

Biological Sciences (BIO SCI)

Courses

BIO SCI 2A. Freshman Seminar. 2 Units.

Weekly meetings consisting of presentations by faculty, professional staff, and Peer Academic Advisors provide information about the School of Biological Sciences, campus resources, learning skills, and special programs/opportunities.

Grading Option: Pass/no pass only.

Restriction: Freshmen only. School of Biological Sciences students only.

BIO SCI 2B. Freshman Seminar . 1 Unit.

Faculty presentations and readings focused on the structure, function, opportunities, and current issues in the biological sciences.

Grading Option: Pass/no pass only.

Restriction: Freshmen only. School of Biological Sciences students only.

BIO SCI 2C. Solutions in Science. 1 Unit.

Students will be introduced to approaches that can be used to solve scientific problems. These methods can be utilized in introductory to advanced classes and will allow students to become independent thinkers.

BIO SCI 2D. EASE Seminar. 1 Workload Unit.

Seminars designed to help students achieve success in STEM courses. Provides collaborative learning environment facilitated by undergraduate mentor. Students develop critical thinking and study skills. Also receive guidance to campus resources that assist acclimation to University.

Grading Option: Pass/no pass only.

Repeatability: May be taken for credit 3 times.

BIO SCI 2E. Topics and Careers in Ecology and Evolution. 1 Unit.

Introduces students to topics, research opportunities, and career options in ecology and evolutionary biology.

Grading Option: Pass/no pass only.

Restriction: School of Biological Sciences students have first consideration for enrollment.

BIO SCI 2F. Topics in Academic Success. 1 Unit.

There is an increasing awareness of the importance of non-academic factors (like belongingness) for student success. Provides students with peer mentoring and tools specific to different career stages that have been shown to improve student outcomes.

Grading Option: Pass/no pass only.

Repeatability: May be taken for credit 1 times as topics vary.

BIO SCI 3A. Career Decision-Making. 1 Unit.

An introductory course designed to facilitate the career decision-making process. Decision-making processes, values, and standardized tests of aptitudes, interests, and values are utilized with non-test data in appraising biological sciences career options.

Grading Option: Pass/no pass only.

BIO SCI 3B. Non-Health Sciences Career Exploration. 1 Unit.

A survey course designed to assist students in exploring non-health science career options. Lectures by professionals in various fields.

Grading Option: Pass/no pass only.

BIO SCI 4B. Introduction to Field Biology. 1 Unit.

Field excursions to introduce students to local field sites and resources.

Grading Option: Pass/no pass only.

Repeatability: May be repeated for credit unlimited times.

Restriction: Ecology and Evolutionary Biol Majors have first consideration for enrollment.

BIO SCI 6. Tropical Biology: Race to Save the Tropics. 4 Units.

Population growth combines with tropical resource consumption by industrialized nations to cause high rates of deforestation, pollution, habitat fragmentation, and extinction of species. Discusses tropical biomes, their population, community, ecosystem processes, and possible means of conservation of biodiversity.

(II)

BIO SCI 8. Evolution and the Modern World. 4 Units.

Pandemics, disease, antibiotic resistance, your pets, the food you eat: evolution has shaped our world. Discusses the intellectual development of evolution and illustrates, with current events, that evolution is happening all around us, all the time.

Overlaps with BIO SCI 94, BIO SCI E106.

(II)

BIO SCI 9A. Nutrition Science. 4 Units.

An introduction to nutrition science, integrating concepts from biology, biochemistry, microbiology, physiology, and psychology to explain the interaction between nutrients and the human body. Biological basis of nutrient standards is analyzed. Effects of nutrition, behavior, exercises on health/disease.

(II)

BIO SCI 9B. Biology and Chemistry of Food and Cooking . 4 Units.

The kitchen is used as a laboratory to introduce fundamental principles of biology, chemistry, and physics. A molecular/cellular analysis of cooking, including concepts such as protein structure, browning reactions, colloids, emulsions, carbohydrate metabolism, and development of flavor/texture through biochemical transformations.

(II)

BIO SCI 9K. Global Change Biology. 4 Units.

Field trips and lectures that address ways in which humans are altering the global environment, with consequences for the ecology of animals, plants, and microbes.

(II)

BIO SCI 11. Topics in Biological Sciences. 4 Units.

Studies in selected areas of biological sciences.

Repeatability: May be taken for credit 3 times.

BIO SCI 12. Molecular Basis of Human Disease. 4 Units.

Describes the cause and treatment of human diseases at the cutting edge of modern molecular understanding for non-science majors, including history, interviews, and stories.

(II)

BIO SCI 14. California Teach 1: Introduction to Science and Mathematics Teaching. 3 Units.

First in a series for students interested in becoming middle or high school teachers of mathematics or science. Students gain an understanding of effective, research-based teaching strategies. Includes supervised field experience in a K-12 classroom.

Same as PHY SCI 5.

Restriction: School of Biological Sciences students have first consideration for enrollment. School of Physical Sciences students have first consideration for enrollment. School of Engineering students have first consideration for enrollment. School of Info & Computer Sci students have first consideration for enrollment.

BIO SCI 17. Evolutionary Psychology. 4 Units.

Introductory overview of the field of evolutionary psychology. Surveys topics operating at the interface of social sciences, i.e. behavioral psychology and evolutionary biology, while developing select aspects of the history of this developing field.

(II)

BIO SCI 23. Sustainable Landscaping: Design and Practices. 4 Units.

Through lectures and hands-on work, students learn how to design habitats around dwellings, within cities, and in rural environments. These include traditional/sustainable landscaping, restoration, stormwater/wastewater treatment, xeriscaping, and low impact development design. Sustainable landscape plant materials emphasized.

(II)

BIO SCI 25. Biology of Cancer. 4 Units.

Biological, clinical, and psychosocial nature of cancer through the perspectives of medical researchers, biologists, physicians, and health educators. For students of all majors, designed so that each can increase personal awareness of the biology of cancer.

Restriction: BIO SCI 25 may not be taken for credit if taken after BIO SCI M125.

BIO SCI 35. The Brain and Behavior. 4 Units.

Introduction to how the brain works. Biological processes underlying perception, movement, sleep-wake cycles, motivation, language, learning, and memory. Changes in the brain associated with sex differences, drug use, aging, seasons, and time of day. Fundamental properties of the nervous system.

(II)

BIO SCI 36. Drugs and the Brain. 4 Units.

Introduction to the actions of drugs on the brain. How studying drug action helps reveal normal functions of neurons. How drugs can correct neural disorders or disrupt neural function. Biological issues related to drug abuse, drug addiction, and drug seeking.

(II)

BIO SCI 37. Brain Dysfunction and Repair . 4 Units.

Introduction to the disruptions in brain function that underlie disorders such as Alzheimer's disease, Parkinsonism, schizophrenia, and depression, and the basis for drug therapies. The brain's ability to repair itself after damage and the pros and cons of that repair.

(II)

BIO SCI 38. Mind and Memory. 4 Units.

Introduction to neural mechanisms underlying learning and memory. Emphasis on molecular changes that mediate memory as well as structures involved in different forms of memory. Additionally, examines the biology of memory phenomena, from extraordinary memory to false memory to amnesia.

(II)

BIO SCI 41. Mood Disorders. 4 Units.

There are significant differences in response to psychiatric illness across cultures. Delves into the neuroscience underlying mood disorder, investigating current pharmacological treatments and sociocultural influences on treatment outcomes.

(II)

BIO SCI 44. Stem Cells and Brain Repair. 4 Units.

Students introduced to the field of regenerative neurobiology. Both basic stem cell discoveries and their potential clinical application to brain disorders examined. Discussion of opportunities, challenges, and implications of this research.

Overlaps with BIO SCI N172.

(II)

BIO SCI 45. AIDS Fundamentals. 4 Units.

Considers the biological and sociological bases of the AIDS epidemic. Topics include the history of AIDS, current medical knowledge, transmission, risk reduction, and how the community can respond.

Same as PUBHLTH 80.

(II)

BIO SCI 46. Discussion and Literature Research in AIDS. 2-4 Units.

Students carry out two activities: (1) leading discussions about HIV/AIDS (predominantly regarding sociological and personal reactions) among students taking the AIDS Fundamentals course and (2) literature research about biomedical aspects of AIDS.

Prerequisite: BIO SCI 45 or PUBHLTH 80

BIO SCI 47. Stress. 4 Units.

Investigates stress at a psychological, physiological, and molecular level, and provides a current overview of the field of stress research.

