–4 seminars. Prerequisite: Graduate standing and/or consent of instructor.

IME 575 Critical Technologies (4)
Scientific, engineering and strategic overview of numerous critical emerging technologies. Topics include: technologies critical for different engineering disciplines, critical to numerous industries, and/or critical to the national interest. Focus on each technology to include: understanding key scientific fundamentals, evaluating commercialization potential to industry, and identifying conditions and outlook for future technological breakthroughs. 3 seminars, 1 laboratory. Prerequisite: Engineering graduate student and consent of instructor.

IME 577 Engineering Entrepreneurship (4)
The special requirements of entrepreneurship in a high-tech environment. Guest lectures, focused seminar topics, a business plan project, and case studies provide the tools to evaluate and pursue technology-based business opportunities. 3 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

IME 580 Manufacturing Systems (4)
Modern approaches in production and inventory planning and control to support large-scale manufacturing systems, material requirements planning (MRP I), manufacturing resource planning (MRP II), and just-in-time (JIT) manufacturing systems. Enterprise resource planning (ERP) and integration with financials. Information requirements, operational issues, and policy matters. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

IME 591, 592 Integrated Product Development I, II (4) (4)
Team taught course addressing: product opportunity identification, customer needs analysis, concept definition, requirements definition, product-process analysis, product specification, design/process description, prototyping, project management, packaging, product promotion/introduction, and manufacturing ramp-up. Team projects in partnership with industry sponsors, field-trips and formal presentations. 3 seminars, 1 laboratory for each. Prerequisite: Graduate standing.

IME 593 Cooperative Education Experience (2) (CR/NC)
Advanced study analysis and part-time work experience in student’s career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

IME 594 Cooperative Education Experience (6) (CR/NC)
Advanced study analysis and full-time work experience in student’s career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career
field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**IME 595 Cooperative Education Experience (12) (CR/NC)**
Advanced study analysis and full-time work experience in student’s career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A fully-developed formal report and evaluation by work supervisor will be required. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

**IME 596 Team Project/Internship (1-10)**
Integrative learning experience through internship and team project with industrial organizations. Requires advanced study and focuses on industrial unstructured problem or opportunity requiring integration across disciplines. Team project involves student, faculty, and sponsoring firm representative(s) in a collaborative learning environment, and culminates in comprehensive written report. Total credit limited to 10 units, normally taken over 2 quarters. Prerequisite: Advanced graduate standing, completion of, or concurrent enrollment in, engineering courses in specialization, and consent of participating faculty.

**IME 599 Design Project (Thesis) (1-9)**
Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis. Prerequisite: Graduate standing and consent of instructor.

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### IS–INTERDISCIPLINARY STUDIES

**IS 101 Orientation to Interdisciplinary Studies and the University (3)**
Introduction to collaborative interdisciplinary inquiry. Topics include: Scholarly knowledge production and bibliographic finding tools, University role in knowledge dissemination and creation, and information search and evaluation processes. “Learn-by-doing” discipline investigation and interdisciplinary analysis and synthesis. 3 lectures.

**IS 301 Critical Issues Seminar (4)**
Discussion-oriented seminar focusing on ethics and effective interdisciplinary decision-making in the contemporary world. Examination of ethical and other issues facing society through current public debates, as well as great intellectual traditions that have shaped the past. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisites: Admission to the Adult Degree Program (Bachelor of Arts in Interdisciplinary Studies) prior to enrolling in this seminar.

**IS 302 Analytical Skills Seminar (4)**
Improvement of abilities to collect data, analyze information, frame questions, reach and defend logical conclusions. Emphasis on applying methods of data analysis to a variety of contemporary interdisciplinary issues. The Schedule of Classes will list topic selected. 4 seminars. Prerequisite: Admission to the Adult Degree Program (Bachelor of Arts in Interdisciplinary Studies) prior to enrolling in this class, and IS 101.

**IS 305 New course – Effective Spring 2009; see Updates**

**IS 450 Advanced Investigation Seminar (5)**
In-depth interdisciplinary investigation into a narrowly defined issue of personal and/or professional interest. Identification of topic and examination from a variety of viewpoints (e.g., cultural, environmental, religious, political, or economic). The Schedule of Classes will list topic selected. 5 seminars. Prerequisite: Admission to Adult Degree Program (Bachelor of Arts in Interdisciplinary Studies), IS 301 and IS 302.

**IS 453 New course – Effective Spring 2009; see Updates**

**IS 460 Capstone Project (6)**
Selection and completion of a summative project or report under the supervision of a faculty member. Topic must be approved by the seminar instructor and the ADP director. Investigation of the topic from an interdisciplinary approach. Prerequisite: Senior standing, IS 301, IS 302, IS 450.

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### IT–INDUSTRIAL TECHNOLOGY

**IT 137 Electrical/Electronic Systems (4)**
Introduction to electrical and electronic circuit fundamentals. Essential information for technical managers regarding the universal law, theory, principles, application and troubleshooting of AC and DC circuits and devices. Familiarity with concepts used extensively in manufacturing/production and countless electronic products. Understanding of inductance, capacitance, resistance, integrated circuit components and the relationship they have with each other. Strategic decision and problem solving skills developed using electricity/electronics as the environment. 3 lectures, 1 laboratory.

**IT 150 Industrial Power Systems (4)**
Introduction to systems that supply energy, convert energy to power, transmit energy and power, and use energy and power to drive industrial enterprises. Energy systems include fossil, atomic and prominent alternative resources. Power conversion systems include reactors, internal and external combustion, direct conversion, and alternative technologies. Power transmission and end-use systems include mechanical, thermal, fluid, and electrical. Industrial facilities management strategies including advantages and disadvantages of economics, safety, conservation, design and maintenance. 3 lectures, 1 laboratory. Prerequisite: IT 137.

**IT 233 Decision Making and Problem Solving Using CAD (4)**
Fundamental theory and practice of technical design communication and management of information systems. The basic application of 2-D and 3-D computer-aided design (CAD) and fundamental skills in communication of product design and their impact on the industrial organization. 2 lectures, 2 laboratories.

**IT 260 Manufacturing Processes (4)**
Manufacturing processes; emphasis on shaping metallic products. Precision measuring, technical drawings, safety and equipment use as they apply to metal machining, welding, casting and sheet metal fabrication. 2 lectures, 2 activities.

**IT 300 Symposium Organization (2) (CR/NC)**
Managing the development of a technical information symposium from concept through symposium presentation. Organization of facilities, speakers, dinner meeting, professional meetings, industrial displays, food services, personnel, finances, and advertising. Credit/No Credit grading only. Total credit limited to 6 units. 2 seminars. Prerequisite: Completion of Area A or equivalent.

**IT 326 Product Evaluation (4)**
Value engineering, product dissection and the study of reverse product engineering as they relate to product design for manufacturing; improved product quality; reduced usage of energy and materials; material recycling and reuse; product design and development, proving value to the customer and society. 3 lectures, 1 laboratory. Prerequisite: Completion of GE Area B3 via a college course in physics (PHYS), or PSC 101.

**IT 329 Industrial Materials (4)**
Structure, properties, applications and limitations of select industrial materials to include ferrous and nonferrous metals, ceramics, glasses, composites, and organic materials. Materials testing and material selection. 3 lectures, 1 activity. Prerequisite: CHEM 110 or CHEM 111 or equivalent.

**IT 330 Fundamentals of Packaging (4)**
Overview of packaging. Historical development, functions, and materials. Processes and technology employed to protect goods through the supply chain. Container types, package design, development, research and testing. Economic and international importance and perspective as an industrial activity. Packaging and the environment, and laws affecting packaging. 2 lectures, 2 activities. Prerequisite: Consent of instructor. Changed effective Spring 2009; see Updates.

**IT 336 Textile Technology (4)**
Physical and chemical characteristics of natural and manufactured fibers. Production of synthetic polymers. Technology of fabric production and finishes. Industrial and consumer applications. Textiles as a global industry. Legislation. Laboratory identification of fibers and evaluation of

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performance properties of fabrics. 3 lectures, 1 laboratory. Prerequisite: Junior standing, completion of Area A and one laboratory science course, or consent of instructor.

**IT 341 Plastic Processes and Applications (4)**

GE Area F

Cultural, social and economic implications of plastics in a worldwide environment. Study of materials, costs, processes, resource management, recycling, safety, laws and regulations. Applied laboratory experiences with common industry processes, i.e., injection, blow, rotational and compression; molding with plastic casting and fabrication. Application of laboratory experiences to improve consumer conformance to specifications and economic analysis of raw material cost and availability. Evaluation of current materials and technologies to reduce waste and improve reuse and recycling plastics. 3 lectures, 1 laboratory. Prerequisite: Completion of GE Area B3 via Chemistry.

**IT 371 Decision Making in Supply Chain, Services, and Project Management (4)**

Introduction to supply chain, services, and project management decision making using information technology tools. Application of flowchart, project management network and spreadsheet software to process improvement, project planning, forecasting, and inventory management planning and control in manufacturing and service industries. Understanding current practices for decision making in manufacturing and service operations and project management. 3 lectures, 1 activity. Prerequisite: A grade of C- or better in: MATH 141 or MATH 221, and STAT 211 or STAT 252.

**IT 381 Industrial Management (4)**

Organization and functioning of management in industry. Planning, direction, and control of the business enterprise in terms of policy formation, organizational structure, finance, sales, procurement, plant location, facilities and production processes. 4 lectures. Prerequisite: Junior standing.

**IT 400 Special Problems for Advanced Undergraduates (1-4)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of instructor.

**IT 402 Analyzing and Presenting the Operations Infrastructure for New Industrial Enterprises (4) (formerly IT 302)**

Taking a new industrial enterprise from concept to successful launch. The planning and management of a successful product-based start-up to include the integration of: product development; manufacturability and costs of production; manufacturing/outsourcing decisions; market channel selection; supply chain and distribution alternatives; inventory investment and scheduling to meet estimated demand. Successful new enterprises and application to a class project case study. Special emphasis on skills associated with developing effective technical presentations. 2 lectures, 2 activities. Prerequisite: COMS 101 or COMS 102, BUS 346, IT 326.

**IT 403 Quality Systems Management (4)**

Quality assurance as viewed from a systems perspective that includes cost, time, and process elements. Lean thinking applied as a problem solving approach to achieve continuous process improvement through the elimination of waste and the reduction of variability. 4 lectures. Prerequisite: IT 341 and STAT 217, or STAT 218, or STAT 251. Changed effective Fall 2008; see Updates.

**IT 406 Industrial Sales (4)**

Development of the technical competencies required in industrial selling and purchasing through the application of value stream mapping techniques and the philosophies and tool sets encompassing the discipline of process management as it relates to sales, marketing and customer service in Indus-trial settings. Includes guests speakers and team-based projects with local business organizations, individual and team product presentations, with written proposals. 3 lectures, 1 activity. Prerequisite: BUS 346 and IT 341.

**IT 407 Applied Industrial Product Design, Fabrication, and Sales (4)**

An integrative experience replicating a manufacturer’s business/production systems, including the design, fabrication, processing, quality-control, resource management, cost-control, marketing, sales and packaging functions. Focus of instruction methodology on the development of the student’s comfort with ambiguity and change inherent in business/production systems. Builds upon the foundational concepts developed throughout the Industrial Technology curriculum. 2 lectures, 2 laboratories. Prerequisite: BUS 346 and IT 326.

