

# BIOLOGY

College of Natural and Behavioral Sciences  
Department of Biology

## Program Description

The Biology Program at CSU Dominguez Hills is designed to provide students with intensive, progressive and balanced learning experiences in cell and molecular biology, organismal biology, population and community biology, and environmental science.

The Biology Department offers students eight programs from which to choose:

1. An undergraduate program which awards the Bachelor of Arts Degree;
2. Three undergraduate major options that award the Bachelor of Science Degree: a Cellular and Molecular Biology Option, an Ecology and Environmental Biology Option and a Microbiology Option;
3. Two minor programs: a General Minor and a Microbiology Minor;
4. A Biological Science Subject Matter Preparation Program for students pursuing a secondary teaching credential;
5. A graduate program which awards the Master of Science Degree.

## Subject Matter Preparation Program

The Subject Matter Preparation Program is authorized by the California Commission on Teacher Credentialing. This course of study includes a number of prescribed courses that address proficiency standards for content knowledge required for the Single Subject credential in Biological Sciences. Interested students should contact the departmentally designated advisor for current information.

### Specific Biological Sciences Subject Matter Authorization (32 units)

Holders of a Single Subject or Multiple Subject credential issued by the California Commission on Teacher Credentialing may secure an additional Specific Biological Sciences Subject Matter Authorization that allows the holder to teach the specific subjects in grades preschool, K-12, and classes organized primarily for adults.

For other requirements governing the issuance of this authorization, consult the Teacher Education section of this catalog or contact the College of Education Student Services Center.

## Features

The most important feature of the Biology Department is its excellent faculty, of which all full-time and most part-time members hold a doctoral degree. They are dedicated to excellence in teaching and are active in basic and applied research and other scholarly activities. The department currently has more than \$1.5 million in private foundations, federal and international research grants. Another attractive feature of the department is its small class size. This allows students to interact frequently and effectively with instructors both within and outside of class. It also permits instructors to easily identify students in need of additional assistance and to supply such assistance.

The Biology Department's teaching and research facilities are modern and well equipped. Special facilities and equipment that are available for student use include a tissue culture laboratory, a next-generation sequencer, a greenhouse and a nature preserve. In addition to on-campus

facilities, students may study marine biology and desert biology using facilities available in the Southern California Ocean Studies Institute and the Desert Studies Consortium. Excellent computer and library facilities also are available.

Since the Biology faculty maintain several diverse research programs that are well supported by public and private funds, the department can provide both undergraduate and graduate students with opportunities to actively participate in research. Biology students have been successful, not only in conducting research, but in presenting reports at scientific meetings, publishing their findings, and receiving national recognition for the high quality of their work.

## Academic Advisement

The Biology Department requires that each semester prior to or during registration, undergraduate and graduate students meet with their biology advisor to review their progress, select new courses, update their departmental advisement file, explore career options, and to discuss any issues they may have encountered.

## Preparation

Students planning to enter the biology program directly from high school should prepare by completing four years of English, including composition; algebra, geometry, trigonometry, and pre-calculus if available; and at least one year each of biology, chemistry, and physics.

Students transferring from a community college should have completed one semester of statistics, one semester of calculus, one year of introductory biology and one year of general chemistry.

## Graduation with Honors

An undergraduate student may be a candidate for graduation with Honors in Biology provided the following criteria are satisfied:

1. A minimum of 36 units in residence at CSU Dominguez Hills;
2. A minimum grade point average of 3.5 in all courses used to satisfy the upper-division requirements in the major.

Students who achieve Honors in Biology will have the information recorded on their transcripts and diplomas.

## Pre-Health Professions in Biology

Students who choose a career in the health professions, e.g. medicine, pharmacy, dentistry, physician assistant, veterinary medicine, etc. must satisfy certain prerequisites for entry into programs that offer those degrees. Students interested in a healthcare career often chose biology as their major since many of the prerequisites are required courses in biology; however, a pre-health student may declare any major if the prerequisites are met. Regardless of major, students choosing to become a health professional are highly recommended to meet with a CSUDH Pre-Health Advisor. Currently these individuals are Dr. HK Choi and Professor Nancy Roback (Chemistry).

In general, the courses required for many of these programs include General Biology (BIO 120 and BIO 121 Principles of Biology I with Lab/ BIO 122 and BIO 123 Principles of Biology II with Lab), General Chemistry (CHE 110 General Chemistry I/CHE 112 General Chemistry II), Organic Chemistry (CHE 310 and CHE 311 Organic Chemistry I with Lab/CHE 312 and CHE 313 Organic Chemistry II with Lab) and Physics (PHY 120 Elements Of Physics I/PHY 122 Elements Of Physics II). Most programs

have their unique requirements, so individual review of all prerequisites is recommended. For example, medical schools strongly recommend one semester of biochemistry (CHE 450 Biochemistry I) in addition to the prerequisites listed above, whereas other programs, such as pharmacy school, may require two semesters of biochemistry with laboratory. Due to the variation of prerequisites at different institutions, students are advised to work closely with Pre-Health advisors.

