Course ID	Course title	2007-2008	Instructor	CRN
ATM 160	**Intro to atmospheric chemistry**--Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 2B. Quantitative examination of current local, regional and global problems in atmospheric chemistry (including photochemical smog, acid deposition, climate change, and stratospheric ozone depletion) using fundamental concepts from chemistry. Basic chemical modeling of atmospheric reaction systems.	Winter	Anastasio	
~~**ATM 231**~~	~~**Adv air pollution meteorology**--and one course in fluid dynamics. Processes determining transport and diffusion of primary and secondary pollutants. Models of chemical transformation, of the atmospheric boundary layer and of mesoscale wind fields, as applicable to pollutant dispersion problems. Offered in alternate years.~~	~~Fall~~	-	-
ATM 260	**Atmospheric chemistry**--Chemistry and photochemistry in tropospheric condensed phases (fog, cloud, and rain drops and aerosol particles). Gas-drop and gas-particle partitioning of compounds and effects of reactions in condensed phases on the fates and transformations of tropospheric chemical species.	Next offering in Spring 2009	Anastasio	

BIM 246	**Magnetic resonance**--Lecture—3 hours. Prerequisite: Physics 9D, Mathematics 22B. Course covers MRI technology at an advanced level with emphasis on mathematical descriptions and problem solving. Topics include spin dynamics, signal generation, image reconstruction, pulse sequences, biophysical basis of T1, T2, RF, gradient coil design, signal to noise, image artifacts.	Fall	Buonocore	45187
CHE 205	**Sym spectroscopy & structure**--Lecture—3 hours. Prerequisite: course 201 or the equivalent. Vibrational and rotational spectra; electronic spectra and photoelectron spectroscopy; magnetism; electron spin and nuclear quadrapole resonance spectroscopy; nuclear magnetic resonance spectroscopy; other spectroscopic methods.	Winter		
CHE 216	**Magnetic resonance spectroscopy**--Lecture—3 hours. Prerequisite: courses 210A, 210B (may be taken concurrently). Quantum mechanics of spin and orbital angular momentum, nuclear magnetic resonance, theory of chemical shift and multiplet structures, electron spin resonance, theory of gtensor in organic and transition ions, spin Hamiltonians, nuclear quadrupolar resonance, spin relaxation processes.	Spring		
CHE 217	**X-ray structure determination**--Lecture—3 hours. Prerequisite: consent of instructor. Introduction to x-ray structure determination; crystals, symmetry, diffraction geometry,	Spring		

	sample preparation and handling, diffraction apparatus and data collection, methods of structure solution and refinement, presentation of results, text, tables and graphics, crystallographic literature.			
CHE 218	**Macromolecules: Physical Principles**--Lecture—3 hours. Prerequisite: courses 110A, 110B, 110C or the equivalent. Relationship of higher order macromolecular structure to subunit composition; equilibrium properties and macromolecular dynamics; physical chemical determination of macromolecular structure.	Next offering in Fall 2008		
CHE 219	**Spectroscopy of Organic Compounds**--Lecture—3 hours; laboratory—2.5 hours. Prerequisite: course 128C or the equivalent. Identification of organic compounds and investigation of stereochemical and reaction mechanism phenomena using spectroscopic methods—principally NMR, IR and MS.	Spring		
CHE 228A	**Bio-inorganic chemistry**--Lecture—3 hours. Prerequisite: course 226 or consent of instructor. Defines role of inorganic chemistry in the functioning of biological systems by identifying the functions of metal ions and main group compounds in biological systems and discussing the chemistry of model and isolated biological compounds. Offered every third year.	Check with chemistry department		

