## Biology Courses (BIOL)

### BIOL Courses

This is a list of courses with the subject code BIOL. For more information, see Biology (College of Liberal Arts and Sciences) in the Catalog.

**BIOL:1000 First-Year Seminar**  
1 s.h.  
Small discussion class taught by a faculty member; topics chosen by instructor; may include outside activities (e.g., films, lectures, performances, readings, visits to research facilities, field trips). Requirements: first- or second-semester standing.

**BIOL:1060 Big Ideas: Origins of the Universe, Earth, and Life**  
3 s.h.  
Origin of the universe, the biochemistry of life, and the origin of life on Earth; for non-science majors. Recommendations: first-year or sophomore standing. GE: Natural Sciences without Lab. Same as ASTR:1060, EES:1060.

**BIOL:1140 Human Biology: Nonmajors**  
4 s.h.  
Overview of molecular and cellular basis of human life; structure, function of human tissues, organs, organ systems; evolution, reproduction, genetics, impact of molecular biology and genetic engineering; integration of humans and the biosphere; lecture, laboratory. GE: Natural Sciences with Lab.

**BIOL:1141 Human Biology: Health Professions**  
4 s.h.  
Molecular and cellular basis of human life; structure, function of human tissues, organs, organ systems; evolution, reproduction, genetics, impact of molecular biology and genetic engineering; integration of humans and the biosphere; lecture, laboratory. Requirements: one year of high school chemistry. Recommendations: CHEM:1070. GE: Natural Sciences with Lab.

**BIOL:1251 How the Brain Works (and Why it Doesn't)**  
3-4 s.h.  
Introductory survey of neuroscience; structure and function of the brain; nature of consciousness; brain function in mental illness and degenerative disorders; genes and the mind; perception, sensation, memory, and emotions. Requirements: non-biology major. GE: Natural Sciences without Lab.

**BIOL:1260 Plants and Human Affairs**  
2-3 s.h.  
How plants are useful to people: food, clothing, shelter, medicines, psychoactive agents; plants' social, economic, ecological significance. GE: Natural Sciences without Lab.

**BIOL:1261 Introduction to Botany**  
4 s.h.  
Biology of plant life; emphasis on structure, function, reproduction, inheritance, diversity, evolution. Requirements: one year of high school chemistry. GE: Natural Sciences with Lab.

**BIOL:1295 Career Preparation and Life Design for Biology Majors**  
1 s.h.  
Exploration of career paths, employers, graduate programs; preparation for life after college; development of practical skills in job searching, writing, interviewing, and networking; for students who are unsure what they can do after graduation with a bachelor's degree in biology. Requirements: junior or senior standing.

**BIOL:1370 Understanding Evolution**  
3 s.h.  
Evolution and diversity of living things, their patterns on Earth, their organization in ecological systems; dynamics of evolutionary processes. GE: Natural Sciences without Lab.

**BIOL:1411 Foundations of Biology**  
4 s.h.  
Unifying concepts of living systems; emphasis on common properties and processes; chemical and cellular basis of life, genetics, and evolution. Prerequisites: CHEM:1110 with a minimum grade of C- or CHEM:1070 with a minimum grade of A-. GE: Natural Sciences with Lab.

**BIOL:1412 Diversity of Form and Function**  
4 s.h.  
Underlying unifying concepts of life; emphasis on diversity of living systems; the tree of life, cellular evolution, prokaryotic and eukaryotic diversity, plant and animal form and function; interactions among diverse forms of life and their environment. Prerequisites: BIOL:1411 with a minimum grade of C-. GE: Natural Sciences with Lab.

**BIOL:1808 Ways of Knowing Science**  
1 s.h.  
Science as a powerful way of knowing based on experimentation and observation of natural world; introduction to subdisciplines of scientific research; scope and methods of scientific research; questions that scientific research seek answers for; methods that scientists use to obtain answers to their questions; how science affects us personally and how it affects the rest of society; research seminars, discussion, and exploration.

**BIOL:2120 Good Genes Gone Bad: Genetic Disorders of Notable Celebrities**  
3 s.h.  
Introduction to a wide range of genetic disorders affecting notable celebrities; relevant genetic pathways in easy-to-understand language; exploration of mechanisms of disease and treatments. GE: Natural Sciences without Lab.