In addition to the prerequisite courses, most programs require other components for their application, e.g.

1. a standardized test such as the MCAT, DAT, OAT, etc.;
2. GPAs, both the overall and BCPM (biology, chemistry, physics and math);
3. a personal statement;
4. letters of recommendation;
5. experience associated with the eventual health profession, e.g. some exposure to clinical situations such as volunteering, internships, etc.

To schedule a career advising appointment with a Pre-Health advisor, contact the Biology Office at 310-243-3381.

## Career Possibilities

A student in the Biology Department will be prepared to pursue a variety of career opportunities, depending on the curricular program chosen. An undergraduate major may choose any of the options. The Cellular and Molecular Biology Option can fulfill the major entrance requirements for professional schools of medicine, dentistry, veterinary medicine, pharmacy, optometry, podiatry and medical technology, or prepare the student for further graduate study in biology. Biology graduates from CSU Dominguez Hills have competed successfully for admission to professional and graduate schools in California and elsewhere. Students also may use the Cellular and Molecular Biology Option to prepare for careers in teaching, research, government, academia or the biotechnology industry. The Ecology and Environmental Biology option will prepare students for graduate studies or careers with federal, state, and local agencies, non-governmental organizations (NGOs) and consultants, and careers in teaching, among others. The Microbiology Option provides training in microbiology, medical microbiology, immunology and related courses (virology, mycology and parasitology) for students interested in a career in applied biology, biomedical research or allied fields.

Students may prepare for a career in teaching science at the secondary level (junior high or high school) by completing an approved "Subject Matter Preparation Program." Completion of such a program is the first step in meeting the state requirements for a teaching credential. Interested students should consult the departmentally designated advisor for current information.

The Master of Science program in Biology will provide students with an in-depth background suitable for pursuing a career in biological research, teaching or in a related field such as public health, psychology and human services. Students may develop a program of courses and research that is tailor-made to their individual needs within the areas of expertise of their advising faculty. The graduate program also can establish a strong foundation for training in medicine, dentistry, veterinary, pharmacy, and allied health professions, as well as doctorate programs.

## Undergraduate Programs

### Bachelors

- Biology, Bachelor of Arts (<https://catalog.csudh.edu/academics/biology/biology-ba/>)
- Biology, Bachelor of Science (<https://catalog.csudh.edu/academics/biology/biology-bs/>)

### Minors

- Biology, Minor (<https://catalog.csudh.edu/academics/biology/biology-minor/>)
- Microbiology, Minor (<https://catalog.csudh.edu/academics/biology/microbiology-minor/>)

## Graduate Programs

### Master

- Biology, Master of Science (<https://catalog.csudh.edu/academics/biology/biology-ms/>)

### Subject Matter Preparation

- Biology, Subject Matter Preparation (<https://catalog.csudh.edu/academics/biology/biology-subject-matter-preparation/>)

## Faculty

Helen Chun, Department Chair

Fang Wang, Graduate Program Coordinator

H.K. Choi, Karin Kram, Samantha Leigh, Charlene McCord, Terrence McGlynn, Sonal Singhal, Davood Soleymani, Eillen Tecle, Kathryn Theiss, Justin Valliere, Fang Wang

Department Office: SCI 229, (310) 243-3381

## Emeriti Faculty

David E. Brest, Lois W. Chi, Evelyn Tutt Childress, Robert V. Giacose, Carol Guze, Catherine Jacobs, Gene A. Kalland, Getachew Kidane, Richard

Kuramoto, Thomas Landefeld, Francis McCarthy, Laura M. Phillips, John Roberts, Laura Robles, John Thomlinson

## Courses

### BIO 101. Success for Biologists. (1 Units)

Co-requisite: CHE 108 is required. This course will introduce concepts and skills to help students successfully navigate STEM courses and the biology major. Study skills, resources, careers, and academic mindset will be discussed. Students will be asked to reflect on their own learning. Consent required.

Offered Fall, Spring

### BIO 102. General Biology. (3 Units)

Representative topics in modern biology, emphasizing the present state of knowledge and the major means whereby this knowledge is being expanded. Three hours of lecture per week.

Offered Fall, Spring

### BIO 103. General Biology Laboratory. (1 Units)

Prerequisite: BIO 102 (may be taken concurrently) Laboratory work and demonstrations in representative areas of modern biology. Emphasizes scientific methodology. Three hours of laboratory per week.

