BIOLOGY (BIO) Courses

BIO 5001. Ethical Conduct in Research. (1-0) 1 Credit Hour.
Prerequisite: Graduate standing. This course provides a basic overview of the requirements for ethical conduct within the research laboratory. The grade report for this course is either "CR" (satisfactory completion) or "NC" (unsatisfactory completion). (Credit cannot be earned for both BIO 5001 and BIO 7413.) Course Fees: GS01 $30; LRS1 $5; STSI $5.

BIO 5033. Biotechnology Laboratory. (0-6) 3 Credit Hours.
Prerequisite: Graduate standing. Concurrent enrollment in BIO 5323 is strongly recommended for M.S. in Biotechnology students. An organized course offering an introduction to routine procedures employed in the modern research laboratory. Course Fees: GS01 $90; IUB1 $10; L001 $30; LRS1 $15; STSI $15.

BIO 5103. River Ecosystems. (3-0) 3 Credit Hours.
Prerequisite: Graduate standing in biology or environmental science, or consent of instructor. This course examines the physical, chemical, and biological factors that determine biodiversity and the distribution of freshwater ecosystems. Key ecological and hydrogeomorphology concepts and their application to environmental concerns are covered. Field trip required. (Same as ES 5113. Credit cannot be earned for both BIO 5103 and ES 5113.) Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5113. Microbial Genetics and Recombinant DNA. (3-0) 3 Credit Hours.
Prerequisites: BIO 2313, BIO 3513, and BIO 3713, or consent of instructor. This course covers recombinant DNA and various technologies that it has spawned. It also covers those aspects of microbial genetics that directly relate to recombinant DNA. (Formerly BIO 5373. Credit cannot be earned for both BIO 5113 and BIO 7543.) Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5193. Hands-On Scientific Learning. (0-6) 3 Credit Hours.
An introduction to the practical application of a variety of cell and molecular biology techniques. This course is intended to provide laboratory experience in selective aspects of modern biotechnology and their applications appropriate for Science Educators. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5213. Principles of Chemical Biology. (3-0) 3 Credit Hours.
Prerequisites: BIO 3513 and BIO 3813, or equivalents. The role of chemistry in prokaryotic and eukaryotic biological systems. Topics will cover the probing and controlling biological systems using chemical methods and the manipulation of biological systems via novel chemistries to advance fundamental knowledge which serve as a basis for translational approaches. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5233. Medicinal Plants. (3-0) 3 Credit Hours.
Prerequisite: Graduate standing in Biology or Chemistry. An overview of plant secondary metabolism, and the ethnobotany, biochemistry, and pharmacology of some of our most important plant-derived pharmaceuticals. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5243. Advanced Plant Ecology. (3-0) 3 Credit Hours.
Prerequisites: BIO 3283 and BIO 3292, or consent of instructor. A study of the major biomes of the world, including North America and Texas, and the factors that influence the development of these biomes. Special consideration is given to species interactions that lead to high and low density species. (Same as ES 5243. Credit cannot be earned for both BIO 5243 and ES 5243.) Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5273. Global Change Biology. (3-0) 3 Credit Hours.
Prerequisite: Graduate standing or consent of instructor. Historical, present-day and future predictions of global changes in biological communities and species will be examined. Gas exchange, mating systems, phenological changes, pollination and pollinators as well as other species interactions, species diversity and species distribution will be examined. Both intrinsic and extrinsic factors influencing the changes will be scrutinized. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5343. Proteins and Nucleic Acids. (3-0) 3 Credit Hours.
Prerequisite: BIO 3513 or equivalent. Protein sequences, domains, folding, proteomics, glycoproteins, protein-DNA interaction, RNA conformations. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5363. Microbial Genetics and Recombinant DNA. (3-0) 3 Credit Hours.
Prerequisites: BIO 2313, BIO 3513, and BIO 3713, or consent of instructor. This course covers recombinant DNA and various technologies that it has spawned. It also covers those aspects of microbial genetics that directly relate to recombinant DNA. (Formerly BIO 5373. Credit cannot be earned for both BIO 5363 and BIO 5373.) Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5423. Neuroanatomy. (3-0) 3 Credit Hours.
Prerequisite: Consent of instructor. The anatomy of the vertebrate nervous system. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5433. Neurophysiology. (3-0) 3 Credit Hours.
Prerequisite: BIO 3433 or an equivalent. The fundamentals of neurophysiology are presented from the cellular to the systems level. Course Fees: GS01 $90; LRS1 $15; STSI $15.
BIO 5443. Molecular Neurobiology. (3-0) 3 Credit Hours.  
Prerequisite: BIO 3433 or an equivalent. BIO 3513 or an equivalent recommended. An introduction to the biochemical basis of synaptic transmission, and the pathological changes in synaptic transmission associated with neurobiological diseases and disorders. (Formerly titled "Neurochemistry") Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5453. Neuroendocrinology. (3-0) 3 Credit Hours.  
Prerequisites: BIO 3433 and BIO 3813. Anatomical and molecular neurobiology of the endocrine hypothalamus and associated organs. Morphological, cell biological, and feedback mechanisms of endocrine regulation are emphasized. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5463. Reproductive Biology. (3-0) 3 Credit Hours.  
Prerequisite: Graduate standing in Biology. Mammalian reproduction including mechanisms involved in sexual differentiation, fertilization, and fetal development. Endocrine regulation and environmental influences with a focus on human reproduction. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5473. Developmental Neurobiology. (3-0) 3 Credit Hours.  