CHE 236	**Chem of natural products**--Lecture—3 hours. Prerequisite: course 128C or the equivalent. Advanced treatment of chemistry of naturally occurring compounds isolated from a variety of sources. Topics will include isolation, structure determination, chemical transformations, total synthesis, biological activity, and biosynthesis. Biosynthetic origin will be used as a unifying theme.	Winter		
CHE 237	**Bio-organic chemistry**--Lecture—3 hours. Prerequisite: course 128C or the equivalent. Structure and function of biomolecules; molecular recognition; enzyme reaction mechanisms; design of suicide substrates for enzymes; enzyme engineering; design of artificial enzymes and application of enzymes in organic synthesis.	Check with the chemistry department.		
CHE 240	**Advance analytical chemistry**--Lecture—3 hours. Prerequisite: courses 110A and 115 or the equivalent. Numerical treatment of experimental data; thermodynamics of electrolyte and non-electrolyte solutions; complex equilibria in aqueous and non-aqueous solutions; potentiometry and specific ion electrodes; mass transfer in liquid solutions; fundamentals of separation science, including column, gas and liquid chromatography.	Fall		46933
CHE 241	Special topics in analytical chemistry	----	Guo, Fawcett, Lebrilla, Liu,	

ECH 254	**Colloid & surface phenomena**--Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in science or engineering or consent of instructor. Thermodynamics and rate processes at interfaces. These fundamental processes will be applied to determine the collective properties of thin films and membranes, self-assembled systems, liquid crystals and colloidal systems. Experimental techniques in surface analysis.	Spring	Stroeve, Longo	
ECH 265	**Micro emulsions & biolayers**--Lecture—3 hours. Prerequisite: an undergraduate course in physical chemistry. Thermodynamic and mechanical descriptions of surfactant-laden interfaces. Forces between and within interfaces. Physics of micelle and microemulsion formation. Structure and stability of emulsions. Properties of phospholipid bilayers, with emphasis on vesicles.	Winter	Dungan	
ECI 240	**Water quality**--Lecture—4 hours. Prerequisite: courses 141 and 142. Quality requirements for beneficial uses of water. Hydrologic cycle of quality. Hydromechanics in relation to quality of surface and groundwaters; transport and fate of waterborne pollutants. Heat budget for surface waters; predictive methods; introduction to water quality modeling.	Winter	Schladow	

ECI 242	**Air quality**--Lecture—4 hours. Prerequisite: Engineering 105, course 141, 149 or the equivalent. Factors determining air quality. Effects of air pollutants. Physical and chemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling.	Spring	Kleeman	
ECI 243A	**Water and waste treatment**--Lecture—4 hours. Prerequisite: course 148A or the equivalent. Characteristics of water and airborne wastes; treatment processes and process kinetics; treatment system design.	Fall	Schroeder	49990
ECI 245A	**Applied environmental chemistry - inorganic**--Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 105, Chemistry 2B or the equivalent, course 140; Chemistry 2C or 107A recommended. Chemistry of natural and polluted waters. Topics include chemical, kinetic and equilibrium principles, redox reactions, gas solution and solid-solution equilibria, thermodynamics, carbonate systems, coordination chemistry, interfacial phenomena.	Spring	Young	

ECI 245B	**Applied environmental chemistry - organic**--Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 128A, 128B, 128C, or the equivalent; Chemistry 2C or 107A recommended. Transport and transformation of organic chemicals in the environment. Topics include application of thermodynamics to predict solubility and activity coefficients; distribution of organic chemicals between the aqueous phase and air, solvent, or solid phases; chemical, photochemical and biological transformation reactions.	Not offered again until Spring 2009	Young	
ECI 247	**Aerosols**--Lecture—4 hours. Prerequisite: Engineering 103, 105, course 141, 149. Behavior of airborne particles including particle formation, modification, and removal processes.	Not offered again until Fall 2008	Kleeman	
ECI 247L	**Aerosols laboratory**--Lecture—2 hours; laboratory—6 hours. Prerequisite: course 247. Methods of generation and characterization of aerosols. Detailed topics may include flow rate measurement, aerosol generation, aerosol collection, ions measurement, metals measurement, and carbon measurement. May be repeated once for credit.	Check with Civil & Environmental Eng. Department	Kleeman	