Offered Fall, Spring

**BIO 120. Principles of Biology I. (3 Units)**

Prerequisite: CHE 108 or satisfactory performance on General Chemistry Placement Test. CHE 110 is recommended. Co-requisite: BIO 121.

Introduction to basic biological concepts including biochemistry and macromolecules, the structure and function of cells, basic genetic principles, DNA replication, transcription and translation. Three hours of lecture per week.

Offered Fall, Spring

**BIO 121. Principles of Biology Laboratory I. (1 Units)**

Co-requisite: BIO 120. Laboratory investigations of the properties of biological molecules and cells, metabolism, and patterns of inheritance. Modern laboratory techniques and application of the scientific method are emphasized. Three hours of laboratory per week.

Offered Fall, Spring

**BIO 122. Principles of Biology II. (3 Units)**

Prerequisites: BIO 120 and BIO 121, CHE 108 or satisfactory performance on General Chemistry Placement Test. CHE 110 is recommended. Co-requisite: BIO 123. Introduction to basic biological concepts, including biology of prokaryotes, fungi, plants, invertebrates, and vertebrates, the anatomy and physiology of select organ systems. Three hours of lecture per week.

Offered Fall, Spring

**BIO 123. Principles of Biology Laboratory II. (1 Units)**

Laboratory investigations demonstrating the major properties of the animal kingdom, plant structure and reproduction, vertebrate organ systems and animal fertilization. Application of the scientific method is emphasized. Three hours of lab per week.

Offered Fall, Spring

**BIO 124. Principles of Biology III. (3 Units)**

Prerequisites: BIO 122 and BIO 123. Co-requisite: BIO 125. Introduction to basic concepts of evolution and ecology, including Darwinian evolution, biogeography, biodiversity, genomics, biomes, coevolution, and population, community, ecosystem, landscape, behavioral ecology. Three hours of lecture per week.

Offered Fall, Spring

**BIO 125. Principles of Biology Lab III. (1 Units)**

Co-requisite: BIO 124. Fossils and stratigraphy, population genetics and ecology, field measurements in ecology and field trips to local ecosystems. Three hours of laboratory per week.

Offered Fall, Spring

**BIO 190. Introduction to Marine Life. (3 Units)**

General aspects of marine biology including the principles of physical and biological oceanography, the biological processes of marine life and the ecology of marine environments.

Offered As needed

**BIO 194. Independent Study. (1-3 Units)**

Academic work that may include library, field, or laboratory work. A contract must be signed by the student and supervising faculty. Credit in this course is contingent upon completion of a final assignment representing the work accomplished. Not more than three units may be applied toward the Biology major or minor. Repeatable course.

Offered As needed

**BIO 195. Special Topics in Biology. (3 Units)**

Introductory course of special interest in Biology for entry level students. Topic and content will vary as announced. Two to three hours of lecture per week. Not open for credit toward the Biology major.

Offered Infrequent

**BIO 214. Embryology. (2 Units)**

Offered All terms

**BIO 220. Molecular Biology. (3 Units)**

Prerequisites: BIO 120, BIO 121, BIO 122, BIO 123 and CHE 110. Co-requisite: BIO 221. Principles of molecular biology including DNA replication, transcription, translation, DNA recombination and repair and gene regulation. Emphasis on prokaryotic and eukaryotic systems. Three hours of lecture per week.

Offered Fall, Spring

**BIO 221. Molecular Biology Laboratory. (1 Units)**

Co-requisite: BIO 220. Basic laboratory techniques used in molecular biology, including DNA recombination, cDNA synthesis, PCR, transfection, gel electrophoresis, protein purification, immunoblotting. Required laboratory reports. Three hours of laboratory per week.

Offered Fall, Spring

**BIO 250. Elem Hum Anat & Physiol. (3 Units)**

Prerequisite: BIO 102 or equivalent or BIO 120 or equivalent. Basic principles of anatomical structure and physiological processes of human organ systems. Not open for credit toward the Biology major. Three hours of lecture per week.

Offered Fall, Spring, All terms

**BIO 251. Elem Hum Anatomy Phys Lab. (1 Units)**

Co-requisite: BIO 250. Laboratory work and demonstration in the anatomical structure and processes occurring in man. Not open for credit toward the Biology major. Three hours of laboratory per week.

Offered Fall, Spring

**BIO 254. Human Biology. (3 Units)**

Prerequisite: BIO 102 or equivalent. Biological aspects of humans with emphasis on structure and function of organ systems. Additional topics may include human origins, diseases, and health aspects of human genetics and the environment. Not open for credit towards the Biology major. Three hours of lecture per week.