Prerequisite: BIO 3433 or consent of instructor. A study of the development of the nervous system, with an emphasis on neurogenesis, neuronal migration, growth factors, axonal guidance, and the role of neuronal activity in synapse stabilization. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5483. Computational Neuroscience. (3-0) 3 Credit Hours.  
Prerequisite: BIO 3433 or an equivalent. A non-mathematical approach to the computational functions of the brain, including sensory coding, neural control of movement, and the computational properties of neurons and neuronal networks. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5493. Cognitive Neuroscience. (3-0) 3 Credit Hours.  
Prerequisite: BIO 3433 (or PSY 3103) recommended, or consent of instructor. The biological foundations of mental phenomena, including perception, attention, learning, memory, language, motor control, and executive function, as well as functional specialization, development and plasticity, through various methodologies. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5503. Sensory Physiology. (3-0) 3 Credit Hours.  
Prerequisite: BIO 5433 or consent of instructor. Principles of sensory physiology, including sensory transduction and central processing of sensory information in vertebrate and invertebrate species. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5523. Enzymes. (3-0) 3 Credit Hours.  
Prerequisite: BIO 3513 or an equivalent. A study of enzyme structure and mechanism, inhibitors, cofactor, kinetics, and regulation. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5533. Human Electrophysiology. (3-0) 3 Credit Hours.  
Prerequisite: BIO 3433 (or PSY 3103) recommended, or consent of instructor. The electrophysiological basis of human behavior, with an emphasis on event-related brain potentials associated with cognitive function, perception and action. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5543. Pharmacology and Toxicology. (3-0) 3 Credit Hours.  
Prerequisite: Graduate standing in Biology. Mechanisms of action of major classes of therapeutic drugs. Clinical uses, drug comparisons, beneficial and adverse effects involved in clinical therapeutics. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5553. Toxicology. (3-0) 3 Credit Hours.  
Prerequisite: Graduate standing or consent of instructor. The molecular mechanisms by which varied environmental toxins impact human physiological systems will be presented, including the metabolic aspects involved in chemical biotransformation. Processes by which chemical exposures induce cancers and genetic and/or developmental anomalies will be addressed. Risk assessment, food production safety issues and biological aspects of regulatory toxicology will also be discussed. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5643. Bioinformatics and Computational Biology. (3-0) 3 Credit Hours.  
Prerequisites: BIO 2313 or an equivalent; enrollment in Biology Ph.D. program required, or permission of the Biology Department or instructor. Computational analysis of sequences, protein structures, and gene expression network on a large scale. Comparative genomics, functional genomics, and proteomics will also be covered. (Credit cannot be earned for both BIO 5643 and BIO 5623.) Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5663. Applications of Recombinant DNA Technology. (3-0) 3 Credit Hours.  
A course on recombinant DNA technology, concentrating on major DNA manipulation methods, including their use in vaccine and bioactive protein production, gene therapy, plant genetic engineering along with ethical and safety considerations. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5673. Analysis of Next Generation Sequence Data. (3-0) 3 Credit Hours.  
The course has two major goals: 1) A general understanding of next-generation sequencing technologies; 2) An understanding of the benefits in applying next generation sequencing technology for life sciences research. The emphasis will be on applications for microbial infectious diseases research. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5713. Ornithology. (3-0) 3 Credit Hours.  
A course covering various aspects of the biology of birds, including anatomy, physiology, systematics, evolution, behavior, ecology, and biogeography. Field trips may be included. (Same as ES 5763. Credit cannot be earned for both BIO 5713 and ES 5763.) Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5733. Advanced Medical Mycology. (3-0) 3 Credit Hours.  
Prerequisites: BIO 3522 and BIO 3722. This course is a comprehensive study of the etiological agents and host factors that lead to fungal disease in humans. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5743. Advanced Virology. (3-0) 3 Credit Hours.  
Prerequisite: Graduate standing in Biology. A detailed study of the diversity of viruses and biochemical mechanisms for their replication. (Formerly titled "Biochemical Virology") Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5753. Conservation Biology. (3-0) 3 Credit Hours.  
The class topics will include the nature of the biosphere, threats to its integrity, and ecologically sound responses to these threats. Also included will be the origin and preservation of biotic diversity, how the rich variety of plant and animal life arose, how it has been maintained by natural processes, and how its destruction can be prevented. (Same as ES 5753. Credit cannot be earned for both BIO 5753 and ES 5753.) Course Fees: GS01 $90; LRS1 $15; STSI $15.
BIO 5762. Fundamentals of Immunology for Biotechnology. (2-0) 2 Credit Hours.
An integrated examination of the principles of immunology pertaining to the Biotechnology Industry. An emphasis on current immunological techniques, including: recombinant antibody, flow cytometry and elispot technology. Issues related to vaccine production and therapeutics will also be considered. Course Fees: GS01 $60; LRS1 $10; STSI $10.