ECS 124	**Theory practice bioinformatics**--Lecture—3 hours; laboratory—1 hour. Prerequisite: course 10 or 30 or Engineering 5 or 6, Statistics 12 or 13 or 32 or 100 or Mathematics 131/Statistics 131A, Biological Sciences 1A or Molecular and Cellular Biology 10. Fundamental biological, mathematical and algorithmic models underlying bioinformatics, sequence analysis, database search, gene prediction, molecular structure comparison and prediction, phylogenetic trees, high throughput biology, massive datasets; applications in molecular biology and genetics; use and extension of common bioinformatics tools.	Spring	Gusfield, Fikou	
EMS 251	**Solid state NMR**--251. Applications of Solid State Nuclear Magnetic Resonance Spectroscopy (3) Lecture—3 hours. Prerequisite: graduate standing in chemistry, physics or engineering, or consent of instructor. Fundamentals of solid state NMR spectroscopy and principles of advanced NMR techniques for analyzing structure of solid materials.	Spring	Risbud	
ETX 214	**Mechanisms of toxic action**--Lecture—3 hours. Prerequisite: Biological Sciences 102, 103, and consent of instructor. Chemical, biochemical, and molecular mechanisms underlying the adverse effects of toxic chemicals. Students are required to write a grant proposal and participate in a grant review panel.	Spring	Dennison, Hammock	

ETX 220	**Analysis of toxicants**--Lecture—3 hours. Prerequisite: coursework in organic chemistry. Principles of microanalysis of toxicants. Theoretical considerations regarding separation, detection and quantitative determination of toxicants using chemical and instrumental techniques. (Same course as Forensic Science 220.)	Fall	Wood	54953
ETX 220L	**Analysis of toxicants Lab**--Laboratory—6 hours. Prerequisite: course 220 (may be taken concurrently) and consent of instructor. Laboratorytechniques for microanalysis of toxicants. Separation, detection, and quantitative determination of toxicants using chemical and instrumental methods.	Fall	Wood	54954
ETX 228	**GC/MS of toxic chemicals**--Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 220 and Chemistry 129C; or consent of instructor. Application of GC/MS techniques to investigate toxic chemicals. Mass spectral fragmentations and their application to the structural elucidation. Practical application of GC/MS in current research. Preference given to environmental toxicology graduate students.	Winter	Holstege	

ETX 240	**Ecotoxicology**--Lecture—3 hours. Prerequisite: elementary course in toxicology and ecology or the equivalent, or consent of instructor. Principles of toxicology as applied to chemical action on natural populations, communities, and ecosystems. Physical, chemical, and biological characteristics which influence ecotoxic effects, modeling, and field research. Selected case histories are analyzed and presented in class.	Spring	Johnson, Miles	
ETX 270	**Toxicology of pesticides**--Lecture—3 hours. Prerequisite: one course each in (a) Organic Chemistry, (b) Biochemistry, (c) Toxicology (course 101 or equivalent), or consent of instructor;graduate standing. Classification and chemical properties of pesticides, their mode of action, metabolism and disposition, pesticide resistance, effects on human health and ecological health and methods of risk benefit analyses. Offered in alternate years.	Winter	Matsumura	
FST 201	**Food chem and biochemistry**--Lecture—3 hours. Prerequisite: Biological Sciences 103. Topics on enzymes, proteins, pigments, lipids, and vitamins. Biochemical principles and methods related to food composition, preservation, and processing. Research proposals and group problem solving.	Fall	G. Smith, Shoemaker, Frankel	56379

FST 202	**Chem & physical changes**--Lecture—3 hours; term paper. Prerequisite: Biological Sciences 103; Chemistry 107B. Fundamental principles of chemistry and physics are applied to a study of changes in water binding properties and activity, changes in proteins, nutrients, toxic constituents, and other compounds during storage, heating, freezing, dehydrating, and concentrating of food materials.	Spring	Dungan	
FST 203	**Food processing**--Lecture—3 hours. Prerequisite: course 110A, Physics 5C or 7C, Chemistry 107B, and one undergraduate food processing course. Principles of food engineering applied to food processing. Relationship of Newtonian and non-Newtonian fluid properties to heat and momentum transfer. Application of mass transfer in controlling kinetics and quality changes of foods.	Winter	K. McCarthy , M. McCarthy	
FST 207	**Advanced sensory-instrumental analysis**--Lecture—2 hours; laboratory—3 hours. Prerequisite: course 107 and consent of instructor. Basic principles of measurement of color, texture, and flavor of foods by sensory and instrumental methods. Advanced statistical analysis of relation of colorimetry, texturometry, and chemistry of volatile compounds to perception of appearance, texture, flavor. Offered in alternate years.	Check with food science & technology department		