Offered Fall

**BIO 310. Plant Physiology. (3 Units)**

Prerequisites: BIO 124, BIO 125. Co-requisite: BIO 311. An introduction to cell metabolism in plants. Topics include photosynthesis, respiration, amino acid synthesis and lipid metabolism. Physiology of plants, including hormones, photoperiodism and circadian rhythms, will also be covered. Three hours of lecture per week.

Offered Spring

**BIO 311. Plant Physiology Laboratory. (1 Units)**

Co-requisite: BIO 310. Associated laboratory to BIO 310. Topics include photosynthesis, respiration, amino acid synthesis and lipid metabolism. Physiology of plants, including hormones, photoperiodism and circadian rhythms, will also be covered. Three hours of laboratory per week.

Offered Spring

**BIO 312. Animal Physiology. (3 Units)**

Prerequisites: BIO 124, BIO 125. Co-requisite: BIO 313. Introduction to comparative animal physiology with emphasis on the vertebrates. Topics include gas exchange, circulatory function, digestion temperature regulation, metabolism, osmoregulation and excretion. Three hours of lecture per week.

Offered Fall

**BIO 313. Animal Physiology Laboratory. (1 Units)**

Co-requisite: BIO 312. Laboratory work and demonstration of the principles on how physiological systems work in normal and stressed conditions. Exercises coordinate with and reinforce material presented in BIO 312. Three hours of laboratory per week.  
Offered Fall

**BIO 314. Developmental Biology. (3 Units)**

Prerequisites: BIO 124, BIO 125, and BIO 220 required. Co-requisite: BIO 315 required. Students will discuss developmental events from gametogenesis through organogenesis in a variety of animal models. The cellular and molecular mechanisms controlling development will be explored. We will also discuss how intrinsic and extrinsic factors can alter the developmental outcomes, which might lead to developmental defects and diseases.  
Offered Spring

**BIO 315. Developmental Biology Lab. (1 Units)**

Co-requisite: BIO 314. Laboratory work and examination of the developmental anatomy in the frog and chick embryos, fertilization and early development of sea urchin and isolation of chick muscle, organs and whole embryos. Three hours of laboratory per week.  
Offered Spring

**BIO 320. Cell Biology. (3 Units)**

Prerequisite(s): BIO 220, BIO 221 and one of CHE 310 & CHE 311 or CHE 300 & CHE 301 or CHE 316 & CHE 317. This course is an upper division course designed to introduce you to a variety of topics in cell biology. We will learn the fundamentals of cell structure and cell function. Topics will include cell membrane, organelle function, cytoskeleton, cell signaling, extra cellular matrix, cell-cell interactions, cell cycle and apoptosis.  
Offered Fall, Spring

**BIO 324. Microbiology with Clinical Applications. (3 Units)**

Prerequisite: BIO 122, BIO 123; CHE 300, CHE 301 or CHE 310, 311, or CHE 316, CHE 317; Corequisite: BIO 325. The morphology, physiology, genetics and classification of microorganisms; applied aspects of microbiology. Basic bacteriological techniques included in the laboratory. Three hours of lecture per week.  
Offered Fall

**BIO 325. Microbiology with Clinical Applications Laboratory. (1 Units)**

Co-requisite: BIO 324. Use of basic bacteriological techniques, including correct use of compound microscope, standard staining for microorganism identification, routine aseptic inoculations and culturing microbes. Three hours of laboratory per week.  
Offered Fall, All terms

**BIO 326. General Microbiology. (3 Units)**

Prerequisites: BIO 124, BIO 125, BIO 220, CHE 112 are required. BIO 221, CHE 310, and CHE 311 are recommended. Co-requisite: BIO 327 is required. Introduction to the biology of microorganisms. The course examines microbial structure, metabolism, genetics, and growth, and will discuss microorganisms in different ecological environments and their role in pathogenicity. Three hours of lecture per week.  
Offered Fall, All terms

**BIO 327. General Microbiology Laboratory. (1 Units)**

Prerequisites: BIO 124, BIO 125, BIO 220 and CHE 110 are required. Co-Requisites: BIO 326 is required. This laboratory course will introduce microbiology research and testing methods, including establishing experimental design. Basic techniques are emphasized, such as sterile techniques, culturing and microscopy. Students will be using methods to identify unknown microorganisms. Three hours of laboratory per week.  
Offered Fall

**BIO 330. Botany. (3 Units)**

Prerequisites: BIO 124 and BIO 125 are required. Co-requisite: BIO 331 is required. An introduction to plant biology. Topics include anatomy and morphology, the evolution of land plants, and basic ecology. There will be a special focus on plant reproduction. Three hours of lecture per week.  
Offered All terms, Fall