BIO 5783. Introduction to Good Manufacturing Practices and Good Laboratory Practices. (3-0) 3 Credit Hours.
Review of FDA and U.S. Pharmacopeia regulations. Practical considerations for the implementation of GMP/GLP systems; data management and reporting, as well as problem solving and interpretive skills, will be emphasized. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5793. Wildlife Management. (3-0) 3 Credit Hours.
An introduction to wildlife management including ecological principles dealing with ecosystems, natural communities, and populations. The importance of animal behavior, the availability of food, cover, wildlife diseases, predators, hunting, and trapping will be included. Field trips may be included. (Same as ES 5773. Credit cannot be earned for BIO 5793 and ES 5773.) Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5833. Membrane Structure and Function. (3-0) 3 Credit Hours.
Prerequisite: BIO 3513 or an equivalent. A study of the composition, organization, transport functions, and permeability of natural and model membranes. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5873. Plant Biotechnology. (3-0) 3 Credit Hours.
Prerequisite: BIO 3513 or equivalent. BIO 5123 is recommended. The principles of plant physiology and genetics, and techniques used in plant modification, and principles of plant breeding and quantitative genetics as applied to plant biotechnology. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 5971. Directed Research. (0-0) 1 Credit Hour.
Prerequisites: Admission to either the Biology or Biotechnology Master's program or admission as a special graduate or non-degree-seeking student, and permission in writing (form available) of the instructor and the student's Graduate Advisor of Record. The directed research course may involve either a laboratory or a theoretical problem. May be repeated for credit, but not more than 6 hours, regardless of discipline, in combination with BIO 6951-3 (Independent Study), will apply to the Master's degree. Course Fees: GS01 $30; LRS1 $5; STSI $5.

BIO 5972. Directed Research. (0-0) 2 Credit Hours.
Prerequisites: Admission to either the Biology or Biotechnology Master's program or admission as a special graduate or non-degree-seeking student, and permission in writing (form available) of the instructor and the student's Graduate Advisor of Record. The directed research course may involve either a laboratory or a theoretical problem. May be repeated for credit, but not more than 6 hours, regardless of discipline, in combination with BIO 6951-3 (Independent Study), will apply to the Master's degree. Course Fees: GS01 $60; LRS1 $10; STSI $10.