FST 210	**Proteins: Functional activities and interactions**--Lecture—3 hours. Prerequisite: Biological Sciences 103. The relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in plant and animal materials and products.	Check with food science & technology department		
FST 211	**Lipids: Chemistry and nutrition**--Lecture—3 hours. Prerequisite: Biological Sciences 103, Chemistry 107B, 128B. Chemistry of lipids as it pertains to research in food and nutrition. Relations between lipid structure and their physical properties in tissues and foods. Regulation of absorption, transport, and metabolism of lipids. Implications of dietary fats and health.	Winter	German	
GEL 227	**Stable isotope biogeochemistry**--Lecture—2 hours; laboratory—6 hours. Prerequisite: graduate standing and consent of instructor. Discussion and application of stable isotope techniques for scientific research problems. Course emphasizes carbon, oxygen, nitrogen, hydrogen and sulfur isotopes. Laboratory will develop basic skills of cryogenic gas extraction and specific techniques for individual research using stable isotopes.	Check with geology department		

HYD 143	**Hydrologic processes in ecosystems--** Lecture—3 hours. Prerequisite: course 141 or Environmental and Resource Science 100. Movement and storage of water are integral parts of landscape and ecosystem functioning. Hydrological processes in individual ecosystems and the role of water linking the myriad components of the landscape.	Not offered until Winter 2009	Pasternack	
HYD 210	**Modeling of vadose zone--** Lecture/discussion--3 hours. Prerequisite: Soil Science 107, Mathematics 22B, programming language, or consent of instructor. Principles and modeling of water flow and chemical transport in the vadose zone, with specific applications to soils. Topics include hydraulic properties, finite difference application to unsaturated water flow, parameter optimization, diffusive and convective transport in gaseous and liquid phases.	Not offered until Spring 2009	Hopmans	
MCB 200B	**Current techniques biochemistry**--103 and course 120L or the equivalent. Current techniques used in biochemical research including protein and carbohydrate analyses, immunochemistry, recombinant DNA methods, electrophoretic and chromatographic methods. (S/U grading only.)	Winter	Kaplan	

MCB200C	**Current techniques biophysics**--200C. Current Techniques in Biophysics (2) Lecture—2 hours. Prerequisite: graduate standing; Biological Sciences 102 or 104 or the equivalent. Current techniques in biophysics research including diffraction, magnetic resonance spectroscopy, calorimetry, optical spectroscopy, and electrophysiology. (Same course as Biophysics Graduate Group 200.) (S/U grading only.)	Winter	T. Chen, Jue	
MCB 221A	**Physical biochemistry**--Lecture—4 hours. Prerequisite: Biological Sciences 103, Chemistry 107B, 108, and 128C, 129C, or 118C or the equivalent or consent of instructor. Chemical and physical properties of biomacromolecules emphasizing the interrelationship of molecular interactions and thermodynamic properties as determinants of higher order structure. The use of NMR and crystallography in determining macromolecular structure.	Fall	Baldwin, Schmid, Wilson, Stahlberg	61628
MCB 221B	**Mechanistic enzymology**--Lecture—3 hours. Prerequisite: undergraduate level organic and biological chemistry, one course in physical chemistry recommended. Analysis of organic enzyme reaction mechanisms and the exploration of enzyme catalyzed reactions.	Fall	Toney, Baldwin	61629

