Bioengineering Related Graduate Courses  
Spring 2019

BMSE 204, MCDB 245, Post-translational Protein Processing
Structure/function relationships in interesting macromolecules isolated from marine organisms. Focus is on well-characterized pathways from horseshoe crabs, abalones, mussels, and fish as well as others. 4 units. T R 11:00 am - 12:15 pm, F 9:00 am - 9:50 pm

BMSE 219, Microscopy for Quantitative Biology  Fluorescence live imaging is a powerful tool to study dynamics of living matter. This course provides an overview on geometric and frontier optics, bright field microscopy fluorescence and absorption spectroscopy. Practicing these concepts students will construct a light-sheet microscope. Goals Fluorescence: Basic components of the microscope for manipulating light; Diffraction and interference for image formation; Complex microscope systems, e.g. EPI, Confocal, 2 photon, Light sheet. 2 units. T R 12:30 pm - 1:45 pm

BMSE 223, Chem 223, MCDB 223, Signal Transduction  A cell’s growth is controlled by positive and negative cues from its surroundings. A discussion of the cell’s signaling mechanisms that recognize these cues and initiate and intracellular set of events that generates a response. 3 units. M W F 9:00 am - 9:50 am

BMSE 265, BMSE 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

BMSE 290BP, Group Studies: Bacterial Pathogenesis  Presentation and discussion of current research, to be selected from the following list: BP. Bacterial Pathogenesis. 2 units. TBA

BMSE 290CE, Group Studies: C. elegans Development  Presentation and discussion of current research, to be selected from the following list: CE. C. elegans Development. 2 units. TBA

BMSE 290DN, Group Studies: Development Neurobiology  Presentation and discussion of current research, to be selected from the following list: DN. Developmental Neurobiology. 2 units. TBA
BMSE 294B, MCDB 294B, Bioengineering: Career and Development Opportunities
Based on presentations by experts from the bioengineering industry. Presenters describe their companies’ technologies and developments, including biosensors, therapeutics, tissue engineering, quantum dots and advanced instrumentation. Training and educational requirements for different career tracks are discussed. 2 units. M 10:00 am - 12:00 pm

BMSE 595, Biochemistry/Molecular Biology Literature Seminar
A critical review of research in selected areas of biochemistry-molecular biology. 2 units. TBA

BMSE 595BG, Biochemistry/Molecular Biology Literature Seminar
A critical review of research in selected areas of biochemistry-molecular biology. 2 units. TBA

CH E 294B, Bioengineering
Based on presentations by experts from the bioengineering industry. Presenters describe their companies’ technologies and developments, including biosensors, therapeutics, tissue engineering, quantum dots and advanced instrumentation. Training and educational requirements for different career tracks are discussed. 2 units. T R 12:00 pm - 1:50 pm

CHEM 223, BMSE 223, MCDB 223, Current Events Organic Chemistry
Faculty and students present and critically discuss current chemical literature.

CHEM 239, Selected Topics in Organic Chemistry
Selected topics from organic chemistry the contents of this course will vary. 1-4 units. T R 2:00 pm - 3:15 pm

CHEM 242C, Chemical Aspects of Biological Systems
Macromolecular biosynthesis and specialized cellular processes. A survey of nucleic acid and protein biosynthesis, characterization of lipids and membranes; function of membranes in transport, energy transduction, and cellular control; mechanisms of muscle contraction and cell motility; neurochemistry. 3 units. T R 2:00 pm - 3:15 pm

CHEM 251, Protein Processing
Structure/function relationships in interesting macromolecules isolated from marine organisms. Focus
is on well-characterized pathways from horseshoe crabs, abalones, mussels, and fish as well as others. 4 units. T R 11:00 am - 12:15 pm, F 9:00 am - 9:50 pm

**CHEM 259, Selected Topics in Biological Chemistry** Selected topics from bio-organic, biophysical, or biological chemistry. The content of this course will vary. 1-4 units. 9:30 am - 10:45 am

