Bioengineering Related Graduate Courses Winter 2017

ENGR 220B, Molecular Bioengineering introduces students to structural components of cells with application of engineering principles for analysis. Topics include: biomembrane structure and function, membrane proteins, membrane transport, intracellular compartments, intracellular trafficking, chemotaxis, cell cycle, apoptosis, and stem cells. *4 units. T R 9:30 am - 10:45 am*

ENGR 225, Current Topics in Bioengineering Seminar series highlighting current topics and advances in bioengineering presented by UCSB faculty or visiting scientists providing context and motivation for bioengineering learning, introducing students to concepts outside of their primary research specialty, and promoting interdisciplinary thinking and research collaboration. *1 unit. T 4:00 pm - 5:15 pm*

ENGR 230, Bioengineering Student Seminar Seminar series where students present their original thesis research and also review journal articles that critically analyze contemporary bioengineering research. Three quarters of ENGR 230 are required for the optional BioE graduate emphasis. Presentations will be evaluated and feedback provided. *1 unit. R 2:00 pm - 3:15 pm*

BMSE 220C, RNA to Membranes Structure and dynamics of biological membranes and membrane proteins, protein translocation and sorting in the endomembrane system of eukaryotic cells, extracellular matrix protein structure/function, cell-matrix and cell-cell interactions, cell adhesion receptors, transmembrane signaling by cell adhesion receptors. *2 units. M W F 10:00 am - 10:50 am*

BMSE 230, Gene Regulation Mechanisms and regulation of transcription and translation in prokaryotic and eukaryotic organisms and their viruses. *2 units. M W F 10:00 am - 10:50 am*

BMSE 232, Bacterial Pathogenesis The mechanisms by which bacterial pathogens cause disease. Investigation of the bacterial gene products produced during infection to understand the metabolic, physiological, and genetic factors that contribute to the virulence of bacterial pathogens. *2 units. M W F 11:00 am - 11:50 am*

BMSE 244, Informational Macro- and Supra-Molecules Selected topics at the interface of chemistry and biology; informational molecular coding, molecular machines, self-assembling and self-replicating molecular systems, evolution and selection of molecules with binding and catalytic properties, biopolymer-based materials, special emphasis on cutting-edge technologies. *2 units. T R 11:00 am - 12:15 pm*

BMSE 246, Membrane Biochemistry Introduction to the structures and roles of lipids and their behavior, liposomes, membrane proteins and kinetics, protein sorting, and signal transduction. *3 units. M W F 12:00 pm - 12:50 pm*

BMSE 247, Quantitative Methods in Biology A review of quantitative methods required to develop models of biological and ecological systems. Topics illustrated through computer exercises. *3 units. M W 12:30 pm - 1:45 pm*

BMSE 265, Seminar Discussion Group A weekly seminar discussion group to review, in advance, relevant literature of participating BMSE seminar guests. *1 unit. T 3:00 pm - 4:00 pm*

CH E 211B, ME 210B, Numerical Simulation Linear multistep methods and Runge-Kutta methods for ordinary differential equations: stability, order and convergence. Stiffness. Differential algebraic equations. Numerical solution of boundary value problems. *4 units. M W 9:00 am - 10:50 am*

CH E 228, Non-Newtonioan Fluids, Soft Materials and Chemical Products Overview of soft materials (suspensions, gels, polymers, surfactants, emulsions, powders and granules) that arise in diverse industries, including consumer products, foods, advanced materials, biotechnology, and mineral and energy production. Influence of non-Newtonian rheology (shear-thickening and thinning, viscoelasticity, extension-thickening, yield stresses, normal stress differences, and metastability)

upon handling, processing, production, and performance of chemical products. Strategies to design chemical products that meet performance targets, and to scale-up production. Real-world case studies and classroom demonstrations. *3 units. T R 11:00 am - 12:15 pm*

CH E 240A, Advanced Chemical Reaction Engineering Following review of the theory of reaction kinetics for catalyzed and noncatalyzed systems, detailed consideration is given to design and performance of catalysts and chemical reactors. Mathematical studies of stability and optimization are emphasized in relationship to mass, energy, and momentum transport. *3 units. T R 9:30 am - 10:45 am*

CH E 260, Intro Polymer Science Introductory course covering synthesis, characterization, structure, and mechanical properties of polymers. The course is taught from a materials perspective and includes polymer thermodynamics, chain architecture, measurement and control of molecular weight as well as crystallization and glass transitions. *3 units. M W 10:00 am - 11:15 am*