**IT 408 Paper and Paperboard Packaging (4)**

Physical and chemical properties, manufacture, conversion and use of paper, paperboard, corrugated board and related components. Design, use and evaluation of packages made from these materials. Survey of tests and procedures for paper based packaging materials and packaging products following ASTM, TAPPI, and ISO standards. 2 lectures, 2 activities. Prerequisite: IT 330.

**IT 409 Machinery For Packaging (4)**

Analysis of major types of packaging machinery from a practical, operational and marketing viewpoint. Basic processes utilizing packaging machinery. Specialized operations, contract specifications, selection, operation and maintenance. Material handling and distribution equipment and systems, and storage and retrieval systems. Required field trips to packaging operations. 3 lectures, 1 activity. Prerequisite: IT 330, PHYS 104 or PHYS 121, or consent of instructor.

**IT 410 Operations Planning and Control (4)**

Linking supply chain operations to deliver value to the end customer. Contrasting of advanced manufacturing concepts, such as pull systems, sales and operations planning, mixed model manufacturing, level production, and theory of constraints to traditional materials requirements planning systems. 3 lectures, 1 activity. Prerequisite: IT 341 and BUS 391.

**IT 411 Industrial Safety and Quality Program Leadership (4)**

Effective program development and leadership required to implement safety and quality process improvement in industry. Application of industrial leadership, knowledge, skills and methods to develop and implement total safety and quality management programs. Class safety/quality process project includes the oral presentation. 3 lectures, 1 activity. Prerequisite: Senior standing.

**IT 419 Cooperative Education/Internship (2-12) (CR/NC)**

Work experience in business, industry, government and other areas of student career interest. Periodic written progress reports, final report, and evaluation by work supervisor required. Credit/No Credit grading. Total credit limited to 16 units. Prerequisite: Approval of area chair, junior standing, and a CPSLO cumulative GPA of at least 2.5 without being on academic probation.

**IT 422 Computer Process Simulation of Operational Systems (4)**

Focus on management of business process flows, utilizing computer process simulation software. Transformation of inputs into outputs by means of capital and labor resources. Models, modeling tools, solution approaches and methodologies for process improvement, including product development within both service and manufacturing organiza-tions. 2 lectures, 2 laboratories. Prerequisite: IT 407.

**IT 428 Commercialization of New Technologies (4)**

Concepts, frameworks, and experiences necessary to understand the business potential of technology innovations and determine if one or more sustainable market opportunities can be identified to exploit them. Hands-on exercises and real new inventions to illustrate concepts. 4 lectures. Prerequisite: IT 326 and BUS 212 or BUS 214.

**IT 435 Packaging Development (4)**


**IT 445 Computer Numerical Control and Robotics (4)**

Automated manufacturing systems, including computer numerical control (CNC), flexible manufacturing systems, computer-integrated manufacturing and robotics. Laboratory work in manual/automatic
programming and set-up of CNC machines and robots. 2 lectures, 2 laboratories. Prerequisite: IT 233, IT 260, or consent of instructor.

**IT 446 Textile Product Design and Development (4)**

**IT 451 Facility Equipment and Systems (4)**
Develop an understanding of how major mechanical equipment and systems are incorporated in the utility and production support systems of a modern industrial facility. Includes field trips to industrial/commercial facilities. 4 lectures. Prerequisite: IT 150 or consent of instructor.

**IT 454 Facilities Development (4)**
Construction and maintenance of physical facilities and equipment as related to plant layout/design, regulatory and environmental compliance, safety/security, energy conservation, and process improvement. 4 lectures. Prerequisite: IT 451 or consent of instructor.

**IT 464 Applied Industrial Technology Senior Project Seminar (4)**
Selection and analysis of industrial and technological problems and opportunities in directed individual or group-based projects. Problems typical to those which graduates could encounter in their fields of employment. Formal report required. 4 seminars. Prerequisite: Senior standing.

**IT 470 Selected Advanced Topics (1–4)**
Directed group study and seminars in selected topics in industrial technology. Open to undergraduate students. The Schedule of Classes will list topic selected. Total credit limited to 12 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

**IT 475 Packaging Performance Testing (4) (formerly IT 375)**
Survey of tests and procedures for packaging materials and packaging products following ASTM and ISTA standards. The testing procedures include tests for shock, vibration, drop and impact as prescribed for shipment by truck, rail, sea, and air. Hands-on product/packaging testing for quality control. 2 lectures, 2 laboratories. Prerequisite: IT 330.

**IT 482 Advanced Operations Management (4)**
Advanced principles in operations management as applied to both manufacturing and service organizations. Product-service conversion systems, capacity planning and utilization, aggregate planning, scheduling and control, inventory management, and operations subsystem coordination with the organization's strategy. 4 lectures. Prerequisite: IT 371, and senior standing.

**IT 487 Seminar in Quality Management (4)**
Principles and techniques of quality and performance management as applied to organizations in the private and public sector. Emphasis on competitive implications. Integrations of fundamental management techniques, existing improvement efforts, technical tools, and new management technologies focused on continuous organizational improvement. 4 seminars. Prerequisite: IT 371, and senior standing.

**IT 500 Individual Study (1–6)**
Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Maximum of 6 units may be applied to degree requirements. Prerequisite: Graduate standing and formal petition with approval from the Associate Dean of OCOB Graduate Programs.

**IT 510 Impact of Science and Technology (4)**
Comprehensive study of innovation – ideas implemented successfully in practice. Theories, strategies, and information for directing cutting-edge technological trends in a variety of industries but not limited to: materials, telecommunications, biotechnology, environmental management, packaging, transportation, food technology, and facilities. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 512 Improving Productivity Through Technology (4)**
Study, from a management of technology perspective, of current and emerging automation technologies, from a technology perspective, and how they are used in manufacturing to provide firms with a competitive advantage; problems raised and opportunities made available by modern manufacturing automation technologies; issues concerning technology selection, justification, implementation, technology consistency, and restructuring. 4 lectures. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 514 Commercializing Technological Development (4)**
The process utilized in developing technologies for customers. Emphasis on new technology/product development process, including idea generation, concept development, industrial market niche, product research and development, manufacturing, product launch and evaluation. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 518 Management of Technology (4)**
The role and importance of technology in corporate production environments. Different approaches to manufacturing leadership, organization and planning, in terms of their impact on decision-making, product development and innovation. 4 lectures. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 521 Training in Industrial and Technical Systems (4)**
Developing and managing technological training in industry. The integration of people, technology, philosophy, corporate visions, missions, goals, objectives, resources, populations, facilities, budgets and evaluation in the development of industrial training curriculum and instruction. 4 lectures. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 522 Facilities Planning (4)**
Introduction of prospective managers to the methods and techniques used in the planning of the modern industrial facility, including but not limited to: site selection, layout, materials handling, utilities, color and lighting, sound, air, safety standards, and current trends. 4 lectures. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 523 Industrial Sales (4)**
Development and implementation of a base of competencies that support the sale of products whose intended application is in manufacturing. Refinement of technical knowledge and selling in an industrial setting. 4 lectures. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 527 Trends and Issues in Technology Management (4)**
Advanced study of key current trends and issues relative to technology management of industrial and technical systems. 4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 570 Selected Advanced Topics (1–4)**
Directed group study of selected topics for advanced students. Open to undergraduate students. The Schedule of Classes will list topic selected. Total credit limited to 16 units. 1–4 seminars. Prerequisite: Graduate standing or approval from the Associate Dean of Graduate Programs.

**IT 571 Selected Advanced Topics Laboratory (1–4)**
Directed group laboratory study of selected topics for advanced students. The Schedule of Classes will list topics selected. Total credit limited to 16 units.
units. 1-4 laboratories. Prerequisite: OCOB graduate standing or approval from the Associate Dean of OCOB Graduate Programs.

**IT 598 Industrial and Technical Studies Project (5)**
Completion of a project involving individual research significant to the field of industrial and technical systems. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. Course satisfies culminating experience requirement through the completion of the project. Prerequisite: Graduate standing, consent of instructor and IT 510, IT 512, IT 520 and IT 527 or approval from the Associate Dean of OCOB Graduate Programs. **Changed effective Fall 2008; see Updates.**

**IT 599 Industrial and Technical Studies Thesis (5)**
Completion of a thesis involving individual research that is significant to the field of industrial and technical systems. A formal written proposal must be accepted by the Associate Dean of OCOB Graduate Programs before work begins. Course satisfies culminating experience requirement through the completion of the comprehensive thesis. Prerequisite: Graduate standing, consent of instructor and IT 510, IT 512, IT 520 and IT 527 or approval from the Associate Dean of OCOB Graduate Programs. **Changed effective Fall 2008; see Updates.**

**ITAL–ITALIAN**

ITAL 101, 102, 103 **Elementary Italian I, II, III (4) (4)**
Italian for beginners. Class practice in pronunciation, sentence structure, reading, writing, and basic conversation. Laboratory drill required. Language taught in its cultural context. To be taken in numerical sequence. 3 lectures, 1 activity.

**JOUR–JOURNALISM**

**JOUR 201 Journalism History (4)**
Survey of historical influences in the development of today's journalism. Contributions of women and minorities to American mass media. Rise of technology in the communication industry. 4 lectures.

**JOUR 203 Writing for the Media (4)**
Introduction to the techniques of reporting and writing news from various media perspectives including print, online, broadcast and public relations. Intensive laboratory and field practices in gathering and evaluating information. Writing basic news stories under close supervision. 3 lectures, 1 laboratory.

**JOUR 205 Agricultural Communications (4)**
Survey of the media of agricultural communication. Newspaper farm pages and sections, general and specialized agricultural magazines. Radio and TV farm broadcasts. Public and private agencies involved in agricultural communication. Role of California minorities in agriculture. Writing on agriculture-related issues. 3 lectures, 1 activity.

**JOUR 219 Mass Media in a Multicultural Society (4)**
Challenges and triumphs of the mass media in a multicultural society. Survey of print, electronic and online media and how they serve and reflect the communication needs and aspirations of citizens in a multi-ethnic democracy. 4 lectures. **Changed effective Spring 2009; see Updates.**

**JOUR 233 Copy Editing (4)**
Introduction to the techniques of newspaper, magazine, and on-line copy desk work. Rewriting and editing copy and headlines for news, feature stories, and on-line material. Headline, caption, and display copy writing. Ethical issues in copy editing. Selecting, cropping, and writing captions. Art/photography selection, sizing, and cropping. Basic editing functions of Photoshop and Quark. Practical laboratory experience in editing. 3 lectures, 1 laboratory. Prerequisite: JOUR 203.

**JOUR 302 Mass Media Law (4)**
Legal basis for freedom of expression. Court decisions resolving conflicts between First Amendment and right to fair trial, privacy, reputation. Source confidentiality, freedom of information, contempt, copyright. Federal and state laws and regulations affecting mass media reporters, editors, publishers, news directors. 4 lectures. Prerequisite: JOUR 203.

**JOUR 304 Public Affairs Reporting (4)**
Experience leading to advanced skills in reporting and writing stories about contemporary issues, government and courts. Field and laboratory assignments in beat reporting, public meeting coverage, writing style, investigative techniques and online journalism research. 3 lectures, 1 laboratory. Prerequisite: JOUR 203 and JOUR 233 or JOUR 342.

**JOUR 312 Introduction to Public Relations (3)**
Growth and development of public relations as a practice in business and industry, government, volunteer agencies and other public institutions. Communications and activities utilized to gain public interest and support. 3 lectures. Prerequisite: Sophomore standing.