**CHEM 274, Solid State Inorganic/Materials** An introductory course describing the synthesis, physical characterization, structure, electronic properties and uses of solid state materials. 3 units. T R 9:30 am - 10:45 am

**CHEM 290, Seminar in Chemistry and Biochemistry** Presentation of seminar required of all departmental graduate students. 2 units. F 10:00 am - 11:50 am

**ECE 594Q, Nanotechnology** Instruction in these variable unit courses may be carried out by lecture, by laboratory, or by a combination of these. These courses provide a study of topics of current interest in various areas of electrical and computer engineering. 1-5 units. M W 12:00 pm - 1:50 pm

**ECE 595E, Group Studies in Electrical and Computer Engineering** Instruction in research group meetings carried out by lecture, by laboratory, or by a combination of the two. Courses provide a critical review of research in various areas of electrical and computer engineering. E. signal processing. 1 unit. TBA

**EEMB 511, Writing Science-EEMB Colloquium** A hands-on workshop to polish writing skills. Modules focus on “story telling” to make ideas compelling, streamlining to make writing compact and effective, and developing flow of ideas and paragraphs. Students work on a chapter, paper, or proposal. 2 units. R 12:00 pm - 2:50 pm

**EEMB 595EV, Evolutionary Biology** A critical review of research in selected fields of biology. 2 units. R 3:00 pm - 4:50 pm

**EEMB 595T, Parasitology** A critical review of research in selected fields of biology. 2 units. M 2:30 pm - 3:30 pm
EEMB 595TE, Theoretical Ecology and Evolution  Focus on Bayesian Methods, featuring special guest instructor Grace DiRenzo. 2 units.  
TBA

ENGR 220A, Molecular Bioengineering  This course Introduces students to molecular components of biology with application of engineering principles for analysis. Topics include: molecular components of cells, DNA/RNA structure and function, protein structure/function/folding, gene and protein regulation, DNA replication, and experimental and computational research methods. 3 units. T R 9:30 am - 10:45 am

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 220C, Tissue/Systems Bioengineering  This course introduces students to tissue and organism-level organization with application of engineering principles for analysis. Topics include: cardiovascular, respiratory, digestive, and central nervous systems, structural components of organisms (bones and muscles), immune system, and of pharmacology. 3 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. R 2:00 pm - 3:15 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. T 2:00 pm - 3:15 pm


MATRL 200C, Structure Evolution  Study of phenomena underlying the evolution of structure across the relevant length and time scales in Materials. Structural defects. Driving forces, mechanisms and kinetics of structural change. Diffusional transport. Fundamentals of phase transformations. Crystallization. Evolution of microstructural features and patterns. 4 units. M W 9:00 am - 10:50 am, F 9:00 am - 10:50 am

MATRL 222A, Structure Evolution  Study of phenomena underlying the evolution of structure across the relevant length and time scales in Materials. Structural defects. Driving forces, mechanisms and kinetics of structural change. Diffusional transport. Fundamentals of phase transformations. Crystallization. Evolution of microstructural features and patterns. 4 units. M W 9:00 am - 10:50 am, F 9:00 am - 10:50 am


MATRL 278, Interaction in Biomolecular Complexes  Focuses on the interactions, structures, and functional properties of complexes comprised of supramolecular assemblies of biological molecules. Systems addressed include lipid molecules. Systems addressed include lipid membranes, lipid-DNA complexes, and assemblies of proteins of the cell cytoskeleton. 3 units. T R 11:00 am - 12:15 pm

MCDB 223, Ch E 223, BMSE 223, Signal Transduction  See BMSE 223 for course description.
MCDB 225, Development The molecular mechanisms of pattern formation and cellular differentiation that underlie developmental processes in a variety of important model systems. 2 units. M W F 9:00 am - 9:50 am, T R 8:00 am - 9:15 am.