CHEM 217A, Statistical Mechanics Fundamentals of statistical thermodynamics, partition functions for ideal gases and crystals, quantum statistics, calculations of thermodynamic properties. *3 units. M W F 1:00 pm - 1:50 pm*

CHEM 218, Photochemistry and Radiation Chemistry Interaction of light and matter, reaction paths from electonically excited molecules, flash photolysis, high energy radiation. *3 units. M W F 5:00 pm - 5:50 pm*

CHEM 222B, Fundamentals of Quantum Chemistry Molecular Orbital theory and Valence Bond theory (Secular Equ.) applications to conjugated systems, electronic spectra, and term symbols; introduction to infrared, raman, and microwave spectroscopy. *3 units. M W 3:30 pm - 4:45 pm*

CHEM 242B, Chemical Aspecst Biological Systems Chemical aspects of intermediary metabolism. The chemistry and elementary dynamic properties of enzymes; study of enzyme active sites; characterization of metabolic pathways and methods of examining cellular regulation. *3 units. M W F 10:00 am - 10:50 am*

CHEM 271, Bioinorganic Chem Selected topics in bioinorganic chemistry and metal-lobiochemistry with a major focus on recent developments. Topics will include discussions of metalloproteins and corresponding model compound investigations. Emphasis will be on reaction mechanisms and spectroscopic properties of metal sites. *3 units. M W 3:30 pm - 4:45 pm*

ECE 210B, Numerical Simulation Linear multistep methods and Runge-Kutta methods for ordinary differential equations: stability, order and convergence. Stiffness. Differential algebraic equations. Numerical solution of boundary value problems. *4 units. M W 9:00 am - 10:50 am*

EEMB 247, Quantitative Methods in Biology A review of quantitative methods required to develop models of biological and ecological systems. Topics illustrated through computer exercises. *3 units. M W 12:30 pm - 1:45 pm*

MATH 206B, Numerical Simulation Linear multistep methods and Runge-Kutta methods for ordinary differential equations: stability, order and convergence. Stiffness. Differential algebraic equations. Numerical solution of boundary value problems. *4 units. M W 9:00 am - 10:50 am*

MATRL 220, Mechanical Behavior of Materials Concepts of stress and strain. Deformation of metals, polymers, and ceramics. Elasticity, viscoelasticity, plastic flow, and creep. Linear elastic fracture mechanics. Mechanisms of ductile and brittle fracture. *3 units. M W 11:30 am - 12:45 pm*

MATRL 271B, Complex Fluids Structure, phase behavior, and phase transitions in complex fluids. Characterization techniques including x-ray and neutron scattering, and light and microscopy methods. Systems include colloidal and surfactant dispersions (e.g., polyballs, microemulsions, and micells), polymeric solutions and biomolecular materials (e.g., lyotropic liquid crystals). *3 units. T R 12:30 am - 1:45 pm*

MATRL 281, Technical Communication and Presentation Design Focuses on a practical, hands-on, interactive approach to developing

communication skills and presentation style. Using current literature and seminars, critical attributes such as clearly explaining complex ideas, the do's and don'ts of presentation will be covered. *3 units. T R 3:30 am - 4:45 pm*

MCDB 220A, Chromosomes and Cell Cycle Structure and organization of the nucleus, chromatin and chomosome structure, organization, and function; DNA replication and replication origins; eukaryotic cell cycle regulation. *2 units. M W F 10:00 am - 10:50 am, T R 9:30 am - 10:45 am*

MCDB 220B, Cytoskeleton Structure and function of the eukaryotic cytoskeleton. Intracellular protein transport and membrane trafficking. *2 units. M W F 10:00 am - 10:50 am, T R 9:30 am - 10:45 am*

MCDB 220C, RNA to Membranes Structure and dynamics of biological membranes and membrane proteins, protein translocation and sorting in the endomembrane system of eukaryotic cells, extracellular matrix protein structure/function, cell-matrix and cell-cell interactions, cell adhesion receptors, transmembrane signaling by cell adhesion receptors. *2 units. M W F 10:00 am - 10:50 am, T R 9:30 am - 10:45 am*

MCDB 226, Basic Pharmacology History and scope of pharmacology as a basic science; principles of drug action and relationship of pharmacology to physiology, chemistry, biochemistry emphasized. *4 units. M W F 9:00 am - 9:50 am*

MCDB 230, Gene Regulation Mechanisms and regulation of transcription in prokaryotic and eukaryotic organisms and their viruses. *2 units. T R 9:30 am - 10:45 am*