**JOUR 331 Contemporary Advertising (4)**

**JOUR 333 Broadcast News (4)**
Beginning broadcast news writing and reporting for radio and television. Emphasis on developing news judgment and producing radio newscasts. Introduction to television studio equipment and procedures. Lab experience includes writing and reporting live on-air for KCPR. 3 lectures, 1 laboratory. Prerequisite: JOUR 203.

**JOUR 342 Public Relations Writing and Editing (4)**
Theory, strategic planning and practice in writing persuasive public relations copy for diverse internal and external audiences. Emphasis on gathering information, preparing news releases, newsletters and other communications vehicles. Analysis of various media case studies. 4 lectures. Prerequisite: JOUR 312.

**JOUR 346 Broadcast Announcing and Production (4)**
Develop on-air skills in the performance of voice-overs, stand-ups, hosting and the production of televised public service announcements. Emphasis on the effective use of audio and non-linear video editing techniques as well as broadcast writing. 3 lectures, 1 activity. Prerequisite: JOUR 203 and JOUR 333.

**JOUR 348 Electronic News Gathering (4)**
Instruction on electronic news gathering (ENG) that includes advanced news writing, field reporting and editing for broadcast. Emphasis on developing research techniques, interviewing skills, responsible and effective non-linear video editing, compelling use of natural sound and professional on-air delivery. 3 lectures, 1 laboratory. Prerequisite: JOUR 203 and JOUR 333.

**JOUR 352 Advanced Newspaper Reporting: Mustang Daily (3)**
Reporting lab for students holding editorial positions on Mustang Daily. Total credit limited to 6 units. 2 lectures, 1 laboratory. Prerequisite: JOUR 203, JOUR 233 and JOUR 304.

**JOUR 353 Broadcast Journalism Practicum (3)**
Senior-level course synthesizing the diverse skills and experiences developed through the broadcast journalism curriculum. Students produce a live 30-minute CPTV newscast per week, plus a one-hour KCPR segment that incorporates news, information, talk and entertainment. Emphasis on news producing, reporting and announcing skills. Total credit limited to 6 units. 2 lectures, 1 laboratory. Prerequisite: JOUR 333 and JOUR 346 or JOUR 348. Non-majors: consent of instructor.

**JOUR 385 Mass Media Criticism (4)**
Examines mass media (especially broadcasting) from a rhetorical/critical perspective. Aims to expand students' understanding of media issues, media's role as critic, and the role of criticism. 4 lectures. Prerequisite: COMS 101 or COMS 102, and junior standing.

**JOUR 390 Visual Communication for the Mass Media (4)**
Theory and application of visual communication in today's print, broadcast and public relations media. Extensive experience in visual and text
manipulation for effective information communication. 3 lectures, 1 laboratory. Prerequisite: JOUR 203.

**JOUR 400 Special Problems for Advanced Undergraduates (1–4)**
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of instructor.

**JOUR 401 Global Communication (4)**
Global communications facilities and operations; world transmission of information; survey of world wire services and international print and electronic media. Analysis of press operations under varying government ideologies, including third world countries. 4 seminars. Prerequisite: JOUR 203; junior standing.

**JOUR 402 Journalism Ethics (4)**
Current issues revolving around the social responsibility of the mass media. Role of the public, government, and media in considerations of media accountability. Professional behavior in media organizations. 4 seminars. Prerequisite: Junior standing, JOUR 203; junior standing.

**JOUR 407 Feature Writing (4)**
Practice in researching, interviewing, writing and marketing nonfiction articles for print media, and analysis of similar work in current distribution. 4 lectures. Prerequisite: JOUR 205 or consent of instructor; junior standing.

**JOUR 410 Applied Multimedia Reporting (4)**
Exploration of the uses of computers for newsgathering and reporting. Focus on information gathering from mass media, governmental and corporate data bases and contextual manipulation using personal computers and mainframe computers. Commercial online and Internet tools (such as the World Wide Web) and database tools used for day-to-day and project oriented reporting. 3 lectures, 1 laboratory. Prerequisite: JOUR 203; junior standing.

**JOUR 413 Public Relations Campaigns (3)**
Methods employed in dissemination by organizations, institutions and governments. Interaction of media and PR practitioners, strategies for integrating appropriate media to facilitate effective dissemination, case histories, formation and measurement of public opinion. Public opinion survey projects. 3 lectures. Prerequisite: JOUR 203 and JOUR 312 and JOUR 342 or consent of instructor.

**JOUR 415 Advanced Public Relations Practice (4)**
Application of public relations tools and techniques required to create, manage, and implement a comprehensive, professional public relations campaign. Includes research, planning, writing goals and objectives; establishing themes, strategies, and plan evaluations. Public relations crisis management. 4 lectures. Prerequisite: JOUR 203, JOUR 312, JOUR 342 and JOUR 413.

**JOUR 444 Media Internship (3)**
Application of techniques on daily basis with media under supervision of department faculty. Prerequisite: Junior standing in Journalism and consent of instructor.

**JOUR 460 Senior Project (3)**
Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 90 hours total time.

**JOUR 470 Selected Advanced Topics (2–4)**
Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 2–4 lectures. Prerequisite: Consent of instructor; junior standing.

**JPNS—JAPANESE**

**JPNS 101, 102, 103 Elementary Japanese I, II, III (4) (4) (4)**
Beginning Japanese class practice in pronunciation, sentence structure, reading, writing, basic conversation, and introduction to Japanese culture.

**KINE—KINESIOLOGY**
(See also PE—Physical Education)

**PROFESSIONAL ACTIVITIES**
Priority for enrollment given to those students pursuing a major in Kinesiology. Kinesiology majors may apply a maximum of 24 units of credit earned in PE 101-199 or KINE 208-239 toward the bachelor's degree. When applicable, course selection should be determined by students after consultation with their advisor. All courses are one or two units and meet for two or four hours per week. The primary purpose of all professional activities is for students to attain intermediate skills in performance and analysis and knowledge of rules and strategy. Secondary purposes may include leadership and teaching experiences. In some classes a beginning level activity class (see Physical Education) will be recommended for individuals who have little or no previous experience.

**KINE 208 Golf (1)**
KINE 210 Tennis (1)
KINE 211 Softball-Baseball (1)
KINE 212 Handball/Racquetball (1)
KINE 213 Basketball (1)
KINE 214 Volleyball (1)
KINE 216 Wrestling (1)
KINE 217 Flag Football/Football (1)
KINE 218 Aquatics (2)
KINE 219 Progressive Strength Training (1)
KINE 220 Group Fitness Activities (2)
KINE 221 Combatives/Self Defense (1)
KINE 222 Archery (1)
KINE 223 Cross Country and Track Events (1)
KINE 224 Field Events (1)
KINE 225 Team Handball (1)
KINE 226 Soccer (1)
KINE 227 Aerobic Dance Exercise (2)
KINE 228 Cooperative Games and Activities (1)
KINE 229 Badminton (1)

**ACADEMIC COURSES**
Professional courses designed primarily for the student majoring in kinesiology.

**KINE 241 Understanding Fitness and Training (1)**
Introduction to physiological principles and factors which provide the basis for the development and maintenance of optimal physical fitness. 1 lecture. Prerequisite: Concurrent enrollment in one course in the PE 101-199 series, or consent of instructor.

**KINE 250 Healthy Living (4) GE D4**
Personal health with emphasis on healthful behavioral practices including physical fitness, nutrition, psychosocial well-being, alcohol and other drugs, intentional and unintentional injury, reproductive health, infectious and non-infectious diseases. 4 lectures. Not open to students with credit in KINE 255.

**KINE 255 Personal Health: A Multicultural Approach (4) GE D4 USCP**
Personal health with special emphasis on multicultural practices. Not open to students with credit in KINE 250. 4 lectures.

**KINE 270 Orientation to Kinesiology (4)**
Designed to acquaint the students with disciplinary and professional perspectives in kinesiology, computer applications, and the Kinesiology program at Cal Poly. 4 lectures.

**KINE 275 Sports Officiating (2)**
Designed to provide knowledge, understanding, appreciation of officiating in general, and the development of skills in officiating. 1 lecture, 1 activity.
KINE 276 Athletic Coaching Theory (3)
Basic concepts, methods, practices, strategies and philosophies as they apply to competitive athletics. 3 lectures.

KINE 277 Coaching Practicum (2–6) (CR/NC)
Practical experience through the actual coaching of a competitive sports team. 2–6 activities; minimum of 2 hours per week per unit. Total credit limited to 6 units. Credit/No Credit grading only. Learning outcomes must be developmental if more than one practicum is completed. Prerequisite: KINE 276 and consent of advisor.

KINE 280 First Aid/CPR (1) (CR/NC)
An American Red Cross certification course in Standard First Aid Adult/Child/Infant CPR. Skills and knowledge necessary in the treatment of life-threatening emergencies and other injuries and sudden illnesses. Red Cross First Aid/CPR certifications issued upon successful completion of certification requirements. Credit/No Credit grading only. 1 activity.

KINE 300 Planning Techniques in Physical Education (3)
Practical skills and techniques of teaching physical education in schools. Unit and lesson planning, class management, implementation and evaluation of a lesson in a laboratory setting. 2 lectures, 1 laboratory. Prerequisite: KINE 270 and 2 courses from KINE 208-KINE 229 or equivalent. Concurrent: KINE 306.

KINE 301 Functional Muscle Anatomy (1)
Functional organization of the human muscular system. All major muscle groups, with emphasis on segmental motion. 1 laboratory. Prerequisite: KINE 270, ZOO 331, 332 or concurrent enrollment.

KINE 302 Biomechanics (4)
Fundamental biomechanical concepts and their application to human movement activities, and analyses of exercise mechanics and skill performance. 3 lectures, 1 laboratory. Prerequisite: ZOO 331, KINE 301, KINE 270.

KINE 303 Physiology of Exercise (4)
Application of human physiology to exercise situations. 3 lectures, 1 laboratory. Prerequisite: KINE 270, ZOO 331, 332 (or transfer equivalent).

KINE 304 Pathophysiology and Exercise (3)
Selected human diseases, their etiology, pathophysiology, symptoms, diagnosis, effects on health and physical performance, and as affected by preventive or therapeutic exercise. 3 lectures. Prerequisite: KINE 303.

KINE 305 Drug Education (2)
Instruction on the nature and effect of the use of tobacco, alcohol, narcotics and restricted dangerous drugs. 2 lectures. Prerequisite: GE Area D4.

KINE 306 Assessment in K-12 Physical Education (3)
Measurement and evaluation techniques in physical education, including statistics, computer applications, and measurement theories. Assessment tools in psychomotor, cognitive, and affective domains. 1 lecture, 2 laboratories. Prerequisite: KINE 270 and STAT 217/STAT 218. Concurrent: KINE 300.

KINE 307 Adapted Physical Activity (4)
Major categories of disabling conditions with implications for the development of physical activity programs for specific disabilities. 3 lectures, 1 laboratory. Prerequisite: KINE 270, GE Area B2 and B3, sophomore standing. Recommended: ZOO 331, 332.

KINE 308 Motor Development (3)
Motor development of individuals from birth to maturity. Emphasis on interrelationship between motor and cognitive characteristics and affective needs and interests. 3 lectures. Prerequisite: KINE 270, GE D4 or consent of instructor.