**BIOL:2211 Genes, Genomes, and the Human Condition**  
3 s.h.  
Organization, expression, and evolution of genes in context of genomes; focus on human genome; distribution and transmission of variation in human population. Prerequisites: BIOL:1411. Recommendations: BIOL:1412.

**BIOL:2246 Entomology Lab**  
4 s.h.  
Insects are the most species-rich and diverse of all animals; introduction to insect biology; emphasis on evolution, diversity, ecology, and morphology with some additional focus on physiology and behavior; students work in lab and field settings; memorization of entomological terms required; hands-on learning including how to employ various tools, techniques, and approaches used by professional entomologists, insect collecting and preservation, DNA extraction and sequencing, and analysis of evolutionary and ecological data. Prerequisites: BIOL:1412.

**BIOL:2254 Endocrinology**  
3 s.h.  
Production and effect of hormonal chemical messengers of secretory glands; emphasis on cell signaling in vertebrate systems; actions of hormones in regulating growth, physiology, and reproduction; organ to molecular levels. Prerequisites: BIOL:1411 and (BIOL:1412 or HHP:3500 or PSY:2701). Recommendations: CHEM:2210.

**BIOL:2374 Biogeography**  
3 s.h.  
Introduction to processes that lead to the patterns of plant and animal distributions we see across the globe; processes of focus include plate tectonics, climate, and human-ecological interactions; species management and conservation in relationship to climate and change in human patterns of environment. Prerequisites: BIOL:1141 or BIOL:1370 or BIOL:1261 or GEOG:1020 or BIOL:1412. Same as GEOG:2374.
BIOL:2512 Fundamental Genetics 4 s.h.
Nature, function of genetic material: classical, molecular, developmental aspects. Prerequisites: BIOL.1411 with a minimum grade of C- and (BIOL.1412 with a minimum grade of C- or PSY.2701 with a minimum grade of C-) and CHEM.1110. Recommendations: CHEM.2210.

BIOL:2663 Plant Response to the Environment 3 s.h.
Mechanisms of plant responses to environmental factors (biotic and abiotic) at organismal and molecular levels. Prerequisites: BIOL.1411 and BIOL.1412.

BIOL:2673 Ecology 3 s.h.
Adaptations of organisms to their physical and biotic environments; ecosystem interactions; population biology; interactions between species; ecology of communities, ecosystems; human impact on ecosystems. Prerequisites: BIOL.1411 and BIOL.1412. Recommendations: a basic statistics or calculus course. Same as ENV.2673.

BIOL:2723 Cell Biology 3 s.h.
Structures of cells and organelles in relation to their functions at molecular, cellular levels; emphasis on higher eukaryotic cells. Prerequisites: BIOL.1411 and (BIOL.1412 or HHP.3500 or PSY.2701) and CHEM.1120.

BIOL:2753 Introduction to Neurobiology 3 s.h.
Techniques of molecular biology, genetics, neuroparmacology, and functional brain imaging applied to understanding how the brain works. Prerequisites: (BIOL.1412 or HHP.3500) and BIOL.1411.

BIOL:3172 Evolution 4 s.h.
Nature, evidence, analysis, implications, molecular/genetic basis; historical record, phylogeny, speciation, adaptation, investigative methods. Prerequisites: BIOL.2512 with a minimum grade of C- and (STAT.2010 or STAT.3510 or MATH.1380 or MATH.1460 or MATH.1550 or MATH.1850). Prerequisites: BIOL.2512 with a minimum grade of C- or BIOL:2211 with a minimum grade of C-.

BIOL:3212 Bioinformatics for Beginners 3 s.h.
Overview of bioinformatics topics including access to sequence data, pairwise and multiple sequence alignment algorithms, molecular phylogeny, microarray data analysis, protein analysis, proteomics, and protein structure analysis; emphasis on each topic includes biological motivation, computational approach (practical and theoretical), and interpretation of output. Prerequisites: BIOL.2512 or BIOL.2211 or BMB.3120 or MCR.3170. Same as IGPI.3212.

BIOL:3233 Introduction to Developmental Biology 3 s.h.
Fundamental mechanisms in differentiation, organogenesis, morphogenesis; and pattern formation; mechanistic approach at molecular, cellular, tissue levels of organisms. Prerequisites: BIOL.1411 and CHEM.1120 and (BIOL.1412 with a minimum grade of C- or HHP.3500 with a minimum grade of C-). Recommendations: BIOL.2512.