BIO 5973. Directed Research. (0-0) 3 Credit Hours.
Prerequisites: Admission to either the Biology or Biotechnology Master's program or admission as a special graduate or non-degree-seeking student, and permission in writing (form available) of the instructor and the student's Graduate Advisor of Record. The directed research course may involve either a laboratory or a theoretical problem. May be repeated for credit, but not more than 6 hours, regardless of discipline, in combination with BIO 6951-3 (Independent Study), will apply to the Master's degree. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 6073. Medical Physiology. (3-0) 3 Credit Hours.
Prerequisites: Graduate standing or consent of the instructor. Key concepts of medical physiology will be described, to include ethnic health disparities, endocrinology, neurophysiology, autonomic function, muscle mechanics, cardiovascular, respiratory and renal physiology. Students will be expected to master the clinical pathophysiology of each key concept. In addition, the students will be expected to gain sufficient knowledge such that they can integrate multiple physiological systems and answer critical thinking questions on exams. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 6084. MCAT Preparation. (4-0) 4 Credit Hours.
Prerequisites: Graduate standing or consent of the instructor. This course will incorporate a comprehensive review of the biology and biochemistry of living systems, the chemistry and physics of biological systems, the psychology, sociology, and biology of behavior, and critical analysis and reasoning. The course will also contain student self-assessments and effective test taking strategies. Multiple practice MCAT's will be administered during the course. Course Fees: GS01 $120; LRS1 $20; STSI $20.

BIO 6133. Methods in Field Biology. (3-0) 3 Credit Hours.
Prerequisite: BIO 3283 or an equivalent. Examination of techniques to collect, identify, and preserve plants and animals. Field methods used in the analysis of populations and communities are considered. (Same as ES 6133. Credit cannot be earned for both BIO 6133 and ES 6133.) Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 6213. Advanced Ecology. (3-0) 3 Credit Hours.
Prerequisite: BIO 3283 or an equivalent. Interaction of organisms with their environment, allelopathy, competition, distribution, succession, and factors that control growth and dispersal. Special consideration is given to the concepts of climax, succession, and land management. (Same as ES 6213. Credit cannot be earned for both BIO 6213 and ES 6213.) Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 6233. Quantitative Biology. (3-0) 3 Credit Hours.
Prerequisite: Graduate standing or consent of instructor. An introduction of quantitative analysis of biological data and design of experiments. Topics include probability theory and distributions; descriptive statistics; hypothesis testing and confidence intervals for means, variances, and proportions; chi-square statistic; categorical data analysis; linear correlation and regression model; analysis of variance; and nonparametric methods. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 6313. Molecular Biology and Biophysics of Ion Channels. (3-0) 3 Credit Hours.
Prerequisites: BIO 5433 and BIO 5443, or permission of instructor. A study of the molecular composition and biophysical properties of ion channels. The course emphasizes three families of ion channels: voltage-gated, ligand-gated and metabotropically-stimulated channels. Their structure and function will be related to how ion channels mediate cellular actions in excitable cells. Course Fees: GS01 $90; LRS1 $15; STSI $15.
BIO 6323. Essentials of Biostatistics for Biotechnology. (3-0) 3 Credit Hours.
Basic, intermediate, and advanced (but not bioinformatics) statistical vocabulary, concepts, and methods commonly used in the biotechnology industry. A focus on tests for quality control and assurance of equipment and test systems to assess accuracy, precision, and bias related to test validations. Concepts and appropriate selections of test/study design using power analyses and estimations of sample sizes; also for clinical trials. Analytical calibration curves, frequency distributions, descriptive statistics, measures of central tendency and dispersion/error, probability, paired and unpaired, one-tailed and two-tailed t-tests, correlations, regression, one-way and two-way analysis of variance with repeated measures, parametric and nonparametric tests, post hoc tests for significance, reporting and interpretations of statistical results, validations of clinical tests for specificity, sensitivity, predictive values, likelihood ratios, receiver operating characteristic curves. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 6483. Animal Behavior. (3-0) 3 Credit Hours.
Prerequisite: BIO 3413 or consent of instructor. An examination of neural, endocrine, genetic, and environmental determinants of behavior. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 6513. Drug Development. (3-0) 3 Credit Hours.
This course will provide students with an overview of the early drug discovery process, including target identification, validation, assay development and high throughput screening up to pre-clinical trials. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 6543. Vaccine Development. (3-0) 3 Credit Hours.
Prerequisites: BIO 5762 and permission of instructor. This course will provide students with an overview of issues about the roles of vaccines in the control of infectious diseases, vaccine development, clinical trials and implementation of vaccine programs. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 6573. Microbial Pathogenesis. (3-0) 3 Credit Hours.
The student will gain an understanding of the cellular and molecular mechanisms by which eukaryotic and viral pathogens cause disease and the host immune responses against these pathogens. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 6803. Advanced Immunology and Immunochemistry. (3-0) 3 Credit Hours.
Prerequisite: BIO 4743 or consent of instructor. The study of current concepts of humoral and cell-mediated immunity, with emphasis on molecular mechanisms. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 6883. Bacterial Pathogenesis. (3-0) 3 Credit Hours.
Prerequisites: BIO 3713 and BIO 4743, or consent of instructor. This course will present a selection of topics in the field of bacterial pathogenesis. Lectures will cover regulation of virulence; colonization and host tissue damage; vaccines, antibiotics and novel antimicrobials; evasion of the immune system; intracellular pathogens; pathogenic mechanisms of Gram-negative and Gram-positive bacteria; pathogenic mycobacteriology; and experimental tools in bacterial pathogenesis. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 6951. Independent Study. (0-0) 1 Credit Hour.
Prerequisites: Graduate standing and permission in writing of the instructor and the student's Graduate Advisor of Record. Independent reading, research, discussion, and/or writing under the direction of a faculty member. For students needing specialized work not normally or not often available as part of the regular course offerings. May be repeated for credit, but not more than 6 hours, regardless of discipline, in combination with BIO 5971-3 Directed Research will apply to the Master's degree. Course Fees: GS01 $30; LRS1 $5; STSI $5.