KINE 309 Creative and Nontraditional Games (3)
Introduction of preparatory teachers to non-traditional and multicultural games and activities which address the State Framework and the National Standards. Students present the activities in a manner which demonstrates effective models of instruction, including maximum participation. 1 lecture, 2 activities. Prerequisite: KINE 300.

KINE 310 Concepts in Elementary Physical Education (2)
Movement as it relates to physical motor skill development, fitness, wellness, social development, cross-cultural understanding, and self-image. 1 lecture, 1 laboratory. Prerequisite: GE D4. Recommended: Junior standing.

KINE 315 Field Sports (3)
Introduction and preparation for teaching field sports in accordance with state and national standards for K-12 physical education programs. Students learn to present activities in a manner that reflects effective models of instruction. 1 lecture, 2 activities. Prerequisite: KINE 300.

KINE 316 Net and Wall Games (3)
Introduction and preparation for teaching net and wall games in accordance with state and national standards for K-12 physical education programs. Students learn to present activities in a manner that reflects effective models of instruction. 1 lecture, 2 laboratories. Prerequisite: KINE 300, KINE 306.

KINE 317 Computer Applications in Kinesiology (2)
Applications of computers, data processing and information technology as related to understanding and solving problems in the field of kinesiology. Total credit limited to 4 units. 2 activities. Prerequisite: Basic computer literacy.

KINE 319 Measurement and Evaluation in Kinesiology (4)
Principles of test selection and administration, measurement and evaluation of data characteristics, and data analysis related to motor behavior and the performance of physical skills. 3 lectures, 1 activity. Prerequisite: KINE 270, STAT 217 or STAT 218.

KINE 323 Sport and Gender (4)  GE D5 USCP
Intersections between sport and gender in American society. Identification and discussion of the historical, sociological and psychological issues that affect the sport experiences of males and females, especially as they relate to class, race/ethnicity, sexuality, and political movements. 4 lectures. Prerequisite: Completion of GE Areas A, D1 and either D3 or D4. Kinesiology majors will not receive GE Area D5 credit.

KINE 324 Sport, Media and American Popular Culture (4)  GE D5 USCP
Issues of class, race/ethnicity, gender, various forms of deviance, and other aspects of social life. Exploration of sociological manifestations and implications of how the aforementioned social issues are embedded in mediated forms of sports. Kinesiology majors will not receive GE Area D5 credit. 3 lectures, 1 activity. Prerequisite: Completion of GE Areas A, D1 and D3.

KINE 354 Health Education Strategies (2)
Introduction to health promotion services, environment, and instruction within public and private settings. Strategies, methods, technology and resources used in the design and delivery of health education about infectious and non-infectious diseases. 2 activities. Prerequisite: BIO 111/BIO 115, KINE 250 or KINE 255.

KINE 384 Water Safety Instructor (4)
Analysis of swimming strokes and techniques with emphasis on teaching methods for beginners through advanced swimmers. Those students who complete the course requirements are eligible for American Red Cross Water Safety Instructor certification. 2 lectures, 2 activities. Prerequisite: Demonstrate proficiency in swimming or instructor permission.

KINE 396 Outdoor Education (3)
Introduction and preparation for teaching Outdoor Education activities in accordance with the Physical Education Content Standards for California. Students learn to present activities in a manner that reflects effective models of instruction. Includes a clinical teaching experience. 1 lecture, 2 activities. Prerequisite: KINE 300, KINE 306, and KINE 384.

KINE 400 Special Problems for Advanced Undergraduates (1–3)
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 3 units per quarter. Prerequisite: Senior standing or consent of instructor.
KINE 401 Managing Kinesiology Programs (3)
Planning, organizing and controlling programs in public, commercial, private and clinical physical activity settings. Emphasis on legal, ethical and budgetary considerations. 3 lectures. Prerequisite: Senior standing or consent of instructor.

KINE 402 Motor Learning and Control (4)
Variables which control sensory-motor integration. Analysis of factors which affect the acquisition of motor skills as related to the learning process and the learning environment. 3 lectures, 1 activity. Prerequisite: STAT 217 or KINE 319 or consent of instructor.

KINE 405 Community Health Promotion (4)
Practices to educate and empower communities toward actions that resolve health issues and problems. Sociological, historical, educational, environmental and biological influences on health status. 3 lectures, 1 activity. Prerequisite: KINE 250 or KINE 255 and GE Areas A and D3, junior standing.

KINE 406 Neuroanatomy (4)
Structure and function of the human nervous system. Afferent and efferent pathways involved in perception and action. Behavioral aspects of motor control and related neurological dysfunction and pathologies. Designed for allied health professions students. 4 lectures. Prerequisite: ZOO 331 and ZOO 332.

KINE 408 Exercise and Health Promotion for Senior Adults (4)
Special fitness, exercise, and health needs of the senior population. Theories of aging and age-related changes. Health promotion, exercise needs and activity programs for senior adults. 3 lectures, 1 activity. Prerequisite: KINE 250 or KINE 255, and one of the following: KINE 220, KINE 227, KINE 228, or KINE 219, senior standing or consent of instructor. Changed effective Fall 2008; see Updates.

KINE 410 Psychology of Coaching (3)
Psychological considerations of the coach-athlete relationship and mental preparation of teams and individuals for competition and practice. Special emphasis on the male and female adolescent with regard to the psychological implications of sports participation. 3 lectures. Prerequisite: Junior standing. Recommended: PSY 201 or PSY 202.

KINE 411 Psycho/Social Aspects of Physical Activity (4)
Psychological and sociological effects of physical activity on individuals and groups in American society. 4 lectures. Prerequisite: KINE 270 and junior standing. Recommended: Completion of GE Areas A and D3; PSY 201 or PSY 202.

KINE 416 Physical Education/Recreation Facilities (3)
Management, clientele considerations, facilities and outdoor areas planning and operations, personnel, finance and equipment as related to physical education and recreation areas and facilities. Consideration of architectural and environmental barriers. Field visits required. 3 lectures. Prerequisite: Upper division standing and consent of instructor for non-KINE/REC majors.

KINE 419 Physical Education Program Content in the Elementary School (3)
Cognitive and psychomotor competencies required to design a developmental physical education program for elementary aged school children. 2 lectures, 1 activity. Prerequisite: KINE 300 and two activity classes.

KINE 421 Strategies for Teaching Physical Education (3)
Systematic analysis and refinement of teaching skills within the discipline of physical education. 2 lectures, 1 activity. Prerequisite: KINE 419.

KINE 422 Teaching Elementary School Physical Education (4)
Implementation of a developmental physical education program for elementary aged children. The program will complement that conducted in the local public schools. 1 lecture, 1 seminar, 2 laboratories. Prerequisite: KINE 421.

KINE 423 Teaching Middle School Physical Education (4)
Techniques for teaching physical education in middle school. Emphasis on class organization, lesson plan development and evaluation, class management and control, and understanding the middle school setting. For students teaching middle school physical education in the local public schools. 1 lecture, 1 seminar, 2 laboratories. Prerequisite: KINE 422.

KINE 424 Organization and Implementation of a K-12 Physical Education Program (4)
Methods of teaching K-12 physical education, with emphasis on alignment with the California Physical Education Challenge Standards, English language learners, special students, and educational technologies. 4 lectures. Prerequisite: KINE 425 or consent of instructor.

KINE 425 Teaching High School Physical Education (4)
Techniques for teaching physical education in high schools. Emphasis on teaching strategies, organization, lesson plan development, self-evaluation, class management, and behavior management. 1 seminar, 1 lecture, 2 laboratories. Prerequisite: KINE 423, and one 300-level activity class.

KINE 426 Senior Seminar (2)
Capstone course which engages students in activities that integrate the sub-disciplines of kinesiology, and facilitates the development of a personal portfolio. 2 seminars. Prerequisite: Senior standing.

KINE 434 Planning Health Promotion Programs: Theory and Practice (4)
Theory and methods to facilitate individual and group behavior change to promote health and prevent disease. Concepts in the behavioral sciences affecting health behavior, motivation, and decision making. Development of planning and evaluation skills. 3 lectures, 1 activity. Prerequisite: KINE 250 or KINE 255, completion of GE Areas A and D3, and junior standing. Changed effective Fall 2008; see Updates.

KINE 437 Directed Fieldwork (1–3) (CR/NC)
Practical work experience in related activities of kinesiology under qualified supervision. Total credit limited to 9 units. Credit/No Credit grading only. Minimum of 2 laboratory hours per week per unit. Prerequisite: Senior standing or consent of instructor.

KINE 438 Adapted Physical Activity Fieldwork (1–3) (CR/NC)
Practical experience in adapted physical activity programming. Students plan and conduct physical activity programs for people who are disabled. Total credit limited to 6 units. Credit/No Credit grading only. Prerequisite: KINE 307, and consent of instructor.

KINE 440 Physical Education Practicum (1)
Supervised experience involving organizational and instructional responsibilities in activity, lecture and/or laboratory classes as determined by curricular concentration or certificate program. Total credit limited to 3 units. Prerequisite: Consent of instructor.

KINE 443 Comprehensive School Health Education (4)
Course content includes the health status of children K-12, and the recommendations of the California Health Framework. 4 lectures. Prerequisite: KINE 250 or KINE 255.

KINE 445 Electrocardiography (4)
Basic principles of electrocardiography, including practical skills of the ECG technician. Recognition of normal ECG patterns and abnormal changes related to rhythm disturbances, conduction defects, myocardial ischemia/infarction, and exercise. 3 lectures, 1 laboratory. Prerequisite: KINE 303 or consent of instructor.

KINE 446 Echocardiography (4)
Basic principles of echocardiography, including practical skills of the echocardiographer. Recognition of normal echocardiographic patterns and abnormalities, including those caused by pathology and exercise conditioning. 2 lectures, 2 laboratories. Prerequisite: KINE 445 or consent of instructor.

KINE 450 Worksite Health Promotion Programs (3)
Designed to acquaint students with those events, situations and relationships leading to healthy lifestyles in fitness and occupational settings. Design and implementation of workplace health promotion programs. 3 lectures. Prerequisite: KINE 250 or KINE 255, KINE 434, and senior standing.
KINE 451 Nutrition for Fitness and Sport (5)
Application of nutritional and metabolic facts to selected aspects of physical training, degenerative disease, obesity and weight control, diet manipulation and modification in sport, nutritional supplementation and special dietary considerations for the young and old, male and female athletes. 5 lectures. Prerequisite: KINE 250 or KINE 255, KINE 303. Recommended: CHEM 313.

KINE 452 Testing and Exercise Prescription for Fitness Specialists (4)
Selected areas of health/fitness screening and evaluation. Application of components relevant to the development and administration of exercise programs for persons regardless of sex, age, functional capacity and presence or absence of CHD or CHD risk factors. 2 lectures, 2 laboratories. Prerequisite: KINE 303, KINE 445 (or concurrent enrollment in KINE 445) or consent of instructor.

KINE 461 Senior Project (1)
Comprehensive report, or a field experience, or a synthesis of professional literature that integrates content from kinesiology courses. Topic must be approved by the instructor. 1 laboratory. Prerequisite: KINE 319 and completion of GE Area A.

KINE 462 Research Honors Senior Project (2-4)
Completion of an advanced research, or creative project. Intended for students taking a significant or leadership role in a professional area. Results may be submitted for poster presentation or other public/professional forum. 2-4 laboratories (minimum 60 hours). Prerequisite: KINE 319, completion of GE Area A, and consent of instructor.