(II)

BIO SCI 48. The Mind-Body Connection in the Neuroscience of Well-Being. 4 Units.

Explores research that provides insight into how exercise, diet, sleep, contemplative practices such as mindfulness and meditation, and contemporary psychological therapeutic approaches alter brain function in beneficial ways to promote positive mental health well-being.

(II and III).

BIO SCI 55. Introduction to Ecology. 4 Units.

Principles of ecology; application to populations, communities, ecosystems, and humans.

Restriction: No Biological Sciences Majors. BIO SCI 55 may not be taken for credit if taken after BIO SCI 96 or BIO SCI E106.

(II)

BIO SCI 56. Life Sciencing from Aristotle to Venter. 4 Units.

History of biology from Aristotle through to the scientific revolutions precipitated by Darwin, geneticists, molecular biologists, and now genomics. Introduces the practices and achievements of biological research to both beginning biology students and non-majors.

Overlaps with BIO SCI H90, BIO SCI H90B.

(II)

BIO SCI 70. Introduction to Vaccines. 4 Units.

Focus on introducing vaccines, covering how vaccines work, as well as how they are tested. Introduction to the immune system, to facilitate understanding how vaccines function. Also covers types of vaccines, clinical trials, and vaccine hesitancy.

(II)

BIO SCI 75. Human Development. 4 Units.

Processes leading to the birth of a healthy child and the avoidance of birth defects. Male and female reproductive systems, hormonal control of egg-sperm formations, sexual intercourse, contraception, venereal diseases, fertilization, cell division, embryonic development, fetal physiology.

(II)

BIO SCI H90. The Idiom and Practice of Science. 4 Units.

The importance of biological sciences in our world is discussed. Topics may include brain and behavior, health and disease, genetics and society, and conservation biology. Primary goal is to encourage students to understand better the world in which they live.

Restriction: Campuswide Honors Collegium students only.

(II)

BIO SCI 93. From DNA to Organisms. 3 Units.

Cell biology, biochemistry, genetics, and the biology of organ systems. Covers concepts of building blocks (nucleotides, amino acids, and cells) and of information flow (DNA to proteins, receptors to nuclei, the blood to distant organs, and DNA to offspring).

Restriction: Nursing Science Majors have first consideration for enrollment. Pharmaceutical Sciences Majors have first consideration for enrollment. Public Health Sciences Majors have first consideration for enrollment. Unaffiliated Majors have first consideration for enrollment. School of Biological Sciences students have first consideration for enrollment. BIO SCI 93 may not be taken for credit if taken after BIO SCI 97 or BIO SCI 98.

(II)

BIO SCI 93L. DNA to Organisms - Introduction to Biology Research. 2 Units.

Focuses on the development of quantitative reasoning and science inquiry skills. Helps students learn how to use the scientific method, ask questions, and develop professional skills applicable to any major or career. Materials fee.

Restriction: Nursing Science Majors have first consideration for enrollment. Pharmaceutical Sciences Majors have first consideration for enrollment. Public Health Sciences Majors have first consideration for enrollment. Unaffiliated Majors have first consideration for enrollment. School of Biological Sciences students have first consideration for enrollment.

BIO SCI H93. Honors From DNA to Organisms. 3 Units.

Cell biology, biochemistry, genetics, and the biology of organ systems. Covers concepts of building blocks (nucleotides, amino acids, and cells) and of information flow (DNA to proteins, receptors to nuclei, the blood to distant organs, and DNA to offspring).

Corequisite: BIO SCI 93L

Restriction: BIO SCI H93 may not be taken for credit if taken after BIO SCI 97, BIO SCI H97, or BIO SCI 98.

(II)**BIO SCI 94. From Organisms to Ecosystems. 3 Units.**

Patterns of diversity, ecology, and evolutionary biology. Emphasis is on the Tree of Life and how its members are distributed and interact.

Prerequisite: BIO SCI 93 or BIO SCI H93

Restriction: Pharmaceutical Sciences Majors have first consideration for enrollment. Public Health Sciences Majors have first consideration for enrollment. Unaffiliated Majors have first consideration for enrollment. School of Biological Sciences students have first consideration for enrollment. BIO SCI 1A may not be taken for credit if taken after BIO SCI 94.

(II)**BIO SCI 94L. Organisms to Ecosystems - Introduction to Biology Research Analysis. 2 Units.**

Helps students learn how to use the scientific method, ask and answer questions about environmental DNA, and develop professional skills. Students learn how to design and conduct experiments, analyze data, interpret graphs, and communicate their findings. Materials fee.

Prerequisite: BIO SCI 93L

Restriction: Pharmaceutical Sciences Majors have first consideration for enrollment. Public Health Sciences Majors have first consideration for enrollment. Unaffiliated Majors have first consideration for enrollment. School of Biological Sciences students have first consideration for enrollment.

BIO SCI H94. Honors From Organisms to Ecosystems. 3 Units.

Patterns of diversity, ecology, and evolutionary biology. Emphasis is on the Tree of Life and how its members are distributed and interact.

Corequisite: BIO SCI 94L

Prerequisite: BIO SCI 93 or BIO SCI H93

Restriction: BIO SCI 1A may not be taken for credit if taken after BIO SCI H94.

(II)**BIO SCI 97. Genetics. 4 Units.**

Introduction to genetics. Basic features of replication and expression of DNA, cell division, and gene transmission. Recombination and mutation in diploid organisms.

Prerequisite: BIO SCI 94

Restriction: Biomedical Engr: Premedical Majors have first consideration for enrollment. Nursing Science Majors have first consideration for enrollment. Pharmaceutical Sciences Majors have first consideration for enrollment. Public Health Majors have first consideration for enrollment. School of Biological Sciences students have first consideration for enrollment.

BIO SCI H97. Honors Genetics. 4 Units.

Introduction to genetics. Basic features of replication and expression of DNA, cell division, and gene transmission. Recombination and mutation in diploid organisms.

Restriction: Campuswide Honors Collegium students only. BIO SCI H97 may not be taken for credit if taken after BIO SCI 97.

BIO SCI 98. Biochemistry. 4 Units.

Structure and properties of proteins; major biochemical pathways and mechanisms for their control.

Prerequisite: (BIO SCI 97 or BIO SCI H97) and (CHEM 1C or CHEM M2C or CHEM H2C). CHEM 1C with a grade of C- or better. CHEM M2C with a grade of C- or better. CHEM H2C with a grade of C- or better

Restriction: Biomedical Engr: Premedical Majors have first consideration for enrollment. Nursing Science Majors have first consideration for enrollment. Pharmaceutical Sciences Majors have first consideration for enrollment. Public Health Sciences Majors have first consideration for enrollment. School of Biological Sciences students have first consideration for enrollment.

BIO SCI 99. Molecular Biology. 4 Units.

Biochemistry and replication of nucleic acids; molecular genetics; protein biosynthesis; genetic code; regulation of expression of genetic information; biochemical evolution.

Prerequisite: BIO SCI 98

Restriction: Pharmaceutical Sciences Majors have first consideration for enrollment. Public Health Majors have first consideration for enrollment. Nursing Science Majors have first consideration for enrollment. Biomedical Engr: Premedical Majors have first consideration for enrollment. School of Biological Sciences students have first consideration for enrollment.

BIO SCI 100. Scientific Writing. 3 Units.

Designed to give an overview of the basic aspects of scientific writing relevant to reporting research in the Biological Sciences.

Corequisite: BIO SCI 190

Prerequisite: BIO SCI 99 or BIO SCI 190. Satisfactory completion of the Lower-Division Writing requirement.

Restriction: Biomedical Engr: Premedical Majors have first consideration for enrollment. Pharmaceutical Sciences Majors have first consideration for enrollment. School of Biological Sciences students have first consideration for enrollment.

BIO SCI 101. California Teach 2: Middle School Science and Mathematics Teaching. 3 Units.

Second in a series for students interested in becoming middle or high school teachers of mathematics or science. Students gain an understanding of effective, research-based teaching strategies for grades 6-8. Includes supervised field experience in a middle school classroom.

Prerequisite: PHY SCI 5

Same as PHY SCI 105.

Restriction: School of Physical Sciences students have first consideration for enrollment. School of Biological Sciences students have first consideration for enrollment. School of Info & Computer Sci students have first consideration for enrollment. School of Engineering students have first consideration for enrollment.

BIO SCI D103. Cell Biology. 4 Units.

Analysis of the basic structure and function of animal cells, with an emphasis on the regulation of cellular processes. The basic features of membranes, cellular compartmentalization, protein trafficking, vesicular transport, cytoskeleton, adhesion, signal transduction, and cell cycle are covered.