BIO 6952. Independent Study. (0-0) 2 Credit Hours.
Prerequisites: Graduate standing and permission in writing of the instructor and the student's Graduate Advisor of Record. Independent reading, research, discussion, and/or writing under the direction of a faculty member. For students needing specialized work not normally or not often available as part of the regular course offerings. May be repeated for credit, but not more than 6 hours, regardless of discipline, in combination with BIO 5971-3 Directed Research will apply to the Master's degree. Course Fees: GS01 $60; LRS1 $10; STSI $10.

BIO 6953. Independent Study. (0-0) 3 Credit Hours.
Prerequisites: Graduate standing and permission in writing of the instructor and the student's Graduate Advisor of Record. Independent reading, research, discussion, and/or writing under the direction of a faculty member. For students needing specialized work not normally or not often available as part of the regular course offerings. May be repeated for credit, but not more than 6 hours, regardless of discipline, in combination with BIO 5971-3 Directed Research will apply to the Master's degree. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 6961. Comprehensive Examination. (0-0) 1 Credit Hour.
Prerequisite: Approval of the appropriate Graduate Program Committee to take the Comprehensive Examination. Independent study course for the purpose of taking the Comprehensive Examination. May be repeated as many times as approved by the Graduate Program Committee. Enrollment is required each term in which the Comprehensive Examination is taken if no other courses are being taken that term. The grade report for the course is either "CR" (satisfactory performance on the Comprehensive Examination) or "NC" (unsatisfactory performance on the Comprehensive Examination). Course Fees: GS01 $30; LRS1 $5; STSI $5.

BIO 6963. Critical Thinking & Writing for the Biological Sciences. (3-0) 3 Credit Hours.
Prerequisites: Consent of the instructor and of the Graduate Advisor of Record. This course introduces students to writing and critiquing research proposals, manuscripts, abstracts, and scientific presentations. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 6971-3. Directed Research. (3-0) 3 Credit Hours.
Prerequisites: Graduate standing and permission in writing of the instructor and the student's Graduate Advisor of Record. For students needing specialized work not normally or not often available as part of the regular course offerings. May be repeated for credit, but not more than 6 hours, regardless of discipline, in combination with BIO 5971-3 Directed Research will apply to the Master's degree. Course Fees: GS01 $60; LRS1 $10; STSI $10.

BIO 6973. Special Problems. (3-0) 3 Credit Hours.
Prerequisite: Consent of instructor. An organized course offering the opportunity for specialized study not normally or not often available as part of the regular course offerings. Special Problems courses may be repeated for credit when the topics vary, but not more than 6 hours, regardless of discipline, may be applied to the Master's degree. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 6983. Master's Thesis. (0-0) 3 Credit Hours.
Prerequisites: Permission of the Graduate Advisor of Record and thesis director. Thesis research and preparation. May be repeated for credit, but not more than 6 hours will apply to the Master's degree. Credit will be awarded upon completion of the thesis. Enrollment is required each term in which the thesis is in progress. Course Fees: GS01 $90; LRS1 $15; STSI $15.
BIO 7041. Biology Colloquium. (1-0) 1 Credit Hour.  
Prerequisite: Graduate standing. Oral presentations, discussions, critical evaluation of students’ research in progress, or discussions of current journal articles or reviews of recent scientific advances. May be repeated for credit. The grade report for this course is either “CR” (satisfactory participation in the colloquium) or “NC” (unsatisfactory participation in the colloquium). (Formerly BIO 5041. Same as ES 6941. Unless topic varies, credit cannot be earned for both BIO 7041 and ES 6941.) Course Fees: GS01 $30; LRS1 $5; STSI $5.