KINE 463 Exercise Science and Health Promotion Fieldwork (3) (CR/NC)
200 hours of concentration specific practical experience over a ten-week period at an approved agency that provides exercise/fitness/health promotion programs. Students participate in program administration under the direct supervision of an approved on-site coordinator. Credit/No Credit grading only. Prerequisite: Senior standing, minimum GPA of 2.0, successful completion of all concentration coursework requirements and consent of fieldwork coordinator.

KINE 470 Selected Advanced Topics (1-4)
Directed group study of selected topics for advanced students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1-4 lectures. Prerequisite: Consent of instructor.

KINE 471 Selected Advanced Laboratory (1-4)
Directed group laboratory study of selected topics for advanced students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1-4 laboratories. Prerequisite: Consent of instructor.

KINE 485 Cooperative Education Experience (6) (CR/NC)
Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

KINE 495 Cooperative Education Experience (12) (CR/NC)
Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

KINE 500 Individual Study (1-3)
Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Only 6 units may be applied to degree requirements. Prerequisite: KINE 517 and consent of department head, graduate advisor, and supervising faculty member.

KINE 501 Evaluation of Current Studies (3)
Analysis and evaluation of published studies in kinesiology. 3 seminars. Prerequisite: Graduate standing.

KINE 502 Current Trends and Issues in Physical Education and Sport (3)
Practical problems in physical education and sport and their solution in terms of desired objectives in these fields. 3 seminars. Prerequisite: Graduate standing.

KINE 503 Current Health Issues (3)
Advanced seminar investigating current health issues. Factors that influence health status, current and historical trends in health and disease, and the healthcare system in the U.S. 3 seminars. Prerequisite: KINE 250 or KINE 255 and graduate standing or consent of instructor.

KINE 504 Advanced Pathophysiology and Exercise (3)
Selected human diseases, their etiology, pathophysiology, symptoms, diagnosis, effects on health and physical performance, and as affected by preventive or therapeutic exercise. Not open to students with credit for KINE 304. 3 lectures. Prerequisite: KINE 303 or equivalent, and graduate standing.

KINE 505 Introduction to Issues, Ethics and Policies in Teaching (1) (CR/NC)
Knowledge and skills of teaching at the college level. Preparation and support for teaching activity and laboratory classes in the department. Prepares students to be supervisors and teachers in their current or future employment. Credit/No Credit grading only. 1 seminar. Prerequisite: Graduate standing.

KINE 510 Health Behavior Change (3)
Examination of contemporary research, theory and practice related to facilitating healthy behavior change. Analysis of health problems from biological, ecological, and psycho-social perspectives with emphasis on understanding the acquisition and maintenance of healthy behavior. 3 seminars. Prerequisite: KINE 250 or KINE 255, KINE 503 or KINE 504.

KINE 511 Management and Administration in Kinesiology (3)
Principles and techniques of administration in health, activity and academic settings including budget, personnel supervision, resource acquisition, leadership techniques, and facility management. 3 seminars. Prerequisite: Graduate standing. Changed effective Fall 2008; see Updates.

KINE 517 Research Methods in Kinesiology (3)
Experimental, descriptive, historical, philosophical, survey, and action research in kinesiology. Selection of adequate problems for investigation; various sampling techniques and analyses; use of library facilities; manuscript requirements for the thesis. 3 seminars. Prerequisite: KINE 501 or consent of instructor.

KINE 518 New course – Effective Spring 2009; see Updates

KINE 522 Advanced Biomechanics (3)
Advanced biomechanical concepts applied to human movement, examination of research, and biomechanical analyses of movement activities. 2 seminars, 1 laboratory. Prerequisite: KINE 302 or equivalent. Changed effective Fall 2008; see Updates.

KINE 525 Advanced Motor Learning and Control (3)
Analysis of control theories, research principles and motor learning variables involved in the acquisition of skilled movement with an emphasis on the behavioral level of learning. 3 seminars. Prerequisite: KINE 402 or equivalent.

KINE 526 Sport and Exercise in Society (3) Changed effective Summer 2007; see Updates
Understanding the role of physical activity and sport as viewed from psychological/sociological perspectives. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

KINE 530 Advanced Physiology of Exercise (4)
Physiological determinants of physical work capacity and sports performance. 3 seminars, 1 laboratory. Prerequisite: KINE 303 and graduate standing.
KINE 534 Planning Health Promotion Programs: Theory and Practice (formerly KINE 514)
Theory and methods to facilitate individual and group behavior change to promote health and prevent disease. Concepts in the behavioral sciences affecting health behavior, motivation, and decision making. Development of planning and evaluation skills. 3 lectures, 1 activity. Prerequisite: KINE 250 or KINE 255, KINE 503 or KINE 504. Changed effective Fall 2008; see Updates.

KINE 536 Advanced Electrocardiography (4)
Theory and application of electrocardiography and other techniques for cardiovascular assessment and treatment of cardiac disease and other abnormalities. 3 seminars, 1 laboratory. Prerequisite: KINE 445 or equivalent and graduate standing.

KINE 537 Internship (3–12) (CR/NC)
Supervised work experience in an approved wellness/fitness clinical facility, school, or other faculty approved setting. Total credit limited to 12 units. Maximum of 6 units may be applied toward Master of Science in Kinesiology. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor. Student must be advanced to candidacy.

KINE 539 Observation and Analysis of Teaching Physical Education and Coaching Sports (3)
Observation and analysis of teaching physical and sport education with special emphasis in pedagogical systems. 2 seminars, 1 laboratory. Prerequisite: KINE 421 or equivalent and graduate standing. Changed effective Fall 2008; see Updates.

KINE 581 Graduate Seminar in Kinesiology (1–3)
Directed group study of selected topics for advanced students. The Schedule of Classes will list topic selected. Total credit limited to 6 units. 1–3 seminars. Prerequisite: Graduate standing or consent of instructor.

KINE 585 Cooperative Education Experience (6) (CR/NC)
Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

KINE 599 Thesis or Project (1-6)
Completion of a thesis or project pertinent to the field of kinesiology. Independent research under the guidance of the faculty. Prerequisite: KINE 517, consent of graduate committee and supervising faculty member.

LA–LANDSCAPE ARCHITECTURE

LA 101 Introduction to Landscape Architecture (4)
Introduction to the profession of landscape architecture and orientation to the department curriculum and learning processes. 3 lectures, 1 discussion.

LA 130 Landscape Interpretation (4)
Introduction to the relationships between culture and art, architecture and the natural environment through the description and exploration of significant landscapes and related societies and cultures. 4 lectures.

LA 170 Principles of Design Communication (4)
Overview of design communications for landscape architects incorporating the principles, techniques, skills and tools used in design generation, exploration, review and implementation. 4 laboratories. Prerequisite: LA 101; concurrent: LA 202.

LA 202 Design Fundamentals I (4)
Introduction to the principles, methods and elements of two- and three-dimensional design in order to communicate intended concepts and meanings. Exploration of the basic design elements including composition, design process and the creation of spatial settings. 4 laboratories. Prerequisite: LA 101, LA 130; concurrent: LA 170.

LA 203 Design Fundamentals II (4)
Continuation of ideas introduced in LA 202 with the introduction of environmental and visual perception, including three-dimensional site design and landscape architectural design principles. Spatial design and sequencing of space with concern for human behavioral, environmental and natural site factors and generation of program, concept and design development. 4 laboratories. Prerequisite: LA 202, LA 170; concurrent: LA 220.

LA 204 Design Fundamentals III (4)
Continuation of ideas introduced in LA 202 and LA 203 with the introduction of the principles of design theory, landscape ecology and technical applications. Problems of increasing complexity incorporate critical and creative problem solving, the relationship of aesthetics, response to human needs and design for sustainable environments. 4 laboratories. Prerequisite: LA 203, LA 220; concurrent: LA 241.

LA 211 History of Landscape Architecture: Ancient Civilizations through Colonial America (4)
Exploration of the continuous alteration of the landscape through recorded time and examination of how humankind has influenced this change. The metaphor of “garden” provides understanding for agrarian regions, urban spaces, and vernacular landscapes of the world. 4 lectures.

LA 212 History of Modern and Contemporary Landscape Architecture (4)
Philosophies and ethics of important personalities in twentieth century landscape architecture. Design theories supporting these individuals' projects and the nature of their practice, combined with the influential events in industry, the arts and sciences, politics, and society of this century. 4 lectures.

LA 213 Site and Terrain Analysis (4)
Introduction to various inventory and analysis methodologies, case study reviews, mapping and overlay techniques, environmental ethics and an overall understanding of the function and structure of the natural landscape. Visual assessment, synthesis techniques and relating mapped analytical data with design program analysis for use in site planning. 2 lectures, 2 laboratories. Enrollment limited to CRP and LA majors.

Concepts, theories and techniques related to landscape analysis, ecology, planning and design with an emphasis on landscape assessment, sustainability, land health, environmental protection and restoration, and natural resource management. 4 lectures. Prerequisite: LA 101, LA 202, LA 170, BOT 121; concurrent: LA 203.

LA 221 California Plants and Plant Communities (4)
(Also listed as BOT 221)
Introduction to the horticultural characteristics and landscape design potential of California native plants, California plant communities and associated vernacular plants. Includes experiences in field identification, basic planting design, installation techniques and maintenance requirements. Required field trips. 2 lectures, 2 laboratories. Prerequisite: BOT 121 or consent of instructor.

LA 240 Additional Landscape Architecture Laboratory (1–3)
Total credit limited to 6 units, with a maximum of 3 units per quarter. 1–3 laboratories.

LA 241 Site Engineering Techniques and Applications (4)
Introduction and application of the techniques, methods, principles and criteria for site engineering and landform design. Includes an introduction to soil science, survey methods, and experiences in the principles, procedures and application of site grading and drainage for landscape architecture. 4 laboratories. Prerequisite: LA 220, MATH 118/119; concurrent: LA 204.

LA 242 Implementation Strategies (4)
Introduction and application of the methods, principles and criteria for landscape implementation. Encompasses fundamental design and technical decisions common to landscape architectural design and construction projects including the development of concept, design development and working drawings, and construction management process. 3 lectures, 1 activity. Prerequisite: LA 204, LA 241; concurrent: LA 243.
LA 243 Materials and Techniques of Landscape Construction (4)
Introduction to the properties, uses and inherent qualities of the fundamental materials of landscape architectural concerns and associated construction techniques and processes. Materials and techniques explored as a source of design ideas, form and expression in landscape architecture. 3 lectures, 1 activity. Prerequisite: LA 204, LA 241; concurrent: LA 242.

LA 317 The World of Spatial Data and Geographic Information Technology (4)
(Also listed as BIO/FNR/GEOG 317)
GE Area F
Basic foundation for understanding the world through geographic information and the tools available to utilize spatial data. Application of Geographic Information Systems (GIS) and related technologies, including their scientific basis of operation. 3 lectures, 1 activity. Prerequisite: A course in computer science, completion of Area B, and junior standing.

LA 318 Applications in GIS (3) (Also listed as FNR 318)
ARC/INFO and ArcView Geographic Information System (GIS) computer software to explore environmental, natural resource, social and economic issues using spatial data. Develop and apply data base and software management competencies. 1 lecture, 2 laboratories. Prerequisite: Junior standing, computer literacy or consent of instructor.