**BIO 331. Botany Laboratory. (1 Units)**

Prerequisite: BIO 124 and BIO 125 are required. Co-requisite: BIO 330 is required. Laboratory work to examine plant cells and tissues, diversity of land plants, and plant ecology. Emphasis includes phylogenetics, floral evolution, and Southern California ecology. Three hours of laboratory per week.  
Offered Fall

**BIO 332. Ecology. (3 Units)**

Prerequisites: BIO 124, BIO 125. Co-requisite: BIO 333. Concepts in ecology including energy flow, biogeochemical cycles, community structure, succession, and population growth and interaction. Sampling techniques and use of ecological instrumentation learned in laboratory. Three hours of lecture per week.  
Offered Spring

**BIO 333. Ecology Laboratory. (1 Units)**

Co-requisite: BIO 332. Laboratory work demonstrating principles of ecology, specifically the physical environment, adaptations of individuals, populations, communities of plants and animals, ecosystem, evolutionary ecology, biodiversity and biogeography, and interactions of human beings with the environment. Three hours of laboratory per week.  
Offered Spring

**BIO 336. Environmental Biology. (3 Units)**

Prerequisite: BIO 102 or BIO 122 is required. Principles of ecology applied to contemporary environmental problems. Emphasis is placed upon human impact in Southern California. One day (18 hour) field trip is required. Not open for credit toward the Biology major.  
Offered Spring

**BIO 340. Genetics. (3 Units)**

Prerequisites: BIO 124, BIO 125, BIO 220, MAT 131. CHE 310 and CHE 311 or CHE 316 and CHE 317 are recommended. Principles of heredity, gene expression at the molecular and organismic levels, variation and mutation. Three hours of lecture per week.  
Offered Fall, Spring

**BIO 342. Cell And Genetics Lab. (1 Units)**

Prerequisite: BIO 220 and BIO 221. An introduction to modern techniques of biological research on cell biomolecules and genetics, with emphasis on microscopy, protein isolation and characterization, enzyme activity, electrophoresis of biomolecules, transformation and PCR. Three hours of laboratory per week.  
Offered Fall, Spring

**BIO 346. Human Heredity. (3 Units)**

Prerequisite: BIO 102 or equivalent. Introduction to human genetics, including human reproduction. Mendelian inheritance, chemical basis of gene action, mutation, and eugenics. Not open for credit toward the Biology major or to students with credit in BIO 340.  
Offered Infrequent



**BIO 360. Marine Biology. (3 Units)**

Introduction to the biology of marine life. Includes a review of common marine organisms and their taxonomic placement. Also includes an ecological perspective on marine planktonic, nektonic, and benthic communities with emphasis on the intertidal habitats of Southern California.

Offered Fall

**BIO 361. Marine Biology Laboratory. (1 Units)**

Co-requisite: BIO 360. The laboratory is devoted to learning the plants and animals common to each of a variety of local marine habitats. Several field trips are required. Transportation to field sites is the responsibility of each student. Three hours of laboratory or field work per week.

Offered Fall

**BIO 370. Bio Basis Human Behavior. (3 Units)**

Prerequisite: BIO 102 or equivalent. Biological structure and function as it relates to human behavior. Emphasis on the structure of the central and peripheral nervous systems, sensory systems, neurotransmission, endocrine system and hormones, genetic influences, neuropharmacology and the impact of disease on human behavior. Not open for credit toward the Biology major.

Offered Spring

**BIO 374. Drug Abuse. (3 Units)**

Prerequisite: BIO 102 or equivalent. Introduction to the problem of drug abuse. The action of commonly abused drugs on the human nervous system will be examined including the physiological and behavioral effects which are produced. Not open for credit toward the Biology major.

Offered Fall, All terms

**BIO 380. Biology of Childhood and Adolescence. (3 Units)**

Prerequisite: BIO 250 or BIO 254. The physiology of growth and development through the second decade of life; reproductive maturation and the hormonal regulation of puberty; common illnesses, growth disorders and health hazards, including a brief introduction to venereal diseases and drug abuse. Not open for credit toward the Biology major.

Offered Infrequent, All terms

**BIO 386. Human Aging. (3 Units)**

Prerequisite: BIO 250 or BIO 254. The effects of aging on the structure and physiology of the human body and the effects of drugs used in the treatment of the elderly. Not open for credit toward the Biology major.

Offered As needed

**BIO 394. Independent Study. (1-3 Units)**

Prerequisite: BIO 124, BIO 125. Advanced library, field or laboratory work. A contract must be signed by the student and supervising faculty. Credit in this course is contingent upon completion of a written report of work accomplished. Not more than three units may be applied toward the Biology major or minor. Repeatable course.