Prerequisite: BIO SCI 99

Restriction: Students who require this class for completion of their degree have first consideration for enrollment.

BIO SCI D104. Developmental Biology. 4 Units.

Cellular and molecular analysis of how a fertilized egg develops into an organism consisting of complex structures such as the eye, arms, and brain. Emphasis is on the key concepts of developmental processes underlying pattern formation, growth, and regeneration.

Prerequisite: BIO SCI 99

Restriction: Students who require this class for completion of their degree have first consideration for enrollment.

BIO SCI 105. Introduction to STEM Education Research. 4 Units.

Introduces students to education research and topics studied in STEM education. Enables students to develop research questions, participate in research projects, design and utilize research tools, and contribute to STEM education research products.

Same as ENGR 113.

Restriction: Upper-division students only. School of Engineering students have first consideration for enrollment.

BIO SCI D105. Cell, Developmental, and Molecular Biology of Plants . 4 Units.

Emphasizes the special features of plant cells and plant development as compared to animals. Two central topics: plants' ability to fuel our planet through photosynthesis, and the interactions of plants with microorganisms in making nitrogen available to other life forms.

Prerequisite: BIO SCI 97 or BIO SCI H97

Restriction: Students who require this class for completion of their degree have first consideration for enrollment.

BIO SCI E106. Processes in Ecology and Evolution. 4 Units.

An in-depth study of the mechanisms that drive evolution and ecology including: natural selection, mutation, genetic drift, speciation, extinction, life history patterns, population dynamics, ecosystem and community structure, predator-prey and host pathogen interactions, and social behavior.

Prerequisite: BIO SCI 94

Restriction: Students who require this class for completion of their degree have first consideration for enrollment.

BIO SCI E106L. Habitats and Organisms. 4 Units.

Introduces students to local habitats and organisms through required field trips and applies ecological and evolutionary principles from BIO SCI E106. Students also explore related literature.

Prerequisite: (BIO SCI 100 or BIO SCI 108) and BIO SCI E106. Satisfactory completion of the Lower-Division Writing requirement.

Restriction: Seniors only. BIO SCI E106L may not be taken for credit concurrently with or after taking BIO SCI E166. Students who require this lab for completion of their degree have first consideration for enrollment.

(Ib)**BIO SCI E107. Seminar in Ecology and Evolutionary Biology. 2 Units.**

Invited speakers, graduate students, and faculty present current research in ecology and evolutionary biology.

Grading Option: Pass/no pass only.

Restriction: Upper-division students only. Ecology and Evolutionary Biol Majors only.

Concurrent with ECO EVO 201.

BIO SCI 108. Research Methods. 4 Units.

Explores tools of inquiry for developing and implementing science research projects. Students undertake independent projects requiring data collection, analysis, and modeling, and the organization and presentation of results. Additional topics include ethical issues and role of scientific literature.

Prerequisite: BIO SCI 14 or PHY SCI 5

Same as PHYSICS 193, CHEM 193.

BIO SCI E109. Human Physiology. 4 Units.

Functional features of the major organ systems in the human body. Emphasis on homeostasis and the interactions of organ systems in health and disease. (Discussion of behavior and brain function deferred to BIO SCI N110.).

Prerequisite: (BIO SCI 93 or BIO SCI H93) and (CHEM 1C or CHEM M2C)

Overlaps with PHRMSCI 120.

Restriction: Students who require this class for completion of their degree have first consideration for enrollment.

BIO SCI N110. Neurobiology and Behavior. 4 Units.

Consideration of the evolution of behavior, including ethological and psychological aspects and analysis of neuroanatomical, neurochemical, neurophysiological, and neuroendocrine systems underlying basic behavioral processes.

Prerequisite or corequisite: BIO SCI 99

Restriction: Students who require this class for completion of their degree have first consideration for enrollment.

BIO SCI D111L. Developmental and Cell Biology Laboratory. 4 Units.

Covers the division of cells, isolate cellular organelles (chloroplasts, mitochondria, nuclei), and follows changes in cells undergoing programmed cell death. Development is demonstrated in experiments showing cooperation of individual cells in forming a multicellular organism. Materials fee.

Corequisite: BIO SCI D103 or BIO SCI D104 or BIO SCI D105

Prerequisite: (BIO SCI 100 or BIO SCI 108) and (BIO SCI D103 or BIO SCI D104 or BIO SCI D105)

Restriction: Seniors only. Students who require this lab for completion of their degree have first consideration for enrollment.

(Ib)

BIO SCI E112L. Physiology Laboratory. 4 Units.

Laboratory with a focus on the whole organism and its organ systems. Examples of structure-function relationships are drawn from both animal and human physiology. Cellular and molecular aspects are introduced as required. Materials fee.

Prerequisite: (BIO SCI 100 or BIO SCI 108) and (BIO SCI E109 or (BME 120 and BME 121)).

Overlaps with PHRMSCI 120L.

Restriction: Seniors only. Students who require this lab for completion of their degree have first consideration for enrollment.

(Ib)

BIO SCI D113. Genetics Majors Seminar. 1 Unit.

Genetics majors attend a weekly seminar to discuss current research techniques and career opportunities in the field. Students have the opportunity to present their own independent research.

Repeatability: May be taken for credit 2 times.

Restriction: Genetics Majors only.

BIO SCI N113L. Neurobiology Laboratory. 4 Units.

An in-depth exploration into biology and physiology of the nervous system. Labs include neuroanatomy, electrophysiology, pharmacology, behavior, experimental design, EEG, and scientific writing. Materials fee.

Prerequisite or corequisite: (BIO SCI 100 or BIO SCI 108) and (BIO SCI N110 or BIO SCI N115A)

Restriction: Seniors only. Students who require this lab for completion of their degree have first consideration for enrollment.

(Ib)

BIO SCI D114. Developmental and Cell Biology Majors Seminar. 1 Unit.

Developmental and Cell Biology majors attend a weekly seminar to discuss current research techniques and career opportunities in the field. Students have the opportunity to present their own independent research.

Grading Option: Pass/no pass only.

Repeatability: May be taken for credit 2 times.

Restriction: Developmental and Cell Biology Majors only.

BIO SCI M114. Advanced Biochemistry. 4 Units.

Physical-chemical properties of macromolecules. Structure-function relationships in nucleic acids, protein, carbohydrates, and lipids. Integration and regulation of metabolism. Biochemistry of organs and biochemistry of diseases.

Prerequisite: BIO SCI 99

BIO SCI M114L. Biochemistry Laboratory. 5 Units.

Properties of enzymes and the culture and isolation of mutants of microorganisms. Materials fee.

Prerequisite: BIO SCI 99 and (BIO SCI 100 or BIO SCI 108)

Restriction: Seniors only. Students who require this lab for completion of their degree have first consideration for enrollment.

(Ib)

BIO SCI E115L. Evolution Laboratory. 4 Units.

Students perform experiments which illustrate important concepts in evolutionary biology such as natural selection, random genetic drift, inbreeding, age-specific selection, sexual selection, and phylogenetic reconstruction. Materials fee.

Prerequisite: (BIO SCI 100 or BIO SCI 108) and BIO SCI E106. Satisfactory completion of the Lower-Division Writing requirement.

Restriction: Seniors only. Students who require this lab for completion of their degree have first consideration for enrollment.

(Ib)

BIO SCI M115. Allied Health Microbiology. 5 Units.

Introductory microbiology lecture and laboratory with an emphasis on microbial growth control and the relationship between microbes and human health.

Prerequisite: (BIO SCI 93 or BIO SCI H93) and CHEM 1C. CHEM 1C with a grade of C- or better

Overlaps with BIO SCI M122, BIO SCI M118L.

Restriction: Program in Nursing Science students have first consideration for enrollment.

BIO SCI N115A. Advanced Neurobiology I. 4 Units.

In-depth coverage of neurobiology, ranging from molecular neurobiology to functional brain imaging. Discussion of molecular, cellular, and developmental neurobiology.

Prerequisite: BIO SCI 99

Restriction: Neurobiology Majors only.

BIO SCI N115B. Advanced Neurobiology II. 4 Units.

In-depth coverage of neurobiology, ranging from molecular neurobiology to functional brain imaging.

Prerequisite: BIO SCI N115A

Restriction: Neurobiology Majors only.

BIO SCI M116. Advanced Molecular Biology. 4 Units.