LA 320 Design Theory for Landscape Architects (4)
Complements the material and knowledge presented in the history of landscape architecture, architecture and art courses. Design theory and associated concepts as they are related to landscape architecture. Literature research and analysis of completed design projects. The artists/designers, materials and overall expressions of work are related to the social and economic issues of the time as well as their associations with the other arts and sciences. 4 lectures. Prerequisite: LA 211, LA 212, or consent of instructor.

LA 330 Cultural Landscapes: People, Places and Ethical Decisions (4)
Investigation of the complexities and interrelatedness of culture, environment and ethical decisions. Interpretation of personal and cultural values and ethics in terms of decisions made and behaviors and actions expressed in the built landscape. 3 lectures, 1 activity. Prerequisite: LA 211, LA 212; concurrent: LA 320.

LA 349 Advanced Planting Design (3)
Advanced examination of the theories and applied principles of planting design. Emphasis on connections between art and science in the design of parks, gardens and other landscapes. Case studies and field trips. 2 lectures, 1 activity. Prerequisite: EHS 231, EHS 232 and EHS 381 or LA 221.

LA 363 Recreation and Open Space Planning and Design (4)
Planning and design methods for meeting leisure requirements. Issues of recreation and society. Relationship of recreation and open spaces, assessment of needs and supply of resources. 3 lectures, 1 activity. Prerequisite: Must have completed minimum of one 200-level course in planning, design or recreation and third-year standing or consent of instructor.

LA 370 Professional Practice (4)
Issues related to the practice of landscape architecture incorporating processes, procedures and outcomes of professional practice. Topics include professional ethics, business and legal aspects of the profession, relationships to the client and society, personal goal setting, resume and portfolio preparation. 4 lectures. Prerequisite: LA 204.

LA 371 Internship (3) (CR/NC)
Involvement in a work setting related to landscape architecture. Thirty hours work experience per unit of credit. Credit/No Credit grading only. Prerequisite: Third year standing in Landscape Architecture.

LA 400 Special Problems for Advanced Undergraduates (1–3)
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 3 units per quarter. Prerequisite: Consent of instructor.

LA 401 Research Project (1) (CR/NC)
Research methods in landscape architecture and proposal writing techniques. Students prepare proposal and strategy for fifth year study in area of concentration. Credit/No Credit grading only. 1 seminar. Prerequisite: LA 451 and LA 452.

LA 402 Design Theory and Exploration Focus Studio (4)
Exploration and application of design theory, exploratory design process and form exploration to design and planning projects. Emphasis on incorporation of inquiry techniques based on the synthesis of interdisciplinary frameworks of art and design theory with historical and cultural issues. Total credit limited to 12 units. 4 laboratories. Prerequisite: LA 204, LA 211, LA 212 or consent of instructor; prerequisite or concurrent: LA 320; concurrent: Integrated Learning Course (ILC) of student’s option.

LA 403 Natural Environments Design Focus Studio (4)
Assessment, exploration and integration of landscape ecology, sustainability and environmental planning to design and planning projects. Emphasis on interpretation and application of environmental and ecological issues at a range of design scales. Total credit limited to 12 units. 4 laboratories. Prerequisite: LA 204, LA 220, LA 211, LA 212 or consent of instructor; concurrent: Integrated Learning Course (ILC) of student’s option.

LA 404 Cultural Environments Design Focus Studio (4)
Assessment, exploration and interpretation of cultural values, issues and landscapes to design and planning projects. Emphasis on observation and inquiry of diverse cultural settings, differences in cultural values and personal ethics in the design process. Total credit limited to 12 units. 4 laboratories. Prerequisite: LA 204, LA 211, LA 212 or consent of instructor; concurrent: Integrated Learning Course (ILC) of student’s option.

LA 405 Project Design and Implementation Focus Studio (4)
Development, exploration and integration of project design and implementation strategies to design and planning projects. Emphasis on creative and exploratory problem solving, spatial design, project resolution, and graphic communication. Total credit limited to 12 units. 4 laboratories. Prerequisite: LA 204, LA 243, LA 242, LA 241 or consent of instructor; concurrent: Integrated Learning Course (ILC) of student’s option.

LA 411 Regional Landscape History (3)
Developmental history of the landscape in the western region with specific focus on the Basin and Range region and California. One or more field trips required. 3 lectures. Prerequisite: Fourth year standing or consent of instructor.

LA 431 CAD and Digital Media Communications (ILC) (4)
Integrated Learning Course (ILC) to assist integration and application of computer-aided drafting (CAD) skills in coursework, project planning and design studio courses. Focus on CAD skills and integration of digital media. Total credit limited to 12 units. 4 activities. Prerequisite: LA 170, LA 204 or consent of instructor; concurrent: Design Focus Studio of student’s option.

LA 432 Landscape Ecology Applications (ILC) (4)
Integrated Learning Course (ILC) to assist integration and application of landscape ecology principles in project planning and design studio courses. Focus on understanding and developing a framework for ecological planning and design to anticipate consequences of planning and design decisions. Total credit limited to 12 units. 4 activities. Prerequisite: LA 220, LA 221 or consent of instructor; concurrent: Design Focus Studio of student’s option.

LA 433 Cultural Environments (ILC) (4)
Integrated Learning Course (ILC) to assist integration and application of culture, environment and personal ethics in coursework, project planning and design studio courses. Focus on skills, distinctions and integration of analyzing the cultural landscape, understanding diverse cultural values and assessing personal ethics. Total credit limited to 12 units. 4 activities.
involvement techniques. 5 laboratories. Prerequisite: LA 353.

LA 434 Project Design and Implementation (ILC) (4)
Integrated Learning Course (ILC) to assist integration and application of project design principles and implementation strategies in project planning and design studio courses. Focus on skills, techniques and decisions of the design, documentation and construction processes. Total credit limited to 12 units. 4 activities. Prerequisite: LA 241, LA 242, LA 243 or consent of instructor; concurrent: Design Focus Studio of student’s option.

LA 435 Professional Practice (ILC) (4)
Integrated Learning Course (ILC) to assist integration and application of professional practice principles and techniques in planning and design studio and internship courses. Focus on achieving a high level of professional quality, ethical concern, and legal responsibility in project work. Total credit limited to 12 units. 4 activities. Prerequisite: LA 370 or consent of instructor; concurrent: Design Focus Studio of student’s option.

LA 436 Traditional and Digital Media Communications (ILC) (4)
Integrated Learning Course (ILC) to assist integration and application of graphic communication and presentation skills in coursework, project planning and design studio courses. Focus on skills, distinctions and integration of traditional and digital media explorations. Total credit limited to 12 units. 4 activities. Prerequisite: LA 170, LA 202, LA 203, LA 204 or consent of instructor; concurrent: Design Focus Studio of student’s option.

LA 437 3D Digital Design Communications (ILC) (4)
Integrated Learning Course (ILC) to assist integration and application of 3D digital graphic communication and presentation skills in coursework, project planning and design studio courses. Focus on skills and integration of three-dimensional digital media explorations. Total credit limited to 12 units. 4 activities. Prerequisite: LA 170, LA 204 or consent of instructor; concurrent: Design Focus Studio of student’s option.

LA 438 GIS Application to Design Projects (ILC) (4)
Integrated Learning Course (ILC) to assist integration and application of geographic information systems (GIS) and spatial information into focus design studio courses. Total credit limited to 12 units. 4 activities. Prerequisite: LA 220 or consent of instructor; concurrent: Design Focus Studio of student’s option.

LA 442 Professional Practice II (2)
Practical aspects of professional practice. Addressing methods of contracting professional services. Project management procedures, office practice and conditions. Goal setting, resume and portfolio preparation. Job procurement and licensure requirements. 2 lectures. Prerequisite: Fourth-year standing, LA 441.

LA 451 Regional Landscape Assessment (6)
Emphasis on regional landscape assessment and design techniques utilizing geographic information systems (GIS) techniques. Land planning and design issues in regional scale environments. 6 laboratories. Prerequisite: LA 353 or consent of instructor.

LA 452 Urban Design Collaborative for Landscape Architects (5)
Emphasis in urban and community design issues related to landscape architecture; scales of investigation and application; community involvement techniques. 5 laboratories. Prerequisite: LA 353.

LA 454, LA 455, LA 456 Design for Landscape Architects I, II, III (4) (4) (4)
Advanced design studio. Emphasis is on complex design problems and special environmental situations or interdisciplinary work and involvement in current design issues. At least one course in the series must be self-directed. 4 laboratories. Prerequisite: Completion of fourth-year design sequence (LA 451, LA 452, LA 461).

LA 461 Senior Design Project Focus Studio (4)
Comprehensive landscape architectural design and research project showing professional level competency in the integration of design theory, landscape architectural principles and project resolution. Emphasis on creative solutions, organization and communication skills and technical abilities in program generation, design process, design and research. Total credit limited to 8 units. 4 laboratories. Prerequisite: Completion of Design Focus Sequence (20 units from LA 402-LA 405).

LA 464 Senior Seminar (1) (CR/NC)
Identification and exploration of problems and opportunities in the environmental design field. Intensive thinking, research and discussion of issues relating to local, regional or global significance. To be taken each quarter during fifth year. Credit/No Credit grading only. 1 seminar. Prerequisite: Fifth-year standing in Landscape Architecture.

LA 470 Selected Advanced Topics (1–4)
Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Consent of instructor.

LA 471 Selected Advanced Laboratory (1–4)
Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 1–4 laboratories. Prerequisite: Consent of instructor.

LA 481 Visual Resource Management Methods (3)
Investigation and application of the major visual resource management methods relevant to landscape architecture. Theoretical basis for visual resource assessment, the different assessment techniques, and the process of translating assessment results into visual resource management techniques. 2 lectures, 1 laboratory. Prerequisite: Fourth-year standing or graduate standing, or consent of instructor.

LA 482 Evaluating Social and Behavioral Factors for Open Space Design (3)
User oriented approach to open space design. Interview and survey techniques, behavioral trace mapping and systematic observation, post occupancy evaluation and similar methods are used to generate user input and feedback in the design process. Understanding the behavioral implications of designed environments. 2 lectures, 1 laboratory. Prerequisite: Fourth-year or graduate standing or consent of instructor.

LA 483 Special Studies in Landscape Architecture (1–12)
Special issues and problems through research, field trips, seminars and other forms of investigation and involvement. Course requirements are determined prior to each individual project through a contractual agreement between students and department. Departmental Off Campus Study Program guidelines apply. Total credit limited to 36 units. 1–12 activities. Prerequisite: Fourth- or fifth-year standing, or consent of instructor.

LA 485 Cooperative Education Experience (6) (CR/NC)
Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Junior standing and consent of instructor.

LA 495 Cooperative Education Experience (12) (CR/NC)
Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Junior standing and consent of instructor.

LA 551 Regional Landscape Assessment I (4)
Definition, research and filing of data covering the biological, cultural and physical resources of a specific region. Concepts of regionalism, land planning, reclamation and preservation are integral to the course. Utilization of mainframe and microcomputer facilities and software. 4 laboratories. Prerequisite: Graduate standing or consent of instructor.

LA 552 Regional Landscape Assessment II (4)
Application of data manipulation techniques in order to model both impacts on natural systems and land development potentials. Use of
planning strategies to predict outcomes resulting from the land use decision process. Utilization of mainframe and microcomputer facilities and software. 4 laboratories. Prerequisite: LA 551 and graduate standing.