Offered Fall, Spring

**BIO 395. Special Topics In Biology. (2-3 Units)**

Prerequisites: BIO 102 or equivalent or consent of instructor. Courses of special interest in Biology for students not majoring in the field. Topic and content will vary as announced. Not open for credit toward the Biology major. Repeatable course. Two or three hours of lecture per week.

Offered As needed

**BIO 412. Comparative Vert Biology. (4 Units)**

Prerequisites: BIO 124, BIO 125 and BIO 312, BIO 313. Vertebrate evolution, classification and ecology and adaptive morphology will be investigated through observations of behavior, study of fossils, and comparative anatomy dissections. Three hours of lecture and three hours of laboratory per week. Several field trips, including one or more weekend trips required.

Offered Infrequent

**BIO 416. Landscape Ecology. (3 Units)**

Interrelationships among ecosystems in space and time. How abiotic, biotic, and historical factors and disturbance combine to shape present-day landscapes. Use of computer technologies, such as remote sensing and geographic information systems, to study landscape characteristics.

Offered Spring

**BIO 419. Histotechnique Laboratory. (2 Units)**

Co-requisite: BIO 420. Preparation of normal and abnormal tissues for microscopic study. Methods of preparation of tissues for sectioning with paraffin and freezing microtomes. Methods of fixation, dehydration, infiltration, embedding and sectioning tissues. Application of different stains on tissues. Six hours of laboratory per week.

Offered Spring

**BIO 420. Histotechnique. (2 Units)**

Prerequisite: BIO 122, BIO 123. Co-requisite: BIO 419. Preparation of tissues for microscopic study, with emphasis on paraffin embedding and staining. Two hours of lecture per week.

Offered Spring, All terms

**BIO 421. Advanced Molecular Biology. (3 Units)**

Prerequisites: BIO 220, BIO 221, BIO 320, BIO 340, BIO 342, CHE 310 and CHE 311. Recombinant DNA techniques used in the study of genome organization and gene structure, expression and regulation; emphasis on eukaryotic cells. One hour of lecture and six hours of laboratory per week.

Offered Fall

**BIO 422. Histology. (3 Units)**

Prerequisites: BIO 122 and BIO 123 are required. Co-requisite: BIO 424. Microscopic study of the structure and function of cells and tissues and their integration into organs. Three hours of lecture per week.

Offered Spring

**BIO 423. Cell Fine Structure. (3 Units)**

Prerequisite: BIO 320 or BIO 422 and BIO 424. Structure and function of eucaryotic sub-cellular constituents at the light and electron microscopic and biochemical level.

Offered Infrequent, All terms

**BIO 424. Histology Laboratory. (1 Units)**

Co-requisite: BIO 422. Microscopic study of the structure and function of cells and tissues and their integration into organs. Three hours of laboratory per week.

Offered Spring

**BIO 425. Medical Bacteriology. (2 Units)**

Prerequisites: BIO 324, BIO 325, CHE 310, CHE 311 or CHE 316, CHE 317. Co-requisite: BIO 435. Characteristics of bacterial agents in human disease emphasizing host-parasite relationships, epidemiology and infection control. Two hours of lecture per week.

Offered Spring

**BIO 426. Immunology. (3 Units)**

Prerequisites: BIO 320 or BIO 340; BIO 342 is recommended. Co-requisite: BIO 436. Principles of immunology. Emphasis on the cellular and molecular nature of antigens and immunoglobulins; immunobiology; laboratory immunoassays. Three hours of lecture per week. Offered Fall

**BIO 427. Clinical Mycology. (3 Units)**

Prerequisites: BIO 324 and BIO 325. BIO 425 and BIO 435 are recommended. Comparative morphology, physiology and pathogenicity of medically important fungi. Laboratory methods for identification emphasize interpretation and evaluation of results including the recognition of contaminating or opportunistic organisms. Two hours of lecture and three hours of laboratory per week. Offered Infrequent

**BIO 428. Virology. (3 Units)**

Prerequisites: BIO 320, CHE 300, CHE 301 or CHE 310, CHE 311, or CHE 316, CHE 317. The anatomy, biochemistry, physiology and pathogenesis of bacterial and animal viruses emphasizing virus diseases of humans. Topics include structure, classification, theory and practical aspects of growth, purification and identification, host-virus interactions, tumor viruses and antiviral agents. Three hours of lecture per week. Offered Fall

**BIO 430. Comp BIO: Phlogenetics. (3 Units)**

Prerequisites: BIO 124, BIO 125 and BIO 340. BIO 332 is recommended. Strategies for rigorous comparisons of different species: Permissions (legal), collection, identification (diagnosis), taxonomy, maintenance-alive and preserved, character state description, phylogenetic analysis and biogeography. Two hours of lecture and three hours of laboratory per week. Offered Infrequent