Mechanisms of gene expression; special emphasis on regulatory events that occur in Eukaryotic organisms other than initiation of transcription. Chromatin structure and rearrangement, RNA polymerases, cis- and trans-acting elements, RNA processing, transport and stability, protein synthesis, trafficking, and turnover.

Prerequisite: BIO SCI 99

BIO SCI M116L. Molecular Biology Laboratory. 5 Units.

Students perform experiments which illustrate the chemical and biological properties of nucleic acids. Emphasis is placed on recent techniques in recombinant DNA technology including gene isolation and characterization. Materials fee.

Prerequisite: BIO SCI 99 and (BIO SCI 100 or BIO SCI 108)

Restriction: Seniors only. Students who require this lab for completion of their degree have first consideration for enrollment.

(Ib)**BIO SCI E117A. Exercise Sciences Seminar. 3 Units.**

Students are introduced to fundamental concepts and topics in exercise sciences with an emphasis on developing innovative approaches for exploring the biological response to physical activity/inactivity. Interactive course with robust discussion amongst faculty and students.

Prerequisite: (BIO SCI E109 or PHRMSCI 120) and BIO SCI E112L and BIO SCI E183

BIO SCI E117B. Exercise Sciences Seminar. 3 Units.

Students are introduced to fundamental concepts and topics in exercise sciences with an emphasis on developing innovative approaches for exploring the biological response to physical activity/inactivity. Interactive course with robust discussion amongst faculty and students.

Prerequisite: BIO SCI E117A

Restriction: Exercise Sciences Majors only.

BIO SCI E117C. Exercise Sciences Seminar. 3 Units.

Students are introduced to fundamental concepts and topics in exercise sciences with an emphasis on developing innovative approaches for exploring the biological response to physical activity/inactivity. Interactive course with robust discussion amongst faculty and students.

Prerequisite: BIO SCI E117B

Restriction: Exercise Sciences Majors only.

BIO SCI N117. Introduction to Neuroscience Clinical Trials. 4 Units.

Provides an overview of the science of clinical development of treatments for neurological disease and injury.

Prerequisite: BIO SCI 99

BIO SCI E118. Ecosystem Ecology. 4 Units.

A mechanistic perspective on ecosystem processes. Covers ecosystem development, element cycling, and interactions with plants and microbes. The role of ecosystems in environmental change is also addressed.

Prerequisite: BIO SCI E106 or EARTHSS 51 or EARTHSS 60A or CHEM 51C

Same as EARTHSS 164.

Restriction: Earth System Science Majors have first consideration for enrollment. Ecology and Evolutionary Biol Majors have first consideration for enrollment. Environmental Science Majors have first consideration for enrollment.

BIO SCI M118L. Experimental Microbiology Laboratory. 5 Units.

Introductory general microbiology designed for preprofessional biology majors. Includes microscopy, cultivation of bacteria, morphological and biochemical characterization of bacteria, microbial metabolism, growth and genetics, microorganisms and human disease, and interactions of microorganisms with the environment. Materials fee.

Prerequisite: BIO SCI 99 and (BIO SCI 100 or BIO SCI 108)

Restriction: Seniors only. Students who require this lab for completion of their degree have first consideration for enrollment.

(Ib)

BIO SCI N118. Clinical Psychophysiology. 4 Units.

Psychophysiology investigates the relationships between physiological processes and psychological phenomena. Technologies examined include reaction times, heart rate variability, EEGs, ERPs, magnetoencephalography, and eye tracking. Applications include diagnosis, the longitudinal assessment, and the identification of individuals at risk of disease onset.

Prerequisite: BIO SCI N110 or BIO SCI N115A or PSYCH 9A or PSCI 11A

Same as PSYCH 122P.

(II)

BIO SCI E119. Selfish DNA. 4 Units.

Focuses on the genetics and evolution of selfish DNA, and introduces necessary background knowledge from molecular biology, cytogenetics, and bioinformatics.

Prerequisite: BIO SCI 94 or BIO SCI 97 or BIO SCI H94 or BIO SCI H97

BIO SCI M119. Advanced Topics in Immunology. 4 Units.

Literature-based, interactive discussions focused on review of seminal historic and recent immunology literature. Student responsibilities include reading, critical evaluation, and discussion of manuscripts.

Prerequisite: BIO SCI M121

Restriction: Microbiology and Immunology Majors have first consideration for enrollment.

BIO SCI N119. History of Neuroscience. 4 Units.

An overview of the conceptual and technical foundations of contemporary neuroscience from ancient times to the present. The subjects include synapses, neurons, brain organization, sensory, motor and regulatory systems, learning and memory, human brain function and dysfunction.

Prerequisite: BIO SCI 35 or BIO SCI N110 or BIO SCI N115A or PSY BEH 115D or (PSYCH 9A and PSYCH 9B and PSYCH 9C)

Restriction: Upper-division students only.

Concurrent with NEURBIO 255.

BIO SCI E120. Marine Biology . 4 Units.

Examines the biotic and abiotic factors influencing the physiology, distribution, abundances, interactions, and evolution of marine organisms and the roles of those organisms in mediating ecosystem services and functions. A field trip is required. Materials fee.

Prerequisite: BIO SCI 94 or BIO SCI H94

BIO SCI N120A. Human Biology I. 4 Units.

Provides an in-depth look at cutting-edge topics in physiology and epidemiology as they relate to global issues of ethics, anthropology, and socioeconomics, providing the student with an understanding of human health beyond basic biological function.

Prerequisite: BIO SCI 99

Restriction: Human Biology Majors only.

BIO SCI N120B. Human Biology II. 4 Units.

Provides an in-depth look at cutting-edge topics in physiology and epidemiology as they relate to global issues of ethics, anthropology, and socioeconomics, providing the student with an understanding of human health beyond basic biological function.

Prerequisite: BIO SCI N120A

Restriction: Human Biology Majors only.

BIO SCI N120C. Human Biology III. 4 Units.

Provides an in-depth look at cutting-edge topics in physiology and epidemiology as they relate to global issues of ethics, anthropology, and socioeconomics, providing the student with an understanding of human health beyond basic biological function.

Prerequisite: BIO SCI N120B

Restriction: Human Biology Majors only.

BIO SCI M121. Immunology with Hematology. 4 Units.

Antibodies, antigens, antigen-antibody reactions, cells and tissues of lymphoreticular and hematopoietic systems, and individual and collective components of cell-mediated and humoral immune response.

Prerequisite: BIO SCI 98

BIO SCI M121L. Advanced Immunology Laboratory. 4 Units.

Emphasis is placed on learning modern techniques in immunology such as ELISAs, western blotting, and immunofluorescent staining assays. Materials fee.

Prerequisite: (BIO SCI 100 or BIO SCI 108) and BIO SCI M121

Restriction: Seniors only. Students who require this lab for completion of their degree have first consideration for enrollment.

Concurrent with MOL BIO 221L.

(Ib)**BIO SCI N121. Drug Addiction. 4 Units.**

Provides a comprehensive overview of topics in the addiction field, including drug pharmacology, models/approaches to investigate addiction, brain circuits, genetics, epigenetics, and the cellular and molecular biology of drug addiction.

Prerequisite: BIO SCI 99

Concurrent with NEURBIO 233.

BIO SCI E122. Physiology and Pathology of the Kidney. 4 Units.

Examines the structure, function, and pathology of the kidney. Topics include anatomy of the kidney, cellular function, urine formation, and disease states of the kidney.

Prerequisite: BIO SCI E109 or PHRMSCI 120

BIO SCI M122. General Microbiology. 4 Units.

Comparative metabolism of small molecules and cell structure and relationship to microbial classification. Macromolecule synthesis and regulation, sporulation, cell division, growth, and effect of antibiotics.

Prerequisite: BIO SCI 98

BIO SCI N122. Scientific Argumentation and Critical Thinking. 4 Units.

Explicitly teaches argument structure, deductive logic, inductive logic, and common fallacies in the biology context. Students identify assumptions and fallacies in faulty arguments and data figures and learn to compose sound arguments.

Prerequisite: BIO SCI 93. Satisfactory completion of the Lower-Division Writing requirement.

BIO SCI M123. Introduction to Computational Biology. 4 Units.

The use of theories and methods based on computer science, mathematics, and physics in molecular biology and biochemistry. Basics in biomolecular modeling. Analysis of sequence and structural data of biomolecules. Analysis of biomolecular functions.

Prerequisite: MATH 2D or MATH 3A or STATS 7 or STATS 8

Same as BME 132, COMPSCI 183.