MCB221D	**Cellular biochemistry**--Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 102, course 221A or the equivalent or consent of instructor. Molecular structure and biophysical properties of cell membranes; organelle biogenesis and trafficking; signal transduction, metabolism and metabolic regulation; cytoplasmic organization, biophysics of the cytoskeleton and force-generating mechanisms, mechanism of intracellular transport and mitosis; cell reproduction and the cell cycle.	Winter	McNally, Nunnari, Powers, Scholey	
MIC 263	**Protein-nucleic acid interaction**--Lecture—3 hours. Prerequisite: advanced graduate standing and completion of one year of basic graduate course work in biochemistry, biophysics, chemistry, genetics, microbiology, or molecular biology. Physical basis of protein–nucleic acid interaction. Topics include nucleic acid recognition by proteins, thermodynamics of protein–nucleic acid stability, and kinetics of binding process for both non-specific and sequence-specific nucleic acid binding proteins. Emphasis on systems that represent paradigms in protein–nucleic acid interactions. Not offered every year.	Check with microbiology department		

NUT 201	**Vitamin and cofactor metabolism--** Lecture—2 hours; discussion—1 hour. Prerequisite: one upper division nutritional biochemistry and physiology course. Review of studies and relationships involving the metabolic functions of vitamins. Comparative nutritional aspects and the metabolism and chemistry of vitamins and vitamin-like compounds.	Spring	Rucker, Steinberg	
NUT 254	**Applications of Systems Analysis in Nutrition--** (3) Lecture—2 hours; discussion—1 hour. Prerequisite: course 202, Physiological Sciences 205A-205B or the equivalent. Quantitative aspects of digestion and metabolism; principles of systems analysis. Evolution of models of energy metabolism as applied in current feeding systems. Critical evaluations of mechanistic models used analytically in support of nutritional research.	Not offered again until Winter 2009	Fadel	
PLS 205	**Experimental design & analysis**--Lecture—3 hours; discussion—1 hour. Prerequisite: course 120 or the equivalent. Graduate students in agricultural and environmental sciences will be introduced to the research process and statistical methods to plan, conduct and interpret experiments. Not open for credit to students who have completed Agronomy 205. (Former course Agronomy 205.)	Winter	Dubcovsky	

PLS 211	**Principles of HPLC**--Lecture—1 hour; laboratory—3 hours. Prerequisite: undergraduate physics and chemistry; Biological Sciences 102, 103 recommended. Principles and theory of HPLC involving various modes of separation and detection. Optimization of separation using isocratic and gradient elution. Develop practical knowledge about the use, maintenance and troubleshooting of HPLC equipment, including HPLC columns. Development of new HPLC methods. Not open for credit to students who have completed Agronomy 211. (Former course Agronomy 211.)	Spring	Goyal	
PTX 201	**Principles of pharmacology & toxicology I**--Lecture—5 hours. Prerequisite: Biological Sciences 102 and Neurobiology, Physiology, and Behavior 101. First of three courses presenting fundamental principles of pharmacology and toxicology. Introductory overview of basic concepts in pharmacology/toxicology, followed by in-depth blocks on fate processes of chemicals in the body, fate processes in tissue selective responses, selective toxicity employed therapeutically.	Fall		70092
PTX 202	**Principles of pharmacolgoy & toxicology II**--Lecture—4 hours. Prerequisite: course 201. The second of three courses presenting fundamental principles of pharmacology and toxicology. Principles of pharmacodynamics and mechanisms of drug/toxicant actions.	Winter		

RNU 401	**Biomedical radiochemistry**--Lecture—2 hours; laboratory—3 hours. Prerequisite: open to graduate and medical students; consent of instructor. Approved for graduate degree credit. Course is designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and vigorous lecture-laboratory experience in biomedical nuclear chemistry. Subjects include choice and purification of appropriate gamma and beta radioisotopes, compounding biological pharmacodynamics and radioimmunoassay. (H/P/F grading only.)	Spring		
SSC 211	**Advanced soil microbiology**--Lecture—3 hours. Prerequisite: Chemistry 8A-8B; course 111; Biological Sciences 102, 103 or an equivalent course recommended. Microbial metabolism of organic chemicals in soil, both natural and xenobiotic. Decomposition of organic matter. Kinetics of microbial processes in soil. Offered in alternate years.	Spring	Scow	
~~**SSC 216**~~	~~**Physical geochemistry**--Lecture—3 hours. Prerequisite: course 102 or Chemistry 110A or Geology 115 and Mathematics 119. First half emphasizes equilibrium thermodynamics, including choices of standard states, ideal solutions, and use of the Gibbs-Duhem relation. Second half covers geochemical kinetics including simple rate laws, transition state theory, solute diffusion, and experimental methods.~~	Course no longer available; professor recommends CHE 240 instead.	~~Casey~~	