**BIO 435. Medical Bateriaology Laboratory. (2 Units)**

Co-requisite: BIO 425. Laboratory methods used. Medical bacteriology, including detection, isolation and identification of medically important bacteria. Six hours of laboratory per week. Offered Spring

**BIO 436. Immunology Laboratory. (1 Units)**

Co-requisite: BIO 426. Principles of immunology. Emphasis on the cellular and molecular nature of antigens and immunoglobulins; immunobiology; laboratory immunoassays. Three hours of laboratory per week. Offered Fall

**BIO 440. Molecular Genetics. (3 Units)**

Prerequisite(s): BIO 340 and BIO 320 or concurrent enrollment in BIO 320. Genome structure in relation to control of gene expression in prokaryotic and eukaryotic cells; interplay between genes and regulatory reactions that control development. Topics include antibody diversity, neoplastic transformation by oncogenes, and pattern formation. Three hours of lecture per week. Offered Spring

**BIO 442. Human Genetics. (3 Units)**

Prerequisites: BIO 320 and BIO 340. BIO 440 is recommended. Principles of human genetics including cytogenetics, Mendelian inheritance, pedigree construction, complex patterns of inheritance, biochemical defects, gene mapping, hemoglobinopathies, molecular genetics, prenatal diagnosis and gene therapy. Three hours of lecture per week. Offered Infrequent

**BIO 450. Evolution. (3 Units)**

Prerequisite(s): BIO 124 and BIO 340 required. Explores how modern approaches to studying evolution are teaching us new and surprising things about how evolution works and its power to help explain patterns in the natural world. This course is a paper-based, discussion-based course. Offered Fall

**BIO 452. Minority Health Disparities. (3 Units)**

Prerequisite: BIO 220 is required. BIO 320 is recommended. This course deals with the issue of minority health disparities from the many possible courses and treatments to ways to address this problem in the future. Offered Spring

**BIO 453. Endocrinology. (3 Units)**

Prerequisites: BIO 220 is required. The role of endocrine glands and tissues in metabolic regulation, environmental adjustment, reproduction, and development of vertebrates, with emphasis on mammals. Three hours of lecture per week. Offered Spring

**BIO 458. Human Parasitology. (3 Units)**

Prerequisites: BIO 122 and BIO 123. Co-requisite: BIO 459. Physiological aspects of parasites in man, their symbiotic host and parasite relationships and clinical diagnostic techniques. Three hours of lecture per week. Offered Fall

**BIO 459. Human Parasitology Laboratory. (1 Units)**

Co-requisite: BIO 458. Physiological aspects of parasites in man, their symbiotic host and parasite relationships and clinical diagnostic techniques. Three hours of laboratory per week. Offered Fall

**BIO 483. Human Physiology. (3 Units)**

Prerequisites: BIO 312 or BIO 320. Advanced lecture and discussion of the functional activities occurring in the human organ systems. Offered Spring

**BIO 490. Senior Project. (3 Units)**

Prerequisites: Senior standing and department consent; completion of general education requirements, lower division major requirements and BIO 340. Students will engage in biological writing for diverse audiences including writing for other biologists and the general public. Synthesis of biological literature, data presentation, and the importance of biology to society will be addressed. A grade of C or better in this course fulfills the GWAR requirement for all Biology majors and minors. Offered Fall, Spring, All terms

**BIO 491. Seminar in Biological and Biomedical Research. (1 Units)**

Prerequisite: Permission by professor. Current topics in biological and biomedical research presented by CSUDH faculty and prominent scientists from throughout the country. CR/NC grading. Repeatable for up to 2 units. Offered Fall, Spring

**BIO 495. Selected Topics in Biology. (2-3 Units)**

Prerequisite: BIO 124 and BIO 125. Advanced course of special interest for students majoring in Biology. May include laboratory exercises. Topic and content will vary as announced. Repeatable course. Two to three hours of lecture per week. Offered As needed

**BIO 496. Internship in Biology. (3 Units)**

Prerequisites: BIO 124 and BIO 125 are required. BIO 332 and BIO 333 are recommended. This course is available as an elective in the BS in Biology: Ecology and Environmental Biology option only. Supervised internship in ecological setting off campus. A maximum of three units may be applied towards the Biology major.

Offered Fall, Spring

**BIO 498. Directed Research in Biology. (3 Units)**

Prerequisites: BIO 124 and BIO 125 are required. BIO 332 and BIO 333 are recommended. This course is available as an elective in the BS in Biology: Ecology and Environmental Biology option only. The class is intended to allow students to receive ecological research experience off-campus. A maximum of three units may be applied towards the Biology major.