Concurrent with MOL BIO 223 and BME 232.

BIO SCI N123L. Human Neuroimaging Lab. 3 Units.

Hands-on laboratory course in human neuroimaging, with particular emphasis on using MRI to understand brain function and how it changes over the course of the lifespan and with disease.

Prerequisite: BIO SCI 93 and (BIO SCI 100 or BIO SCI 108). Satisfactory completion of the Lower-Division Writing requirement.

Restriction: Seniors only. Students who require this lab for completion of their degree have first consideration for enrollment.

(Ib)

BIO SCI D124. Biology of Integrative Medicine. 4 Units.

Presentation of biological principles and the latest clinical and basic research on complementary and alternative therapies (e.g., mind-body medicine, energy medicine, herbal medicine, acupuncture, manipulative therapies) and their integration with Western medicine. Lectures supplemented by demonstrations and hands-on learning sessions.

Overlaps with BIO SCI 9J, BIO SCI 9N.

BIO SCI M124A. Virology. 4 Units.

Replication of viruses in populations, animals, and the host cell. The effects of viral infection on populations, individuals, and specific molecular effects on the target cell. Role of viral infections in cancer and degenerative diseases.

Prerequisite: BIO SCI 99

Restriction: School of Biological Sciences students only.

BIO SCI M124B. Viral Pathogenesis and Immunity. 4 Units.

The mechanisms of viral pathogenesis and of host resistance to viruses are explored in detail. HIV-1 and Influenza-A are used as examples. In each case, viral replication, cytopathic effects, immune response, and viral evasion are discussed.

Prerequisite: BIO SCI M121 or BIO SCI M124A. Recommended: BIO SCI M122.

BIO SCI N124. Model Systems in Biology. 4 Units.

On the use of animal and in vitro models in biomedical research, focusing on assumptions, promises, limitations, and compromises.

Prerequisite: BIO SCI 93

BIO SCI M125. Molecular Biology of Cancer. 4 Units.

Molecular mechanisms of carcinogenesis. Consideration of transformation by DNA tumor viruses, RNA tumor viruses, and chemical carcinogens.

Prerequisite: BIO SCI 99

BIO SCI E126. Parasitology. 4 Units.

Parasitism is the most common animal lifestyle. Yet, because parasites are invisible, they are often overlooked. Explore parasite diversity, disease dynamics, and more with an emphasis on the influential roles that parasites play on ecosystem structure and function.

Prerequisite: BIO SCI 94 or BIO SCI H94

Restriction: School of Biological Sciences students have first consideration for enrollment.

BIO SCI M126. Learning to Read Primary Literature in Biochemistry and Molecular Biology. 4 Units.

An introduction to primary literature focusing on methods to approach, understand, and analyze scientific papers.

Prerequisite: BIO SCI 99

BIO SCI E127. Physiological Plant Ecology. 4 Units.

An examination of the interactions between plants and their environment. Emphasis on the underlying physiological mechanisms of plant function, adaptations and responses to stress, and the basis of the distribution of plants and plant assemblages across the landscape.

Prerequisite: EARTHSS 51 or BIO SCI 94 or (EARTHSS 60A and EARTHSS 60C)

Same as EARTHSS 168.

Restriction: Biological Sciences Majors have first consideration for enrollment. Environmental Science Majors have first consideration for enrollment. Earth System Science Majors have first consideration for enrollment.

BIO SCI N127. Foundations in Neuroimmunology. 4 Units.

The immune system supports normal brain development as well as controls central nervous system (CNS) infections and augments neurodegenerative and neurological diseases. Assesses how the immune system contributes to both host defense and disease.

Prerequisite: BIO SCI M121

Concurrent with NEURBIO 217.

BIO SCI E128. Chemical Ecology. 4 Units.

An introduction to the unspoken chemical language of nature. Emphasis on interactions between insects, plants, and microbes including plant defense, pollination, and microbial warfare.

Corequisite: BIO SCI 94

Prerequisite: (BIO SCI 94 or BIO SCI H94) and CHEM 51A. CHEM 51A with a grade of C- or better

Concurrent with ECO EVO 238.

BIO SCI N128. Into the Human Brain. 4 Units.

Explores different methods for studying the human brain in vivo (EEG, MRI, TMS, and others). Discusses ways to measure and manipulate brain activity directly and indirectly and how these different approaches complement each other.

Prerequisite: BIO SCI 99

BIO SCI N129. The Transparent Brain. 5 Units.

Teaches students how to perform new 3-D histology techniques that reveal the complex circuitry of the brain in unprecedented detail. Students work with real brain samples as part of ongoing neuroscience research projects. Materials fee.

Prerequisite: BIO SCI 93 or BIO SCI H93

Restriction: Students who require this course for completion of their degree have first consideration for enrollment.

BIO SCI D130. Photomedicine. 4 Units.

Studies the use of optical and engineering-based systems (laser-based) for diagnosis, treating diseases, manipulation of cells and cell function. Physical, optical, and electro-optical principles are explored regarding molecular, cellular, organ, and organism applications.

Prerequisite: PHYSICS 3C or PHYSICS 7D

Same as BME 135.

Restriction: Biomedical Engineering Majors have first consideration for enrollment.

BIO SCI E131L. Image Analysis in Biological Research. 4 Units.

Introduction to scientific image analysis including techniques such as high-speed, time-lapse, thermal imaging, and flow visualization. Students make movies using cameras, edit and analyze images using computers, and do a writing project.

Prerequisite: (BIO SCI E106 or PHRMSCI 120 or BIO SCI E109) and (BIO SCI 100 or BIO SCI 108)

Restriction: Seniors only.

(Ib)**BIO SCI M131. Innate Immunity, Infection, and Pathogenesis. 4 Units.**

Role of the innate immune system in health and disease. Molecular pathways of innate immune recognition, expression, and regulation of immune receptors, signal transduction, pathogen sensors, and detection of microbial ligands. Lecture and discussion of primary research articles.

Prerequisite: BIO SCI M121 or BIO SCI M122 or BIO SCI M124A or BIO SCI M124B or BIO SCI M143

BIO SCI N131. Human Neurodegenerative Diseases. 4 Units.

Clinical and epidemiological aspects of neurodegenerative diseases causing dementia are reviewed, including Alzheimer's disease, Parkinson's disease, Huntington's disease, and Frontotemporal Dementia. Seminar format includes student presentation and group discussion.

Prerequisite: BIO SCI 99

BIO SCI D132. Introduction to Precision Medicine. 4 Units.

Introduction to the use of genomic techniques for the study of individual genomes and transcriptomes in healthy and diseased samples. Covers GWAS, current sequencing techniques, cancer genomics, and biomarker discovery.

Prerequisite: BIO SCI 99

BIO SCI E132. Diversity of Fishes. 4 Units.

A survey of the many dimensions of diversity existing across fishes, the largest group of vertebrate organisms (over 30,000 species). Covers systematics, functional anatomy, development, physiology, biogeography, behavior, and more.

Prerequisite: BIO SCI 94 or BIO SCI H94

BIO SCI D133. Advances in Regenerative Medicine. 4 Units.

Introduces the rapidly growing field of regenerative medicine. New developments in stem cell research are discussed. Cellular, molecular, and engineering aspects of stem cell-based organ replacement strategies are examined, with emphasis on specific regenerative therapies.

Prerequisite: BIO SCI D103 or BIO SCI D104

Overlaps with BIO SCI N172.

BIO SCI E133. Environmental Microbiology. 4 Units.

Focuses on non-pathogenic microbes within all habitats (soils, oceans, associated with animals and plants) and their essential functions for ecosystems. Their applied importance for agriculture, bioremediation, energy and food production are also discussed.

Prerequisite: BIO SCI E106

BIO SCI M133. Structural Biology. 4 Units.

Basic principles of magnetic resonance, X-ray crystallography, and CryoEM toward the determination of high-resolution biomolecular structures.

Prerequisite: MATH 2B or MATH 5B

Restriction: Upper-division students only.

Concurrent with MOL BIO 211.

BIO SCI E134. Microbiomes. 4 Units.

Students develop an understanding of microbiomes in the context of both their environment and their impact on host physiology. Discussions on how microbiomes interact with the human body.

Prerequisite: BIO SCI M122

BIO SCI D135. Cell Biology of Human Disease. 4 Units.

Builds on prior biology courses about the underlying cell biological mechanisms and recent treatment advances of several model diseases. Emphasizes literature searches, reading primary literature, and student group work.

Prerequisite: BIO SCI D103

BIO SCI D136. Human Anatomy. 4 Units.