LA 585 Cooperative Education Experience (6) (CR/NC)
Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

LA 595 Cooperative Education Experience (12) (CR/NC)
Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

LIB–LIBRARY

LIB 101 Library Instruction (1)
Instruction and practice in the use of the on-line catalog, reference books, periodical indexes, government documents, and other library materials. Development of student independence and initiative in using the library as a source of information. 1 lecture.

LIB 302 Library Resources and Literature Searches (1–4)
Sources of information and search strategies in major subject fields. Reference materials, bibliographic aids, indexing and abstracting tools, and Internet sources. Evaluation of sources. The Schedule of Classes will list major subject area covered. Total credit limited to 4 units. 1–4 lectures. Prerequisite: ENGL 134, junior standing or consent of instructor.

LIB 402 Library Resources and Literature Searches (1–4)
Sources of information and search strategies in major subject fields. Reference materials, bibliographic aids, indexing and abstracting tools, and Internet sources. Evaluation of sources. The Schedule of Classes will list major subject area covered. Total credit limited to 12 units. 1–4 lectures. Prerequisite: ENGL 134, junior standing or consent of instructor.

LIB 502 Library Resources and Literature Searches (1–4)
Courses of information and search strategies in major subject fields. Reference materials, bibliographic aids, indexing and abstracting tools, and Internet sources. Evaluation of sources. Literature review process for a master’s thesis. The Schedule of Classes will list major subject area covered. Total credit limited to 12 units. 1–4 lectures. Prerequisite: Graduate standing. field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

LS–LIBERAL STUDIES

LS 101 Orientation to Liberal Studies (1)
Exploration of the Liberal Studies Program as preparation for the Multiple Subject Credential and for a teaching career in California. To be taken during the first quarter in attendance at Cal Poly as a Liberal Studies major. 1 lecture.

LS 214 Constitutional Issues in the History of U.S. and California Education (4)
Examination of U.S. and California constitutions, significant legislation, and court cases affecting public education from the colonial period to the present. Overview of contributions by individuals of historical, national, and international educational significance. Examination of landmark decisions. 4 lectures.

LS 230 Field Experience I (2)
Overview of current practices and issues in elementary education, including teacher compensation, cultural impact on schools, time and classroom management, English learners, and the affective aspect of teaching. 30 hours of fieldwork required. 1 lecture, 1 activity.

LS 250 Field Experience II (2)
Overview of current practices and issues in elementary education, including components of effective teaching, motivating students, diagnostic/prescriptive teaching, curriculum, and accountability. In addition to class time, 30 hours of fieldwork required. 1 lecture, 1 activity.

LS 260 New course – Effective Spring 2009; see Updates

LS 270 Introduction to Visual and Performing Arts Standards in the Elementary Classroom (4)
Introduction to the California visual and performing arts teaching standards. Emphasis on aesthetic perception, creative expression, historical/cultural context, aesthetic valuing and application to the elementary classroom. 4 lectures.

LS 310 Storytelling: The Oral Tradition (4)
Techniques for performing traditional folktales and myths in primary and secondary teaching situations. Selection, preparation and presentation of folklore for an audience; history of folk literature and methodology. 4 lectures. Prerequisite: COMS 101 or COMS 102.

LS 311 Visual Arts in the Elementary Classroom (4)
Theory and philosophy of visual arts, through multi-strategies, as related to child development and visual arts processes for the elementary classroom. 4 lectures. Prerequisite: LS 270 or consent of instructor.

LS 312 Advanced Visual Arts in the Elementary Classroom (4)
Application of visual arts, through multi-strategies including direct classroom application, as related to child development and visual arts processes for the elementary setting. 4 lectures. Prerequisite: LS 311.

LS 400 Special Problems for Advanced Undergraduates (1–2)
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: consent of instructor, junior standing.

LS 461 Senior Project Seminar (4)
Examination of issues in education of state, national and international concern. Students prepare presentations and conduct individual research and analysis of selected problems. Substantial research paper required. 4 seminars. Prerequisite: Senior standing, completion of GWR or consent of instructor.

MATE–MATERIALS ENGINEERING

MATE 110 Introduction to Materials Engineering Design I (1)
Laboratory work in teams to design, build and test a product. Material from math, science and engineering courses tied together. 1 laboratory.

MATE 120 Introduction to Materials Engineering Design II (1)
Second design laboratory, working in teams on a project that benefits humanity. Issues of engineering ethics, technology and society, the environment and sustainability also studied. 1 laboratory.

MATE 130 Introduction to Materials Engineering Design III (1)
Third design laboratory in a sequence. Includes working in teams on project that benefits humanity. Issues of engineering ethics, technology and society, the environment and sustainability also studied. 1 laboratory. Prerequisite: MATE 120.

MATE 200 Special Problems for Undergraduates (1–4)
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

MATE 210 Materials Engineering (3)

MATE 215 Materials Laboratory I (1)
Laboratory experiments on the heat treatment and resulting properties of metals. Effects of cold deformation of metals. Brittle-ductile fracture

MATE 222 Materials Selection for the Life Cycle (4)
Materials and product design, materials selection methodologies using current software, principles of green engineering, eco-design, and sustainability. Life cycle analysis of engineered products using current software. Ecological impact of materials and processes. Case studies used to illustrate concepts. 4 lectures. Prerequisite: ARCH 106 or MATE 210 or consent of instructor.

MATE 225 Materials Laboratory II (1)

MATE 232 Nanotechnology, Human Biology, Ethics and Society (4)
(Also listed as BIO 232)
Focus on four nanotechnology examples as focal points for themes of nanoscale science and technology, human biology, society, ethics, and systems thinking: gold nanoshells for cancer treatment; molecular manufacturing; tissue engineering of a vital organ; and a microfluidic glucose sensor. The focal points provide natural contexts for learning biology at the cellular level, the molecular level, the organ level and the biological systems level, respectively. 4 lectures. Prerequisite: GE Areas B1, B2, B3.

MATE 235 Materials Laboratory III (1)
Interpretation of microstructures in metals and alloys from manufacturing processes; laboratory methods for revealing and documenting such microstructures. 1 laboratory. Prerequisite: MATE 225. Concurrent: MATE 232.

MATE 310 Noncrystalline Material Systems (4)
Design and synthesis of noncrystalline material systems. Synthesis, processing techniques, properties and fabrication methods of organic and inorganic polymeric materials. 3 lectures, 1 laboratory. Prerequisite: MATE 210. Concurrent: MATE 350.

MATE 330 Hybrid Material Systems (4)
Design of hybrid material systems, including polymer-matrix, ceramic-fiber composites. Materials (matrices, fibers) and manufacturing methods treated in detail. 3 lectures, 1 laboratory. Prerequisite: MATE 210, MATE 350, CE 204 or consent of instructor. Concurrent: MATE 370.

MATE 340 Electronic Materials Systems (4)
Design of electronic materials systems utilizing the basic concepts in electron theory of solids, electrical properties and conduction in materials, magnetic phenomena and optical properties in materials. 3 lectures, 1 laboratory. Prerequisite: MATE 210, PHYS 133, EE 201, EE 251. Concurrent: MATE 360.

MATE 350 Structural Materials Systems (4)
Design of structural materials systems. Topics include continuum mechanics — stress, strain, elasticity, anelasticity, plasticity. 3 lectures, 1 laboratory. Prerequisite: MATE 210, CE 204; MATE 310 should be taken concurrently.

MATE 359 Living in a Material World (4)
(Also listed as HIST 359)
GE Area F
Evolution of materials (ceramics, metals, polymers, composites, semiconductors) in the context of history. Traces the link between historical and technological developments enabled by materials from the Stone Age to the Electronic Age. 4 lectures. Prerequisite: Completion of GE Area B and junior standing.

MATE 360 Metallurgical Materials Systems (4)
Mass and energy balances applied to metallurgical materials systems, design of materials products and processes including evaluation of energy needs and input/output stream compositions. 3 lectures, 1 laboratory. Prerequisite: MATE 210, STAT 312. Concurrent: CHEM 305, MATE 340.

MATE 370 Process Design (4)
Design of processes for engineering materials. Topics include kinetics in materials: solid-state diffusion (steady-state and non-steady-state), nucleation and growth kinetics, solid state phase transformations. 3 lectures, 1 laboratory. Prerequisite: MATE 360. Concurrent: MATE 330.

MATE 400 Special Problems for Advanced Undergraduates (1–4)
Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

MATE 401 Materials Characterization (3)

MATE 406 Materials Characterization Laboratory (2)

MATE 425 Corrosion Engineering (4)
Forms of corrosion. Influences of environmental variables on corrosion. Methods of corrosion control. 3 lectures, 1 laboratory. Prerequisite: CHEM 125 or CHEM 128, MATE 210, MATE 215. Materials analysis and characterization course or Special topics course.

MATE 430 Microfabrication (3)
Silicon-based fabrication science and technology. Oxidation, diffusion, ion implantation, etching, chemical and physical vapor deposition, photolithography. 3 lectures. Prerequisite: MATE 210. Prerequisite or concurrent: MATE 360 or permission of instructor. Materials processing course.

MATE 435 Microfabrication Laboratory (2)
Basic processes involved in microfabrication; cleanroom protocol, oxidation, diffusion, photolithographic and etching processes, sputtering and evaporation, process development through experimentation, device testing. Each student will be part of a 4-6 person team that will fabricate a micro electronic device or integrated circuit. 2 laboratories. Prerequisite or concurrent: MATE 430, STAT 312 or equivalent. Materials processing course.

MATE 440 Welding Metallurgy and Joining of Advanced Materials (3)
Principles, primary variables, and microstructural changes associated with the joining process. Physics of energy transfer. Heat and mass balances in joining, thermodynamic and kinetic justification of solidification and near interface microstructures. Heterogeneous interfaces, adhesion, wetting. Relation between process selection, interface design, microstructure, and properties, weldability. 3 lectures. Prerequisite: MATE 210. Materials processing course.

MATE 445 Joining of Advanced Materials Laboratory (2)
Laboratory to accompany MATE 440. Illustration of principles, primary variables, and microstructural changes associated with the joining process. Physics of energy transfer. Heat and mass balances in joining, thermodynamic and kinetic justification of solidification and near interface microstructures. Heterogeneous interfaces, adhesion, wetting. Relation between process selection, interface design, microstructure, and properties, weldability. 2 laboratories. Prerequisite: MATE 210. Materials processing course.

MATE 446 Surface Chemistry of Materials (3)
(Also listed as CHEM 446)
Surface energy, capillarity, solid and liquid interface. Adsorption, surface areas of solids, contact angles and wetting. Friction, lubrication and adhesion. Relationship of surface to bulk properties of materials.
MATE 450  Failure Analysis (4)
Procedures for analyzing failed materials and processes. Actual failure analysis of a component by each student. Topics include fracture, fatigue, wear and overload failures, exposure to techniques of metallography, electron microscopy, energy dispersive x-ray spectroscopy, chemical analysis and heat treatment. 3 lectures, 1 laboratory. Prerequisite: MATE 210, MATE 360, MATE 350. Materials analysis and characterization course.

MATE 458  New course (crosslisted). Effective Spring 2009; see Updates
MATE 460  Materials Selection in Mechanical Design (4)
Materials-based approach to mechanical design. Using mechanical and physical properties of materials (performance indices) to select them for design needs (Materials Selection Charts). Detailed background of material properties – information from materials and mechanics. Numer-ous case studies highlight the concepts covered. 4 lectures. Prerequisite: MATE 210, CE 204, or consent of instructor. Special topics course.