MCDB 226C, Basic Pharmacology: Principles and Chemotherapy Fundamental principles of pharmacology, drug-receptor theory, biochemical mechanisms of action of drugs. 4 units. M W F 10:00 am - 10:50 am, F 9:00 am - 9:50 am, W 8:00 am - 8:50 am.

MCDB 245, BMSE 204, Post-Translational Protein Processing See BMSE 204 for Course Description.

MCDB 246, Stem Cell Biology in Health and Disease Basic biology of embryonic and adult stem cells and nuclear transfer, with emphasis on latest findings from the current literature. 4 units. M W 2:00 pm - 3:15 pm.

MCDB 253, Neurobiology III: Developmental Neurobiology This course begins with fertilization and moves through sequential stages in the development of the nervous system, including cell migration and differentiation, axon outgrowth and pathfinding, programmed cell death, synaptogenesis, learning, memory, neurodegenerative conditions and current strategies for neuronal regeneration. 4 units. T R 9:30 am - 10:45 am.

MCDB 263, Progress in Biochemistry and Molecular Biology Research seminars presented by invited speakers on current research topics. 1 unit. R 11:00 am - 12:15 pm.

MCDB 294B, BMSE 294B, Bioengineering: Career and Development Opportunities Based on presentations by experts from the bioengineering industry. Presenters describe their companies’ technologies and developments, including biosensors, therapeutics, tissue engineering, quantum dots and advanced instrumentation. Training and educational requirements for different career tracks are discussed. 2 units. M 10:00 am - 12:00 pm.

ME 211, Pattern Formation and Self-Organization Introductory course to the processes of pattern formation and self-organization in
natural systems (physical and biological systems), as well as in engineering. The goal of the course is to explain how ordered spatial structures appear in different systems. We will discuss the common aspects and the differences in the mechanisms that establish the patterns, and introduce various techniques used in different disciplines to study the formation of spatially extended structures. 3 units. T R 11:00 am - 12:15 pm

**ME 225BP, Methods in Mechanobiology and Biofabrication**

ICell mechanobiology topics including cell structure, mechanical models, and chemo-mechanical signaling. Review and apply methods for controlling and analyzing the biomechanics of cells using traction force microscopy, AFM, micropatterning and cell stimulation. Practice and theory for the design and application of methods for quantitative cell mechanobiology. Weekly lecture and hands-on laboratory sessions. 3 units. T R 12:30 pm - 1:45 pm

**ME 292, Design Transducer**

Design issues associated with microscale transduction. Electrodynamics, linear and nonlinear mechanical behavior, sensing methods, MEMS-specific fabrication rules, and layout are all covered. Modeling techniques for electromechanical systems are also discussed. 3 units. M W 8:00 am - 9:15 am

**PSTAT 231, Data Mining**

Introduction to data mining techniques. Model assessment and performance evaluation. Data preparation. Programming techniques for transforming raw data into a form suitable for predictive modeling. Extracting data to a form that predictive models can utilize. Incorporating non-numeric data in predictive models. Techniques for managing exceptional and extreme data. Building predictive models using SAS Enterprise Miner 5 in SAS 9, including Decision Trees, Neural Networks, and Bayesian Networks. 4 units. T R 5:00 pm - 6:15 pm

**PSTAT 274, 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. M W 11:00 am - 12:15 pm
PSY 221C, Multivariate Analysis in Psychology and Related Social Sciences
The use in psychology of the general linear model, multiple regression, discriminant function analysis, factor-analysis, and principal components analysis 4 units. T R 9:30 am - 11:00 am; F 9:00 am-10:50 am

PSY 269, Neuroanatomy An examination of the organization of the vertebrate nervous system. Topics include neurohistological techniques; neurology and neuropsychology; comparative neuroanatomy; neural degeneration; developmental neuroscience. 4 units. W 9:00 am - 11:50 am