BIOL:3244 Animal Behavior 3.5 s.h.
Genetics, sensory physiology, migration, development of behavior, circadian rhythms, foraging strategies, aggression, sexual and parental behavior, group selection, social behavior. Prerequisites: BIOL.1411 and (BIOL.1412 or PSY.2701).

BIOL:3253 Neurobiology I 4 s.h.
Neurobiology from molecular/cellular to systems levels including cell biology of the neuron; membrane electrophysiology; synaptic transmission and plasticity; functional neuroanatomy; sensory, motor, and autonomic systems; emotion, memory, sleep, language, attention and cognition, neuronal development; focus on systems and developmental neurobiology; first in a two-semester sequence. Prerequisites: BIOL.1411 and (PSY.2701 or BIOL.2753).

BIOL:3254 Neurobiology II 4 s.h.
Neurobiology from molecular/cellular to systems levels including cell biology of the neuron; membrane electrophysiology; synaptic transmission and plasticity; functional neuroanatomy; sensory, motor, and autonomic systems; emotion, memory, sleep, language, attention and cognition, neuronal development; focus on molecular/cellular neurobiology and neurophysiology; second in a two-semester sequence. Prerequisites: BIOL.3253 and (PHYS.1512 or PHYS.1612).

BIOL:3314 Genomics 3 s.h.
Major areas of genomics including genome sequencing, assembly, and annotation; evolutionary genomics, metagenomics, functional genomics, and computational genomics; synthetic biology and genome engineering. Prerequisites: BIOL.2211 or BIOL.2512 or BIOL.2723. Same as IGPI.3314.

BIOL:3343 Animal Physiology 3 s.h.
Principles of cellular and systems physiology; emphasis on quantitative and experimental aspects. Prerequisites: BIOL.1411 and CHEM.1110 and CHEM.1120 and (MATH.1380 or MATH.1460 or MATH.1550 or MATH.1850). Recommendations: (PHYS.1511 and PHYS.1512) or (PHYS.1611 and PHYS.1612).

BIOL:3363 Plant Developmental Biology 3 s.h.
Developmental processes throughout life cycle of vascular plants; current knowledge of mechanisms, control; emphasis on molecular and genetic approaches to studying development. Prerequisites: BIOL.2512.

BIOL:3373 Human Population Genetics and Variation 3 s.h.
Principles of evolutionary change of genes and genomes applied to human populations and to comparisons between humans and their closest primate relatives; emphasis on consequences of mutation, natural selection, and demographic changes. Prerequisites: BIOL.2512 with a minimum grade of C- or BIOL:2211 with a minimum grade of C-.

BIOL:3383 Introduction to Systems Biology 3 s.h.
Concepts and skills used to develop computer models that provide insight into the operation of cellular processes like metabolic pathways and genetic circuits. Prerequisites: BIOL.1411 and (MATH.1460 or MATH.1550 or MATH.1850).

BIOL:3603 Mechanisms of Aging 3 s.h.
Evolutionary theories of aging, cellular and genetic basis of aging and repair, disruption of homeostasis in aging; focus on studies of biological and environmental causes of age-related diseases. Prerequisites: BIOL.1411 and (BIOL.1412 or HHP.3500 or PSY.2701). Recommendations: BIOL.2723.

BIOL:3626 Cell Biology Laboratory 4 s.h.
Conceptual understanding and technical skills in fluorescence microscopy and digital imaging, mammalian cell culture, tissue fractionation, centrifugation, electrophoresis, and expression of recombinant proteins. Prerequisites: BIOL.2723.