Presents a systems approach to the analysis of human structure. Molecular, cellular, tissue, organ, and organ system levels of structure and organization are integrated throughout.

Prerequisite: BIO SCI 99

Overlaps with BIO SCI D170.

BIO SCI E136. The Physiology of Human Nutrition . 4 Units.

Examines the biochemical basis of energy metabolism, physiological processes in digestion and uptake, and the biochemical transformation of carbohydrates, fats, and proteins in the human body. The emphasis is on expanding the students' understanding of physiology.

Prerequisite: BIO SCI 98 and (BIO SCI E109 or PHRMSCI 120)

BIO SCI D137. Eukaryotic and Human Genetics. 4 Units.

Structure and function of genes in eukaryotes with emphasis on special problems of genetic studies in humans. Molecular methods of genetic analysis and gene transfer are discussed. Practical applications and ethical and social issues raised by genetic studies are addressed.

Prerequisite: BIO SCI 97 or BIO SCI H97

BIO SCI E137. Genetics of Complex Traits. 4 Units.

Many ecologically important traits (e.g., size, age at sexual maturity) and clinical.

Prerequisite: BIO SCI 97 or BIO SCI H97

BIO SCI M137. Microbial Genetics. 4 Units.

Basic principles of microbial genetics are presented as lectures for the first half of the course. The second half is devoted to applications of these principles and requires reading review and original research papers and interactions with guest lecturers.

Prerequisite: BIO SCI 98

BIO SCI E138. Comparative Animal Physiology. 4 Units.

Maintenance aspects of physiology: water balance; feeding and digestion; metabolism; respiration and circulation.

Prerequisite: BIO SCI E109 or PHRMSCI 120

BIO SCI N138. Sex Differences in the Brain. 4 Units.

Explores the neural bases of sex influences on brain function.

Prerequisite: BIO SCI 99

BIO SCI D139. Intercellular Signaling and Disease. 4 Units.

Introduces cell-to-cell communication mechanisms, which are fundamentally essential but still not well understood. From well-established to cutting-edge, researches of intercellular communication and how its malfunction leads to diseases are discussed.

Prerequisite: BIO SCI D103 or BIO SCI D104

BIO SCI E139. Animal Locomotion. 4 Units.

The physiology, biomechanics, and neuroscience that determines how animals propel themselves and navigate through the world. Considers the principles that govern the walking, running, flying, and swimming of animals, including exercising humans.

Prerequisite: BIO SCI E109 or PHRMSCI 120

Concurrent with ECO EVO 239.

BIO SCI E140L. Evolution and the Environment Laboratory. 4 Units.

Explores basic topics in ecology and evolutionary biology and applications to agriculture, conservation, environmental issues, and public health. Format involves lab activities and discussion of scientific journal articles, with focus on learning to evaluate scientific evidence.

Corequisite: BIO SCI E106

Prerequisite: (BIO SCI 100 or BIO SCI 108) and BIO SCI E106

Restriction: Seniors only. Students who require this lab for completion of their degree have first consideration for enrollment.

(Ib)**BIO SCI M143. Human Parasitology. 4 Units.**

Introduction to human animal-parasitic diseases including worms and protozoan infections.

Prerequisite: BIO SCI 99

BIO SCI M144. Cell Organelles and Membranes. 4 Units.

Structure, function, and biogenesis of biological membranes and membrane-bound organelles.

Prerequisite: CHEM 51A

BIO SCI D145. Genomics, Development, and Medicine. 4 Units.

Focuses on the applications of genomics and proteomics to problems in genetics, cell, and developmental biology. Students will gain a comprehensive understanding of the techniques currently used for genomics analysis and how best to apply these tools to solve problems.

Prerequisite: BIO SCI 99

BIO SCI E145. Animal Coloration and Vision. 4 Units.

Physiological and behavioral mechanisms of color production and vision including crypsis, mimicry, aposematism, masquerade, sexual dimorphism, and predator-prey interactions through the lens of signals, receivers, and receptors; color and polarization vision in mate choice and visual adaptations to aquatic environments.

Prerequisite or corequisite: BIO SCI E106

BIO SCI E147. Behavioral Endocrinology. 4 Units.

Comparative examination of the major hormone systems that regulate behavior across animals. Emphasizes the reciprocating nature of hormone-behavior interactions and seeks to understand how natural selection drives the evolution of hormone structure and function.

Prerequisite: BIO SCI E109 or PHRMSCI 120

Concurrent with ECO EVO 247.

BIO SCI N147. Hearing and the Brain. 4 Units.

An overview of brain mechanisms of hearing, including perception of simple sounds, speech, and music. Begins with sound itself, and looks at processing by the ear, auditory pathways, auditory cortex, and beyond. Also auditory development, learning, and clinical issues.

Prerequisite: PSYCH 160A or BIO SCI 93 or BIO SCI H93

Same as PSYCH 161H.

Restriction: Cognitive Sciences Majors have first consideration for enrollment. Biological Sciences Majors have first consideration for enrollment. Psychology Majors have first consideration for enrollment.

Concurrent with NEURBIO 260.

BIO SCI E150. Conservation Biology. 4 Units.

Genetic and ecological issues in conservation biology, including effects of human population growth, the value of biodiversity, conservation genetics, demography, metapopulation dynamics, community and ecosystem processes, species invasions, global climate change, and reserve design and management.

Prerequisite: BIO SCI E106

BIO SCI N151. Neurobiology of Aging. 4 Units.

Multidisciplinary overview of the functional capacity of the aging brain, its structural changes and the mechanisms underlying function and structure. Emphasis is on successful brain aging and those mechanisms which lead to the development of Alzheimer's disease.

Prerequisite: BIO SCI N110 or BIO SCI N115A

BIO SCI E152. Biochemistry of Animals in their Environments. 4 Units.

Interactions between organisms and their environments. Topics include the effects of environmental variables on biochemical functions: membrane stability, protein kinetics, energy metabolism, heat-shock-responses, energetics, gene-expression, and circadian rhythms. These topics are integrated with physiological-ecology in context of global climate change.

Prerequisite: BIO SCI 98 and BIO SCI 99

BIO SCI N152. Developmental Neurobiology. 4 Units.

The development of the nervous system is discussed with emphasis on the processes that underlie the appearance of complex and highly ordered neural circuits. Topics include neural induction, specification, migration and death; axon growth, and neural circuit formation.

Prerequisite: BIO SCI 93 or BIO SCI H93

BIO SCI E153. Functional and Structural Evolutionary Genomics. 4 Units.

Function and organization of genomes analyzed from an evolutionary perspective. Review of some of the most recent experimental approaches in genome analysis and comparative genomics. Relevant software to analyze DNA and expression data is used.

Prerequisite: BIO SCI 97 or BIO SCI H97

Concurrent with ECO EVO 253.

BIO SCI M153. Vascular Biology: Blood Vessels in Health and Disease. 4 Units.

Every cell in the body is within a half hair's width of a blood vessel. As such, we cannot understand the body, in health or disease, without understanding the vasculature. Mixes lectures and primary literature reviews.

Prerequisite: BIO SCI 99

BIO SCI N153. Neuropharmacology. 4 Units.

Survey of neurotransmitter systems, focusing on how transmitters are made, how they interact with their receptors, and how drugs can influence these processes to alter neural function and behavior.

Prerequisite: BIO SCI N110 or BIO SCI N115A

BIO SCI E154. Genetics and Human History. 4 Units.

Explores topics in human health/history from an evolutionary perspective, with emphasis on genetics. Topics include the relationship between genetics and human disease as an evolutionary question, and how modern genetic techniques are used to study the history of human populations.

Prerequisite or corequisite: BIO SCI E106

BIO SCI N154. Molecular Neurobiology. 4 Units.

Provides a fundamental understanding of how the brain works at the molecular level. Topics include nature and actions of molecules that regulate the functioning of the brain and cellular mechanisms underlying learning and memory.

Prerequisite: BIO SCI 99

BIO SCI E155. Physiology in Extreme Environments. 4 Units.

An in-depth look at the physiological mechanisms that allow animals, including humans, to be physically active and survive in extreme environments. Physiological responses to high altitude, diving, microgravity, deserts, and extreme cold are examined.

Prerequisite: BIO SCI 94 or BIO SCI H94

BIO SCI N155. Wiring the Developing Brain . 4 Units.

The development of the nervous system is discussed with particular emphasis on the processes that underlie the appearance of complex and highly ordered neural circuits. Basic neurodevelopmental processes are discussed and correlated with normal brain function/dysfunction.