SSC 219	**Ecosystem biogeochemistry**--Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: introductory courses in ecology/biology and soils recommended; undergraduates accepted with consent of instructor. Multidisciplinary analysis of energy and nutrient transfers within terrestrial ecosystems. Examination of processes and inter- and intra-system interactions between the atmosphere, biosphere, lithosphere and hydrosphere. Laboratory section uses biogeochemical simulation models to examine case studies. (Same course as Ecology 219.)	Spring	Dahlgren	
SSC 222	**Organic chemistry of soils**--Lecture—3 hours. Prerequisite: Chemistry 8A, 8B, Mathematics 16A, 16B, course 100 or the equivalent. Structure and function of soil organic matter,biochemistry of humic substance formation, relationship of organic matter to nutrient cycling and sustainability in agricultural and natural ecosystems, reactions of organics with humic substances in soil and water, methods for characterization. Offered in alternate years.	Not offered until Winter 2009	Horwath	

STA 205	**Statistical methods for research**--Lecture—3 hours; laboratory—1 hour. Prerequisite: course 106 or the equivalent. Topics in design of experiments include factorial designs, balanced and unbalanced experiments, random and mixed effects models, response surface methodology, nested design, repeated measures, cross-over design, analysis of covariance. Applications in engineering, biological sciences, medicine and environmental research.	Spring		
VEN 210	**Grape development & composition**--Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 102, 103. The anatomy, physiology and biochemistry of grape berry development, with emphasis on the development of grape composition relevant to winemaking.	Not offered until Spring 2009	Adams, Polit	
VEN 219	**Natural products in wine**--Lecture—3 hours. Prerequisite: courses 123 and 124, or natural products background and consent of instructor. Structure, occurrence, and changes due to wine production to the natural products found in wine. Chemicals with a sensory impact will be emphasized, including flavonoids and other phenolicsphenolics, terpenes and norisoprenoids, pyrazines, oak volatiles and other wine constituents.	Fall	Waterhouse	72399

VEN 223	**Instrumental analysis of Must and Wine**--Lecture—2 hours; laboratory—3 hours; discussion— 1 hour. Prerequisite: course 123 or Food Science and Technology 103; Biological Sciences 102, Chemistry 107B or 115 recommended. Open to upper division students in Fermentation Science, Viticulture and Enology, or graduate students in Food Science, Agricultural and Environmental Chemistry or Viticulture and Enology. Theory and practice of instrumental analysis of wines and musts. Emphasis on the principles of analytical techniques (e.g., CE, GC, HPLC, Mass Spectrometry) and factors determining correct choice of instrumental method.	Spring	Ebeler	
VMB 247	**Natural toxicants**--Lecture—2 hours. Prerequisite: organic chemistry, Biological Sciences 102 and 103, or consent of instructor. Toxicity and metabolism of natural toxicants with emphasis on the toxic plants present in thewestern United States. General pathways of metabolism plus the relationship between chemical properties and biologic activity of natural toxicants are discussed. Offered in alternate years.	Not offered until Spring 2009		

VMB 253	**Metabolism of toxicants**--Lecture—2 hours. Prerequisite: Pharmacology and Toxicology 201, 202, 203, general biochemistry or consent of instructor. Significance/chemical pathways of toxicants and drug metabolism, enzymology and molecular aspects of P450 and flavin monooxygenases, hydrolases and phase 2 transferases and experimental approaches for metabolism studies. Offered in alternate years.	Not offered until Winter 2009	Buckpitt	