BIOL:3655 Neurogenetics Laboratory 4 s.h.
Emphasis on project-oriented training to develop fundamental hands-on experimental manipulations and techniques, problem-solving skills, and data analysis methodology; students utilize modern genetic, behavioral, and electrophysiological methods to explore how gene and environment influence nervous system function and behavioral expression using genetic model organisms. Prerequisites: BIOL.2512 or BIOL.2211. Recommendations: BIOL.2753 or PSY.2701.
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>BIOL:3656</td>
<td>Neurobiology Laboratory</td>
<td>4 s.h.</td>
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<tr>
<td></td>
<td>Principles and practice of neurobiology research, including</td>
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<td>microscopy and imaging, cellular and molecular neurobiology, and</td>
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<td>electrophysiology. Prerequisites: (BIOL:1411 and PSY:2701) or</td>
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<td>BIOL:2753.</td>
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<td>BIOL:3663</td>
<td>Plant Response to the Environment</td>
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<td>Mechanisms of plant responses to environmental factors (biotic and abiotic)</td>
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<td></td>
<td>at organismal and molecular levels. Prerequisites: BIOL:2512 or</td>
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<td>BIOL:2723 or BIOL:3716 or BMB:3120.</td>
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<td>BIOL:3676</td>
<td>Evolution Lab</td>
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<td>Methods of sampling and describing variation in natural populations;</td>
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<td>application of molecular genetic, bioinformatic, and</td>
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<td>computational techniques to describe genetic variation</td>
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<td>through sequence analysis; use of controlled laboratory</td>
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<td>experiments and computer simulations to illustrate evolutionary principles.</td>
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<td>Prerequisites: BIOL:2512 or BIOL:2211. Corequisites: BIOL:3172 or</td>
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<td>BIOL:3373, if not taken as a prerequisite. Recommendations: grade of C or</td>
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<td>higher in BIOL:3172.</td>
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<td>BIOL:3713</td>
<td>Molecular Genetics</td>
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<td>Mechanism, regulation of RNA, DNA, protein biosynthesis, with emphasis on</td>
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<td>methods of genetic analysis; application of modern recombinant DNA</td>
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<td>techniques to basic problems. Prerequisites: BIOL:2512 or BMB:3120 or</td>
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<td>BMB:3110.</td>
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<td>BIOL:3716</td>
<td>Genetics and Biotechnology Lab</td>
<td>4 s.h.</td>
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<td>Expansion of genetic concepts introduced in BIOL:2512; introduction to</td>
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<td>genetic/molecular techniques currently used in genetic analysis and</td>
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<td>biotechnology. Prerequisites: BIOL:1411. Corequisites: BIOL:2512 or BIOL:2211</td>
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<td>if not taken as a prerequisite. Recommendations: grade of C or higher in</td>
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<td>BIOL:2512.</td>
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<td>BIOL:3736</td>
<td>Developmental Biology Lab</td>
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<td>Experimental manipulation of embryos to examine mechanisms of early</td>
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<td>development, including gametogenesis and fertilization, cleavage,</td>
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<td>gastrulation, pattern formation and organogenesis; in vivo imaging of</td>
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<td>development, methods to visualize gene expression and independent research;</td>
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<td>model organisms including sea urchin, fish, frog, chick, mouse. Prerequisites:</td>
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<td>BIOL:3233.</td>
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<td>BIOL:3994</td>
<td>Introduction to Research</td>
<td>2-3 s.h.</td>
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<td>Independent scientific research related to the field of biology.</td>
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<td>BIOL:3999</td>
<td>Independent Research in Neuroscience</td>
<td>2-3 s.h.</td>
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<td>Independent scientific research related to the field of neuroscience. Same</td>
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<td>as PSY:3999.</td>
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<tr>
<td>BIOL:4213</td>
<td>Bioinformatics</td>
<td>2,4 s.h.</td>
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Biol 4995 Honors Research in Neuroscience is a 1-3 s.h. course designed to provide independent scientific research related to the field of neuroscience. Prerequisites include a minimum grade of B in Neuroscience. The course also includes a discussion of the responsibilities of authorship and reviewing, including a focus on modern neuroscience literature and critical thinking. The course concludes with an independent research project, guided by a mentor, and a written research hypothesis or question. The course offers 1-3 s.h. of credit, depending on the student's progress.

Biol 4996 Honors Seminar in Biology is a 2-3 s.h. course aimed at students who have completed the recommended coursework. The course focuses on developing critical thinking and analytical skills, as well as independent research. It includes a series of seminars, discussions, and written assignments designed to prepare students for an independent research project. The course also includes a discussion of ethical issues in research, including plagiarism and intellectual property. The course offers 3 s.h. of credit.

Biol 4997 Teaching Internship in Biology is a course designed to provide practical teaching experience. Students will work with a Ph.D. instructor or course supervisor, providing assistance in the classroom or lab. The course offers 1-2 s.h. of credit, depending on the student's progress.