MCDB 232, Bacterial Pathogenesis The mechanisms by which bacterial pathogens cause disease. Investigation ofthe bacterial gene products produced during infection to understand the metabolic, physiological, and genetic factors that contribute to the virulence of bacterial pathogens. *3 units. M W F 11:00 am - 11:50 am*

MCDB 233, Immunobiology Introduction to, and evaluation of, the current concepts of immunology. Emphasis on immunoglobulin structure and function, cell-cell cooperation in the immune response, and

the role of the major histocompatibility complex in regulating immune responsiveness. *3 units. M W F 12:00 pm - 12:00 pm, M 5:00 pm - 5:50 pm*

MCDB 252, Neurobiology II: Molecular and Cellular Neruobiology This second course of a three quarter neurobiology course sequence (251/252/253) will cover both top down systems level approaches and bottom up molecular approaches to major topics in neurobiology. These topics include mechanisms of sensory transduction in at least two selected sensory systems, processing of sensory information within the brain, mechanisms of muscle control, cell signaling, neuronal plasticity, neuronal polarity, and the mapping of neural information to the brain. *4 units. W F 11:00 am - 12:15 pm, F 10:00am - 10:50 am, F 1:00 pm - 1:50pm*

MCDB 261, Literature in Immunology Critical reading and presentation of the current literature in higher plantmolecular biology, cell biology, and development. *1 units. W 5:00 pm - 8:00 pm*

ME 264, Mechanical Behavior of Materials Concepts of stress and strain. Deformation of metals, polymers, and ceramics. Elasticity, viscoelasticity, plasitc flow, and creep. Linear elastic fracture mechanics. Mechanisms of ductile and brittle fracture. *3 units. M W 11:30 am - 12:45 pm*

PHYS 219, Statistical Mechanics Fundamental principles of classical and quantum statistics. Non-interacting Boltzmann, Bose, and Fermi systems. Virial expansion and other approaches to interacting systems. Phase transitions. *4 units. T R 9:30 am - 10:45 am*

PHYS 221B, Relativistic Quantum Field Theory Introduction to the theory of Lorentz covariant quantized fields. Global and local conservation laws. Path integral formulation. Applications to quantum electrodynamics, quantum chromodynamics, and electroweak interactions. Other possible topics include grand unification, the renormalization group, anomolies, current algebra and supersymmetry. *4 units. T R 11:00 am - 12:15 pm*

PHYS 223B, Concepts and Phenomena of Condensed Matter Physics Lattice and electron dynamics. Elementary excitations and collective

phenomena. Transport properties. Disorder and localization. Long-range order and broken symmetries. Magnetism, superconductivity and liquid crystals. Properties and structures of polymers, membranes, and self-assembling systems. *4 units. M W 9:30 am - 10:45 am*

PSTAT 220B, Advanced Statistical Methods Generalized linear models; log-linear models with application to categorical data; and nonlinear regression models. Discussion of each technique includes graphical methods; estimation and inference; diagnostics; and model selection. Emphasis on application rather than theory. R/SAS computation. *4 units. M W 9:30 am - 10:45 am, R 7:00 pm - 7:50 pm*

PSTAT 231, Data Mining Data Mining is used to discover patterns and relationships in large data sets. Topics will include: data exploration, classification and regression trees, random forests, clustering and association rules. Building predictive models focusing on model selection, model comparison and performance evaluation. Emphasis will be on concepts, methods and data analysis; and students are expected to complete a significant class project, individual or team based, using real world data. *4 units. T R 11:00 am - 12:15 pm*

PSTAT 231, Time Series Stationary and non-stationary models, seasonal time series, ARMA models: calculation of ACF, PACF, mean and ACF estimation. Barlett's formula, model estimation: Yule-Walker estimates, ML method. Identification techniques, diagnostic checking, forecasting, spectral analysis, the periodogram. Current software and applications. *4 units. T R 2:00 pm - 3:15 pm*

PYS 221B, Design and Measurement Experimental design and statistical analysis in psy- chological research. Analysis of variance and related topics. *4 units. M W 1:00 pm - 2:15 pm, F 9:30 am - 10:45 am*

PYS 221E, Statistical Analysis fMRI Datat Experimental design and statistical analysis in fMRI research. Linear and nonlinear models of the hemodynamic response function, the general linear model in fMRI analysis, post hoc testing, group testing with the random effects model, and connectivity analysis. *4 units. M W 11:00 am - 12:15 pm, R 9:30 am - 10:45 am*