Offered Fall, Spring

**BIO 501. Biological Literature. (3 Units)**

Prerequisite: Fulfillment of the Graduation Writing Requirement (GWAR). Standard forms of presentation of scientific research, including research articles, review papers, abstracts, poster and oral presentations. Sources of biological literature and contemporary literature search skills as well as data presentation formats and technical writing conventions will be addressed. Three hours of lecture per week.

Offered Spring

**BIO 502. Biostatistics. (3 Units)**

Prerequisite: MAT 131 or MAT 171 or MAT 191 or equivalent. Application of statistical analyses to biological research with emphasis on experimental design. Analysis of variance, regression and correlation will be the primary topics. Three hours of lecture per week.

Offered Fall

**BIO 503. Biological Instrumentation. (3 Units)**

Introduction to the operation and application of common instruments used in biological research. Emphasis on those instruments available for graduate research. Two hours of lecture and two hours of activity per week.

Offered Infrequent

**BIO 504. Research Techniques in Biology. (3 Units)**

Introduction to how research is conducted and how to avoid the major pitfalls that can beset researchers. Ethical conduct of research, permits and permissions, important laboratory and field techniques, preparation for a PhD program. Three hours of lecture per week.

Offered Fall

**BIO 510. Urban Environmental Science. (3 Units)**

Overview of environmental science. Problems specific to urban context. Pollution of air, water, etc., land-use change, environmental conflicts. Hands-on analysis of environmental conditions in Los Angeles area.

Offered Spring

**BIO 516. Landscape Ecology. (3 Units)**

Prerequisites: BIO 124 and BIO 125 are required. BIO 332 and BIO 333 are recommended. Interrelationships among ecosystems in space and time. How abiotic, biotic, and historical factors and disturbance combine to shape present-day landscapes. Use of computer technologies, such as remote sensing and geographic information systems, to study landscape characteristics. Three hours of lecture per week.

Offered Fall

**BIO 520. Adv In Cell & Molecul Bio. (3 Units)**

Prerequisite: BIO 421 or BIO 440. Current developments in the structure and function of viruses, prokaryotic cells, and eukaryotic cells. Three hours of lecture per week. Repeatable for credit in biology master's program for up to six units.

Offered Spring

**BIO 522. Applied Biotechnology Skills III. (3 Units)**

PABS Skills III is a graduate course for students in the PSM program. In this course, students will learn advanced molecular biology techniques including isolation of DNA and RNA, Southern and Northern blots, transcriptional profiling, and siRNA mediated gene silencing.

Offered Infrequent

**BIO 523. Electron Microscopy. (3 Units)**

Prerequisite: BIO 421. Theory and use of the electron microscopy preparation of tissue and photographic techniques. One hour of lecture and six hours of laboratory per week.

Offered Infrequent

**BIO 590. Graduate Seminar. (2 Units)**

Presentation and discussion of selected topics in Biological Science. A minimum of two and a maximum of four units may be applied toward the biology master's degree. The repeated courses must be taught by different instructors or must be on different topics. Two hours of seminar per week.

Offered Fall, Spring

**BIO 595. Grad Sel Topics Biology. (2-3 Units)**

Prerequisite: Consent of Department Chair. Advanced course of special interest to graduate students in Biology. Topic and content will vary as announced. Repeatable course. Two to three hours of lecture per week.

Offered As needed

**BIO 597. Directed Reading. (1-3 Units)**

Library research on a specific subject in biology. Topic for study to be approved and directed by instructor. Can be used to prepare for the comprehensive examinations or to formulate a research problem prior to enrollment in BIO 598 or BIO 599. A maximum of three units may be applied toward the master's degree. Repeatable course.

Offered Fall, Spring

**BIO 598. Directed Research. (1-3 Units)**

Laboratory research on a specific subject in biology. Topic of research to be approved and directed by an instructor. A maximum of three units may be applied toward the master's degree. Repeatable course.

Offered Fall, Spring

**BIO 599. Thesis. (1-4 Units)**

Laboratory research and writing of thesis for the master's degree. Topic of research to be approved by graduate advisor. A maximum of 9 units of BIO 597, 598 and 599 combined may be applied toward the master's degree. Open only to thesis option graduate students. Repeatable course.

Offered Fall, Spring

**BIO 600. Grad Continuation Course. (1 Units)**

Graduate students who have completed their course work but not their thesis, project, or comprehensive examinations, or who have other requirements remaining for the completion of their degree, may maintain continuous attendance by enrolling in this course. Signature of graduate program coordinator required.

Offered Fall, Spring