Biol 5110 Practicum: College Teaching for Biology is a course designed to provide practical teaching experience. Students will work with a college teaching assistant, providing assistance in the classroom or lab. The course offers 2 s.h. of credit.

Biol 5117 Topics in Molecular Genetics is a course designed to provide an in-depth exploration of molecular genetics. The course includes discussions of the nature and function of genetic material, including classical, molecular, and developmental aspects. The course also includes a discussion of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 2 s.h. of credit.

Biol 5119 Critical Readings in Biology is a course designed to provide critical reading skills. The course includes discussions of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course also includes a discussion of the development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 2 s.h. of credit.

Biol 5211 Genes, Genomes, and the Human Condition is a 3 s.h. course designed to provide an in-depth exploration of the nature and function of genetic material. The course includes discussions of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course also includes a discussion of the development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 3 s.h. of credit.

Biol 5212 Techniques in Immunology and Genetics is a 3 s.h. course designed to provide an in-depth exploration of the nature and function of genetic material. The course includes discussions of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course also includes a discussion of the development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 3 s.h. of credit.

Biol 5218 Microscopy for Biomedical Research is a course designed to provide an in-depth exploration of microscopy techniques. The course includes discussions of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course also includes a discussion of the development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 2 s.h. of credit.

Biol 5412 Fundamental Genetics - Graduate Lecture is a 3 s.h. course designed to provide an in-depth exploration of the nature and function of genetic material. The course includes discussions of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course also includes a discussion of the development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 3 s.h. of credit.

Biol 5512 Readings in Genetics is a 2 s.h. course designed to provide an in-depth exploration of the nature and function of genetic material. The course includes discussions of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course also includes a discussion of the development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 2 s.h. of credit.

Biol 5653 Fundamental Neurobiology I is a 3 s.h. course designed to provide an in-depth exploration of the nature and function of genetic material. The course includes discussions of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course also includes a discussion of the development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 3 s.h. of credit.

Biol 5654 Fundamental Neurobiology II is a 3 s.h. course designed to provide an in-depth exploration of the nature and function of genetic material. The course includes discussions of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course also includes a discussion of the development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 3 s.h. of credit.

Biol 5658 Fundamental Neurobiology I Discussion is a 2 s.h. course designed to provide an in-depth exploration of the nature and function of genetic material. The course includes discussions of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course also includes a discussion of the development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 2 s.h. of credit.

Biol 5659 Fundamental Neurobiology II Discussion is a 2 s.h. course designed to provide an in-depth exploration of the nature and function of genetic material. The course includes discussions of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course also includes a discussion of the development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 2 s.h. of credit.

Biol 6188 Seminar: Writing in Natural Sciences is a 2 s.h. course designed to provide an in-depth exploration of the nature and function of genetic material. The course includes discussions of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course also includes a discussion of the development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 2 s.h. of credit.

Biol 6265 Neuroscience Seminar is a 0-1 s.h. course designed to provide an in-depth exploration of the nature and function of genetic material. The course includes discussions of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course also includes a discussion of the development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 0-1 s.h. of credit.

Biol 6298 Concepts, Models, and Systems in Biology (COSMOS) Seminar is a 1-2 s.h. course designed to provide an in-depth exploration of the nature and function of genetic material. The course includes discussions of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course also includes a discussion of the development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 1-2 s.h. of credit.

Biol 6899 Independent Study in Biology is a course designed to provide an in-depth exploration of the nature and function of genetic material. The course includes discussions of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course also includes a discussion of the development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 1-3 s.h. of credit.

Biol 7270 Principles of Scholarly Integrity is a course designed to provide an in-depth exploration of the nature and function of genetic material. The course includes discussions of the development of functional neuroanatomy, synaptic transmission and plasticity, and development of functional neuroanatomy, sensory, motor and autonomic systems. The course also includes a discussion of the development of functional neuroanatomy, sensory, motor and autonomic systems. The course offers 1 s.h. of credit.
BIOL:7604 Principles of Scholarly Integrity  0 s.h.
Training in responsible conduct of research and scholarly activities; student/mentor responsibilities; authorship; plagiarism/falsification/fabrication of data; intellectual property; conflict of interest; fiscal, institutional, societal; treatment of human and animal subjects; data handling. Requirements: postdoctoral standing in psychology or biology. Same as PSY:7604.