BIO 7051. Seminar in Life Sciences. (1-0) 1 Credit Hour.  
Prerequisite: Graduate standing. Formal presentations of research by outside authorities in the biological sciences. May be repeated for credit. The grade report for this course is either “CR” (satisfactory participation in the seminar) or “NC” (unsatisfactory participation in the seminar). Course Fees: GS01 $30; LRS1 $5; STSI $5.

BIO 7113. Supervised Teaching in Biology. (0-0) 3 Credit Hours.  
Prerequisite: Admission to candidacy for the Doctoral degree. Required course for Biology doctoral students. The student will be responsible for all aspects of leading a discussion section or laboratory course. Approval by the chair of the appropriate Doctoral Studies committee required. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 7143. Principles of Biological Scientific Writing. (3-0) 3 Credit Hours.  
Prerequisite: Graduate standing. This course will provide an overview of scientific grant and manuscript preparation. The class will be directed toward producing a Ph.D. dissertation proposal and a predoctoral fellowship application. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 7211. Doctoral Research. (0-0) 1 Credit Hour.  
Prerequisite: Admission to either the Neurobiology or Cell and Molecular Biology Doctoral program. May be repeated for credit, but no more than 52 hours may be applied to the Doctoral degree. Course Fees: GS01 $30; LRS1 $5; STSI $5.

BIO 7212. Doctoral Research. (0-0) 2 Credit Hours.  
Prerequisite: Admission to either the Neurobiology or Cell and Molecular Biology Doctoral program. May be repeated for credit, but no more than 52 hours may be applied to the Doctoral degree. Course Fees: GS01 $60; LRS1 $10; STSI $10.

BIO 7213. Doctoral Research. (0-0) 3 Credit Hours.  
Prerequisite: Admission to either the Neurobiology or Cell and Molecular Biology Doctoral program. May be repeated for credit, but no more than 52 hours may be applied to the Doctoral degree. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 7311. Doctoral Dissertation. (0-0) 1 Credit Hour.  
Prerequisites: Admission to candidacy for the Doctoral degree and completion of at least 18 semester credit hours of BIO 7211-3. May be repeated for credit. Course Fees: GS01 $30; LRS1 $5; STSI $5.

BIO 7312. Doctoral Dissertation. (0-0) 2 Credit Hours.  
Prerequisites: Admission to candidacy for the Doctoral degree and completion of at least 18 semester credit hours of BIO 7211-3. May be repeated for credit. Course Fees: GS01 $60; LRS1 $10; STSI $10.

BIO 7313. Doctoral Dissertation. (0-0) 3 Credit Hours.  
Prerequisites: Admission to candidacy for the Doctoral degree and completion of at least 18 semester credit hours of BIO 7211-3. May be repeated for credit. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 7563. Practicum in Biotechnology. (0-0) 3 Credit Hours.  
Prerequisites: Enrollment in Master's in Biotechnology program and at least 18 hours credit including satisfactory completion of BIO 5033 and one other organized laboratory course. An internship in a Biotechnology company. Must have approval of Biotechnology Graduate Studies Committee. Course Fees: GS01 $90; LRS1 $15; STSI $15.

BIO 7571. Experimental Techniques in Biology. (0-2) 1 Credit Hour.  
Prerequisite: Consent of instructor. Topics include research methods in cell and molecular biology, molecular neurobiology, and microbiology. May be repeated for credit as topics vary. (Formerly BIO 5571.) Course Fees: GS01 $30; LRS1 $5; STSI $5.

BIO 7572. Experimental Techniques in Biology. (0-4) 2 Credit Hours.  
Prerequisite: Consent of instructor. Topics include research methods in cell and molecular biology, molecular neurobiology, and microbiology. May be repeated for credit as topics vary. (Formerly BIO 5572.) Course Fees: GS01 $60; LRS1 $10; STSI $10.