MATE 470  New course Effective Spring 2009; see Updates
MATE 481  Corporate Culture (1)
Practical working knowledge of key corporate topics such as leadership, ethics, organizational structure, intellectual property, professional communications, life-long learning, global and social impacts of technology. The product development process. 1 activity. Prerequisite: Senior standing. Co-requisite: MATE 482 for MATE majors.

MATE 482  Senior Project Design I (1)
Foundations of senior project design. Completion of the preliminary stages of selecting a senior project, designing experiments, evaluating realistic constraints, conducting initial experiments, and managing a project timeline. 1 lecture. Prerequisite: Senior standing. Co-requisite: MATE 481 for MATE majors.

MATE 483  Senior Project II (2)
Continuation of senior project. Completion of a senior project experimental component under the guidance of a faculty supervisor. Research methodology, experimental design, experimental work and data analysis. 1 lecture and supervised work. Prerequisite: MATE 482.

MATE 484  Senior Project III (2)
Continuation of MATE 483. Completion of a senior project data analysis and communication under the guidance of a faculty supervisor. Mathematical modeling and technical communication. 1 lecture and supervised work. Prerequisite: MATE 483.

MATE 493  Cooperative Education Experience (2) (CR/NC)
Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. Total credit limited to 6 units. Prerequisite: Sophomore standing and consent of instructor.

MATE 494  Cooperative Education Experience (6) (CR/NC)
Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. Total credit limited to 18 units. Prerequisite: Sophomore standing and consent of instructor.

MATE 495  Cooperative Education Experience (12) (CR/NC)
Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. A more fully developed formal report and evaluation by work supervisor required. Credit/No Credit grading only. Total credit limited to 24 units. Prerequisite: Sophomore standing and consent of instructor.

MATE 500  Individual Study (1–4)
Advanced study planned and completed under the direction of a member of department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Total credit limited to 12 units. Prerequisite: Consent of department head, graduate advisor, or supervising faculty member.

MATE 501 (formerly MATE 570) Effective Spring 2009; see Updates
MATE 504  Research and Development in Materials Engineering (4)
Overview of the materials science and engineering field. Current materials research and technologies, such as fuel cells, nanotechnology, etc. Emphasis on independent learning, individual research topics, and presentations. Analysis of information from different media used to comprehend how advancements in materials research and development are made. The Schedule of Classes will list topic selected. Total credit limited to 8 units. 4 lectures. Prerequisite: MATE 210 and graduate standing or consent of instructor.

MATE 510  Materials Analysis (4)
Fundamentals of materials surface analysis methods and thin-film microanalytical techniques, including SPM, AES, XPS, SIMS, Raman and FTIR. 4 lectures. Prerequisite: MATE 210, MATE 340.

MATE 520  X-Ray Diffraction (3)
Theory and application of x-ray diffraction as applied to advanced materials problems such as crystal quality and identification, thin film applications and structural transformations at high and low temperatures. Course will cover techniques in sample preparation, operation of equipment and interpretation of diffraction data. 3 lectures. Prerequisite: Graduate status or instructor’s permission. Materials analysis and characterization or Special topics course.

MATE 522  Advanced Ceramics (5)
Development, utilization, and control of properties in ceramic materials (inorganic-nonmetallic solids). Emphasis on application on processing to achieve structure and properties. Structure of crystalline ceramics and of glasses. Mechanical, thermal, optical, magnetic, and electrical properties. Application of ceramics in technology. Physical chemistry of ceramics. 4 lectures, 1 seminar. Prerequisite: Graduate standing or permission of instructor.

MATE 525  X-Ray Diffraction Laboratory (2)
X-ray diffraction laboratory experiments of advanced materials problems such as crystal quality and identification, thin film applications and structural transformations at high and low temperatures. Radiation safety training, techniques in sample preparation, operation of equipment and interpretation of diffraction data. 2 laboratories. Prerequisite: Graduate standing in engineering or science or instructor’s permission. Concurrent: MATE 520. Materials analysis and characterization or Special topics course.

MATE 530  Biomaterials (4) (Also listed as BMED 530)
Structure-function relationships for materials in contact with biological systems. Interactions of materials implanted in the body. Histological and hematological considerations including foreign body responses, inflammation, carcinogenicity, thrombosis, hemolysis, immunogenic and toxic properties. Microbial interaction with material surfaces, degradation. 4 lectures. Prerequisite: BIO 213, ENGR 213, MATE 210 and graduate standing or consent of instructor.

MATE 540  Tribology (3)

MATE 545  Tribology Laboratory (1)
Wear testing and measurement through various processes including dry sand rubber wheel, cavitation/erosion, and simulated chemical/mechanical polishing. Wear analysis to include wear modeling, materials characterization via metallography, scanning electron microscopy, and surface profilometry. Experiments focus on real engineering systems and their degradation as a result of wear. 1 laboratory. Prerequisite: MATE 210, MATE 215, MATE 235 or consent of instructor. Co-requisite: MATE 540.
MATE 550 Micro Systems (4)
Fundamentals of intelligent systems employing sensors, actuators and intelligent controls. Impact on material properties as devices shrink in the micrometer realm. Applications toward exploring nanotechnology. 4 lectures. Prerequisite: MATE 210, graduate standing or consent of instructor.

MATE 555 New course (crosslisted) – Effective Spring 2009; see Updates

MATE 560 Thin-Film Processing (3)
Thin film science and technology: deposition techniques, surface crystal notation, energy and kinetic processes, epitaxy. Schottky barriers and surface states, stress analysis, characterization techniques, electronics devices incorporating thin films. The Schedule of Classes will list topics for selection. Total credit limited to 6 units. 3 lectures. Prerequisite: Graduate standing or permission of instructor. Materials processing course.

MATE 565 Thin-Film Processing Laboratory (2)
Thin film processing and analytical techniques: direct current and radio frequency magnetron sputtering, reactive sputtering, co-evaporation, epitaxy, grazing incidence x-ray diffraction, magnetic force imaging. The Schedule of Classes will list topics for selection. Total credit limited to 6 units. 2 laboratories. Concurrent: MATE 560 or consent of instructor. Materials processing course.

MATE 570 Advanced Engineering Materials (4) Changed effective Spring 2009; also see Updates
An advanced treatment of the structure of matter. Physical and mechanical properties of materials including metals, alloys, ceramics, insulating materials, semiconductors, superconductors, polymers and composites based on detailed theoretical understanding of material microstructures. Discussions of Equilibrium diagrams, processing approaches, material selection based on thermodynamic and kinetic arguments. Degradation and failure, fitness for purpose. 4 lectures. Prerequisite: Graduate standing or permission of instructor. Special topics course.

MATE 571 New course, effective Spring 2009; also see Updates

MATE 580 Fracture Mechanics and Failure Mechanisms in Materials (4)
Fracture modes and mechanisms in engineering materials, fracture mechanics fundamentals (stress analysis of cracks, energy analysis of fracture process). Use of fracture mechanics in design. Laboratory gives concentrated exposure to fracture development in materials, fracture surface evaluation, fracture toughness testing. 3 lectures, 1 laboratory. Prerequisite: MATE 350, or graduate standing. Special topics course.

MATE 590 Solidification and Densification (4)

MATE 599 Design Project (Thesis) (2) (2) (5)
Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master’s degree, culminating in a written report/thesis. Prerequisite: Graduate standing.

MATH–MATHEMATICS
Satisfactory completion of the Entry Level Mathematics (ELM) requirement is a prerequisite for enrollment in all mathematics courses except MATH 100 and MATH 104. For additional mathematics placement (MAPE) information, see page 48.

MATH 100 Beginning Algebra Review (3) (CR/NC)
Review of basic algebra skills at the beginning algebra level intended primarily to prepare students for MATH 104. Course open only to students who have taken the ELM examination and are not qualified for MATH 104. Not for baccalaureate credit. Credit/No Credit grading only. 3 lectures.

MATH 104 Intermediate Algebra (3) (CR/NC)
Review of basic algebra skills at the intermediate algebra level intended primarily to prepare students for MATH 116. Not for baccalaureate credit. Credit/No Credit grading only. 3 lectures. Prerequisite: Appropriate score on the ELM examination, or credit in MATH 100.

MATH 110 Beginning Algebra Laboratory (1) (CR/NC)
Facilitated study and discussion of the theory, problems, and applications of beginning algebra. Not for baccalaureate credit. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 100.

MATH 111 Pre-Calculus Algebra I, II (3) (3)
For MATH 116 and 117: GE B1
Pre-calculus college algebra without trigonometry. Special products and factoring, exponents and radicals. Fractional and polynomial equations. Matrices, determinants, and systems of equations. Polynomial, rational, exponential, and logarithmic functions. Graphing, inequalities, absolute value, and complex numbers. MATH 116 and MATH 117 are equivalent to MATH 118, but are taught at a slower pace. Upon completion of MATH 116 and MATH 117, a student will receive 4 units of GE credit for Area B1. Not open to students with credit in MATH 118. 3 lectures. MATH 116 prerequisite: Passing score on ELM examination, or an ELM exemption, or credit in MATH 104. MATH 117 prerequisite: MATH 116 with a grade of C- or better or consent of instructor.

MATH 112 The Nature of Modern Mathematics (4) GE B1
Topics from contemporary mathematics, their development, applications, and role in society. Some typical topics, to be chosen by the instructor: graph theory, critical path analysis, statistical inference, coding, game theory, and symmetry. 4 lectures. Prerequisite: Passing score on ELM examination, or an ELM exemption, or credit in MATH 104.

MATH 114 Intermediate Algebra Laboratory (1) (CR/NC)
Facilitated study and discussion of the theory, problems, and applications of intermediate algebra. Not for baccalaureate credit. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 104.

MATH 116, 117 Pre-Calculus Algebra I, II (3) (3)
For MATH 116 and 117: GE B1
Pre-calculus college algebra without trigonometry. Special products and factoring, exponents and radicals. Fractional and polynomial equations. Matrices, determinants, and systems of equations. Polynomial, rational, exponential, and logarithmic functions. Graphing, inequalities, absolute value, and complex numbers. MATH 118 is equivalent to MATH 116 and MATH 117. Not open to students with credit in MATH 117. 4 lectures. Prerequisite: Completion of ELM requirement and passing score on appropriate Mathematics Placement Examination.

MATH 119 Pre-Calculus Trigonometry (4) GE B1
Rectangular and polar coordinates. Trigonometric functions, fundamental identities. Inverse trigonometric functions and relations. Vectors, complex numbers, conic sections, and analytic geometry. 4 lectures. Prerequisite: Completion of ELM requirement and passing score on appropriate Mathematics Placement Examination, or MATH 117, or MATH 118 or equivalent.

MATH 126, 127 Pre-Calculus Algebra Laboratory I, II (1) (1) (1) (1) (CR/NC)
Facilitated study and discussion of the theory, problems, and applications of pre-calculus algebra. Credit/No Credit grading only. 1 laboratory.

MATH 128 Pre-Calculus Algebra Laboratory I (1) (CR/NC)
Facilitated study and discussion of the theory, problems, and applications of pre-calculus algebra. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 118.

MATH 129 Pre-Calculus Trigonometry Laboratory I (1) (CR/NC)
Facilitated study and discussion of the theory, problems, and applications of pre-calculus trigonometry. Credit/No Credit grading only. 1 laboratory. Corequisite: Concurrent enrollment in the associated section of MATH 119.