Prerequisite: BIO SCI N110 or BIO SCI N115A or BIO SCI N152

BIO SCI N156. Molecular Mechanisms of Memory. 4 Units.

Current topics focused on understanding the molecular mechanisms that contribute to synaptic plasticity, learning, and memory. Primary literature is used to explore the variety of molecular mechanisms underlying these processes.

Prerequisite: BIO SCI 99

BIO SCI N158. Neurobiology of Learning and Memory. 4 Units.

How the brain and behavior change as a result of experience, with an emphasis on identifying the neurochemical processes through which memory is stored and the parts of the brain that are involved.

Prerequisite: BIO SCI 35 or BIO SCI N110 or BIO SCI N115A

BIO SCI E160. Biology of Birds. 4 Units.

A thorough introduction to the biology of birds, covering topics ranging from avian anatomy and physiology to behavior, natural history, ecology, genetics, evolution, systematics, and conservation. Examples from both local and global avifauna.

Corequisite: BIO SCI E160L

Prerequisite: BIO SCI 94

BIO SCI E160L. Biology of Birds Lab. 4 Units.

The companion to Biology of Birds (E160). Consists primarily of field trips to identify local birds and study avian natural history. Students must provide their own transportation to field sites, some with entrance fees. Students must have field binoculars.

Corequisite: BIO SCI E160

Prerequisite: (BIO SCI 100 or BIO SCI 108)

Restriction: Seniors only. Students who require this lab for completion of their degree have first consideration for enrollment.

(Ib)

BIO SCI N160. Language and the Brain . 4 Units.

Research analysis on biological bases of human linguistic capacity. Development, focusing on hemispheric specialization, plasticity; localization of specific linguistic functions in adults, with emphasis on study of aphasias; relation of linguistic capacity to general cognitive capacity, considering research on retardation.

Prerequisite: (PSYCH 7A or PSY BEH 9 or PSYCH 9A or PSY BEH 11A) and (PSYCH 9B or PSY BEH 11B or BIO SCI 35 or BIO SCI N110 or BIO SCI N115A)

Same as LSCI 158, PSYCH 161.

Restriction: Cognitive Sciences Majors have first consideration for enrollment. Biological Sciences Majors have first consideration for enrollment. Psychology Majors have first consideration for enrollment.

BIO SCI N164. Functional Neuroanatomy. 4 Units.

How neuroscience uses tools of many disciplines, from imaging to behavior, to develop and test hypotheses about functions of specific parts of the brain. Basic organization of nerve cells/vertebrate nervous system; methods of visualizing nerve cells; neural connections/activity patterns.

Prerequisite: BIO SCI 99

BIO SCI N165. Brain Disorders and Behavior. 4 Units.

Examines the localization of human brain functions and the effects of neurological disorders on psychological functions such as perception, motor control, language, memory, and decision-making.

Prerequisite: (PSYCH 7A or PSCI 9) or ((PSYCH 9A or PSCI 11A) and (PSYCH 9B or PSCI 11B)) or BIO SCI 35 or BIO SCI N110 or BIO SCI N115A

Same as PSYCH 160D, COGS 160D.

Restriction: Biological Sciences Majors have first consideration for enrollment. Cognitive Sciences Majors have first consideration for enrollment. Psychology Majors have first consideration for enrollment.

BIO SCI E166L. Field Biology. 4 Units.

Conducting group and independent studies in Southern California ecosystems, this course covers the fundamentals of experimental design, statistical analysis, communicating scientific findings (orally, visually, in writing), and other skills necessary for the scientific investigation of biological processes in the field. Materials fee.

Prerequisite: (BIO SCI 100 or BIO SCI 108) and BIO SCI E106. Satisfactory completion of the Lower-Division Writing requirement.

Restriction: Seniors only. School of Biological Sciences students have first consideration for enrollment.

(Ib)

BIO SCI E168. Evolution. 4 Units.

An integrative treatment of evolutionary biology that covers evolutionary processes, basic research methods, and the history of life.

Prerequisite: BIO SCI E106

Concurrent with ECO EVO 289.

BIO SCI D170. Applied Human Anatomy. 5 Units.

Systems approach to analyze the form and function of the human body with an emphasis on applying anatomical concepts to evaluate clinical cases. The laboratory uses human models and a simulated cadaver dissection for structure. Materials fee.

Prerequisite: BIO SCI E109 or PHRMSCI 120. BIO SCI E109 with a grade of C or better. PHRMSCI 120 with a grade of C or better

Overlaps with BIO SCI D136.

BIO SCI N170. Clinical Neuroscience. 4 Units.

An introduction to the neuroclinical bases of human behavior, including neuropsychological approaches to mental disorders. Also includes case formulations, research articles, therapeutic approaches, and other discussions related to select psychopathology and other neurobehavioral topics.

Prerequisite: Recommended: PSCI 9 or PSYCH 7A or PSCI 11A or PSYCH 9A or BIO SCI 99.

Same as PSCI 160C.

Restriction: Psychological Science Majors have first consideration for enrollment. Biological Sciences Majors have first consideration for enrollment. Psychology and Social Behavior Majors have first consideration for enrollment. Social Ecology Majors have first consideration for enrollment.

BIO SCI N172. Regenerative Neurobiology. 4 Units.

Explores the field of regenerative neurobiology. Both basic stem cell discoveries and their potential clinical application to brain disorders examined. Opportunities, challenges, and implications of this research also discussed.

Prerequisite: BIO SCI N110 or BIO SCI N115A

Overlaps with BIO SCI 44, BIO SCI D133.

BIO SCI N173. Human Neuropsychology. 4 Units.

A survey of human brain disorders using a clinical case study approach to illustrate fundamental issues in studying brain and behavior. Topics include sensory deficits, attentional neglect, amnesia, cortical organization, clinical psychopathology, and more.

Prerequisite: BIO SCI N110 or BIO SCI N115A or PSYCH 9A or PSCI 11A

Same as PSCI 163C, PSYCH 162N.

Restriction: School of Biological Sciences students have first consideration for enrollment. Cognitive Sciences Majors have first consideration for enrollment. Psychological Science Majors have first consideration for enrollment. Psychology and Social Behavior Majors have first consideration for enrollment. Psychology Majors have first consideration for enrollment.

BIO SCI N174. Principles of Neural Computation. 4 Units.

Introduction to the theoretical principles and biological mechanisms underlying how brains acquire, assimilate, store, and retrieve information, and how they compute adaptive responses to external inputs.

Prerequisite: BIO SCI N110 or BIO SCI N115A

Concurrent with NEURBIO 220.

BIO SCI N176. Cerebral Cortex: Structure, Function, and Plasticity. 4 Units.

The cerebral cortex is highly developed in mammals and is responsible for higher perceptual and cognitive functions. Explores some amazing aspects of cortical structure, function, and plasticity emphasizing primary literature.

Prerequisite: BIO SCI N110 or BIO SCI N115A

BIO SCI E179. Limnology and Freshwater Biology. 4 Units.

Biology of freshwater environments: lakes, ponds, rivers, their biota, and the factors which influence distribution of organisms.

Prerequisite: BIO SCI 94 or BIO SCI H94

BIO SCI E179L. Field Freshwater Ecology. 4 Units.

Analytical techniques for common water-quality variables of lakes, streams, and rivers. Benthic fauna, vertebrates and invertebrates, algae, and aquatic plants. Emphasis on field methods with an experimental approach; laboratory exercises. Field trips to marshes, vernal pools, rivers, and streams. Materials fee.

Corequisite: BIO SCI E179

Prerequisite: (BIO SCI 100 or BIO SCI 108) and BIO SCI E179

Restriction: Seniors only. Students who require this lab for completion of their degree have first consideration for enrollment.

(Ib)

BIO SCI M180. Biotechnological Applications of Energy and Environmental Research. 4 Units.

Covers microbiological and biochemical background related to current biotechnological applications, case studies of biotech-companies, and basic information related to patents and start-up companies. Topics include biofuel, bioremediation, agricultural, and environmental applications.

Prerequisite: BIO SCI 98

BIO SCI E182. Mediterranean Ecosystems: Biodiversity and Conservation. 4 Units.

Biodiversity, history of human impacts, and conservation efforts are examined in the five Mediterranean-type ecosystems. Remaining natural habitat, approaches to ecological habitat restoration, control of exotic species, and predicted consequences of global climate change are described. Field trip required.

Prerequisite: BIO SCI 94

BIO SCI N182. Vision. 4 Units.

Visual perception and the anatomy and physiology of the visual system. Topics include the retina and the visual pathway; visual sensitivity; color vision; spatial vision; motion perception; and the development of the visual system.

Same as PSYCH 131A, COGS 131A.

Overlaps with PSYCH 130A.

Restriction: Upper-division students only. School of Biological Sciences students have first consideration for enrollment. Cognitive Sciences Majors have first consideration for enrollment. Psychology Majors have first consideration for enrollment.

BIO SCI E183. Exercise Physiology. 4 Units.

Focus upon critical topics in the area of exercise biology using the comparative physiological approach. Specifically examine the physiological factors that limit the capacity of an organism to sustain high levels of aerobic metabolism.

Prerequisite: BIO SCI E109 or PHRMSCI 120

BIO SCI E184. Ecology and Diversity of Insects. 4 Units.

Insects—representing two-thirds of all species—play fundamental roles in human health, agriculture, and natural ecosystems. Topics include insect morphology, development, physiology, taxonomy, ecology, and insects in human affairs. Lecture includes interactive demonstrations and an optional weekend trip. Materials fee.

Prerequisite: BIO SCI E106

BIO SCI E186L. Population and Community Ecology Lab. 4 Units.

Covers processes specific to groups of the same species (populations) and multiple species (communities). Includes growth, regulation, dynamics, and persistence of populations and community interactions, development, diversity, and macroecology. Lab activities focus on application of population prediction and biodiversity assessment.

Prerequisite: BIO SCI E106 and (BIO SCI 100 or BIO SCI 108). Satisfactory completion of the Lower-Division Writing requirement.

Restriction: Seniors only.

(Ib)**BIO SCI E187. Exercise as Medicine. 4 Units.**

Explores the link between regular physical activity and health, focusing on mechanistic insights into how regular exercise improves overall health and alters disease trajectories of cancer, type-II diabetes, depression, and other chronic illnesses.

Prerequisite: BIO SCI E109 or PHRMSCI 120

BIO SCI E189. Environmental Ethics. 4 Units.

History of evolution of environmental ethics in America. Management problems in national parks, wilderness areas, wild and scenic rivers, national forests. Contemporary and historical aspects/contributors to the field. Mitigation, endangered species, habitat restoration, biodiversity, and environmental activism. Field trips required.

Restriction: Upper-division students only.

BIO SCI 190. Transfer Student Seminar. 1 Unit.

Weekly meetings consisting of presentations by faculty, professional staff, and New Student Peer Academic Advisors provide information about the School of Biological Sciences, campus resources, and special programs/opportunities.

Grading Option: Pass/no pass only.

Restriction: New transfer students only.

BIO SCI D190. Topics in Developmental and Cell Biology. 4 Units.

Studies in selected areas of developmental and cell biology.

Prerequisite: BIO SCI 99

Repeatability: May be taken for credit 3 times as topics vary.

Restriction: Upper-division students only. School of Biological Sciences students only.

BIO SCI E190. Topics in Ecology and Evolutionary Biology. 2-4 Units.

Studies in selected areas of ecology and evolutionary biology.

Prerequisite: BIO SCI E106

Repeatability: May be taken for credit 3 times as topics vary.

BIO SCI M190. Topics in Molecular Biology and Biochemistry. 2-4 Units.

Studies in selected areas of Molecular Biology and Biochemistry.

Prerequisite: BIO SCI 98

Repeatability: May be taken for credit 3 times as topics vary.

BIO SCI N190. Topics in Neurobiology and Behavior. 2-4 Units.

Studies in selected areas of neurobiology and behavior.

Prerequisite: BIO SCI N110 or BIO SCI N115A

Repeatability: May be taken for credit 3 times as topics vary.

BIO SCI 191A. Senior Seminar on Global Sustainability I. 2 Units.

Students attend weekly seminar to discuss current issues in global sustainability. Weekly attendance at Global Sustainability Forum is also required. Seminar utilized to analyze forum presentations. Prepare bibliography.

Same as SOCECOL 186A, EARTHSS 190A.

Restriction: Seniors only. Global Sustainability Minors have first consideration for enrollment.

BIO SCI 191B. Senior Seminar on Global Sustainability II. 2 Units.

Students attend weekly seminar to discuss current issues in global sustainability. Weekly attendance at Global Sustainability Forum is also required. Seminar utilized to analyze forum presentations. Prepare research proposal.

Prerequisite: BIO SCI 191A or SOCECOL 186A or EARTHSS 190A

Same as SOCECOL 186B, EARTHSS 190B.

Restriction: Seniors only.

BIO SCI 191CW. Writing/Senior Seminar on Global Sustainability III. 4 Units.

Students attend weekly seminar to discuss current issues in global sustainability. Weekly attendance at Global Sustainability Forum also is required. Seminar utilized to analyze Forum presentations and to prepare senior research paper. Prepare/write research paper under direction of faculty member.

Prerequisite: BIO SCI 191B or EARTHSS 190B or SOCECOL 186B. BIO SCI 191B or EARTHSS 190B or SOCECOL 186B. Satisfactory completion of the Lower-Division Writing requirement.

Same as EARTHSS 190CW, SOCECOL 186CW.

Restriction: Seniors only.

(Ib)**BIO SCI 192. Topics in Biological Sciences Tutoring . 1-3 Units.**

Tutoring programs with biological sciences student peers.

Repeatability: May be taken for credit for 12 units.

Restriction: Students tutoring under School of Biological Sciences programs only.

BIO SCI 193A. Campus as a Living Lab I. 2-4 Units.

Students study sustainability concepts and theories and how they apply to our most pressing environmental, social, and economic challenges. Concurrently, they work on hands-on projects to improve the sustainability of campus operations and systems.

Grading Option: In Progress (Letter Grade with P/NP).

Restriction: Upper-division students only.

BIO SCI 193B. Campus as a Living Lab II. 2-4 Units.

Students study sustainability concepts and theories and how they apply to our most pressing environmental, social, and economic challenges. Concurrently, they work on hands-on projects to improve the sustainability of campus operations and systems.

Prerequisite: BIO SCI 193A

Restriction: Upper-division students only.

BIO SCI 193C. Campus as a Living Lab III. 2-4 Units.

Students study sustainability concepts and theories and how they apply to our most pressing environmental, social, and economic challenges. Concurrently, they work on hands-on projects to improve the sustainability of campus operations and systems.

Prerequisite: BIO SCI 193B

Restriction: Upper-division students only.

BIO SCI 194S. Safety and Ethics for Research. 1 Unit.

Introduces students to the concepts, techniques, and ethics involved in biological sciences laboratory work.

Grading Option: Pass/no pass only.

BIO SCI H195. Honors Topics in Biological Sciences. 4 Units.

Varied course topics in Biological Sciences designed for students in Honors in Biological Sciences.

Repeatability: May be taken for credit 2 times.

Restriction: Biological Sciences Honors students only.

BIO SCI 197. Special Study in Biological Sciences. 1-5 Units.

Individualized instruction dealing with conceptual or theoretical problems in the biological sciences, rather than technical problems.

Prerequisite: BIO SCI 94

Repeatability: May be repeated for credit unlimited times.

Restriction: Maximum of 5 units (per quarter) between BIO SCI 197, BIO SCI 198, and BIO SCI 199.

BIO SCI 198. Directed Group Studies. 1-5 Units.

Small group experimental laboratory or field work performed under the direction of a faculty member.

Prerequisite: BIO SCI 94

Repeatability: May be repeated for credit unlimited times.

BIO SCI 199. Independent Study in Biological Sciences Research. 1-5 Units.

Individual experimental laboratory or field research under a professor's direction. Required for participation in the Excellence in Research Program.

Prerequisite: BIO SCI 94

Repeatability: Unlimited as topics vary.

BIO SCI 199W. Research Writing. 1 Unit.

Development of research skills such as learning how to plan and conduct research experiments, read and analyze scientific journal articles, and practice presenting the data experiments and journal articles with an emphasis on scientific writing.

Prerequisite or corequisite: BIO SCI 199

(Ib)

BIO SCI 285. Topics in Allied Health Microbiology. 4 Units.

Basic microbiology with emphasis for allied health professions such as nursing. Emphasis is on micro-organisms involved in human health, disease and food safety.

Prerequisite: BIO SCI 98

Repeatability: May be taken for credit for 4 units as topics vary.

Overlaps with BIO SCI M122, BIO SCI M118L.

Restriction: Program in Nursing Science students only. Master of Nursing Degree students only.