Biology (BIOL)

Courses

BIOL 1010 Physiological Systems (4 Credits)
The second required course in the introductory biology sequence required for students majoring in Biology or another science. Emphasis on physiology and development of plants and animals. Must be a declared science major or biology minor. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement. Co-requisite: BIOL 1020 lab section.

BIOL 1011 Evolution, Heredity and Biodiversity (4 Credits)
The first required courses in the introductory biology sequence required for students majoring in Biology or another science. Emphasis on evolution, basic genetics and inheritance, and biodiversity. Must be a declared science major or biology minor. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement. Co-requisite: BIOL 1021 lab section.

BIOL 1020 Physiological Systems Lab (1 Credit)
Exercises and experimentation to complement lecture material. Lab fee associated with this course. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement. Co-requisite: BIOL 1010 lecture section.

BIOL 1021 Evolution, Heredity and Biodiversity Lab (1 Credit)
Exercises and experimentation to complement lecture material. Lab fee associated with this course. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement. Co-requisite: BIOL 1011 lecture section.

BIOL 1207 Ecology for the New Millennium I (4 Credits)
First class in a three-quarter sequence for non-majors that explores the principles and science of ecology, the nature and consequences of human impacts on the environment, and the role of science in helping to formulate a policy of wise stewardship of the environment on regional and global scales. Examines the principles of ecology through readings, a lecture/discussion format, and field-oriented laboratories for hands on experience with populations, ecological communities and ecosystems. Lab fee associated with this course. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement.

BIOL 1208 Ecology for the New Millennium II (4 Credits)
Second class in a three-quarter sequence for non-majors that explores the principles and science of ecology, the nature and consequences of human impacts on the environment, and the role of science in helping to formulate a policy of wise stewardship of the environment on regional and global scales. Examines the ecology of our own species, beginning first with the biology of human population growth and regulation, and then turning to issues of human environmental change and natural resource management with emphasis on the role of science in problem identification, evaluation and resolution. Lab fee associated with this course. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement.

BIOL 1209 Ecology for the New Millennium III (4 Credits)
Third class in a three-quarter sequence for non-majors that explores the principles and science of ecology, the nature and consequences of human impacts on the environment, and the role of science in helping to formulate a policy of wise stewardship of the environment on regional and global scales. In-depth look at two environmental issues of global concern, climate change and declines in biodiversity. The emphasis here is to explore the science of each issue and then to consider how that knowledge might be combined with perspectives from fields of the social sciences and humanities to implement public policies that promote environmental stewardship. Lab fee associated with this course. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement.

BIOL 1220 Molecules to Humankind I (4 Credits)
First class in a three-quarter sequence for non-majors that examines the mechanisms that sustain life. Emphasis is placed on understanding the human body at the molecular, cellular and physiological levels. In the fall quarter our discussions start with the atom and basic chemistry. We next consider the properties of complex molecules, including DNA, proteins, carbohydrates and lipids, in order to see how such molecules are used and organized by living organisms. Our discussions of large and complex molecules lead naturally to the basic unit of life, the cell. Lab fee associated with this course. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement.

BIOL 1221 Molecules to Humankind II (4 Credits)
Second class in a three-quarter sequence for non-majors begins with an introduction to the general vertebrate body plan; we emphasize the human body plan but also compare it with other vertebrates. Discussions progress through the major organ and physiological systems of the body, including circulatory, respiratory, excretory, endocrine, nervous, skin, immune, reproductive, gastrointestinal, and skeletal and muscle systems. Discussions concentrate on the organization and function of these systems. Lab fee associated with this course. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement.

BIOL 1222 Molecules to Humankind III (4 Credits)
Third class in a three-quarter sequence focuses for non-majors on cell biology, genetics, and human reproduction and development. After a review of cell structure and function, focusing on how cells are capable of replication with modification, the mechanisms by which information is passed on from one cell to another and from one generation to the next are considered. The second half of the quarter concerns sexual reproduction and early development. Lab fee associated with this course. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement.
Biology (BIOL)

BIOL 1230 Origin & Evolution of Life I (4 Credits)
The fall quarter of this three-quarter sequence for non-majors examines evolutionary theory, as formulated by Charles Darwin in the 19th century. Two themes are central: the means by which evolution comes about and the significance of evolution for understanding the origins of biological diversity. Lectures encourage student participation and diversity of viewpoints. Goals include understanding of science as a way of knowing and the application of science inquiry to current topics in fields of human concern. Labs include field trips to explore evolutionary theory through personal observations of regional geology and natural history. Lab fee associated with this course. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement.

BIOL 1231 Origin & Evolution of Life II (4 Credits)
During the winter quarter, the second class this three-quarter sequence for non-majors examines evolutionary theory in light of 21st-century knowledge of inheritance, including how traits are transmitted from parents to offspring and the role of DNA in shaping those traits. Other topics include the role of new molecular technologies in shaping the evolutionary future of the human species through cloning and genetic engineering. Goals follow from fall term about the nature and applications of science to areas of human concern, including the origin, diagnosis and treatment of human diseases. Lab fee associated with this course. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement.

BIOL 1232 Origin & Evolution of Life III (4 Credits)
This is the third quarter in the three-quarter sequence for non-majors that addresses current issues in evolution. It begins with a detailed analysis of "intelligent design" creationism in order to see if the most recent version of the religious challenges to evolution offers anything new. It then looks at the way in which both new discoveries in the fossil record and new molecular approaches to evolution have converged to provide "proof beyond reasonable doubt" for a key evolutionary hypothesis concerning the origin of whales. The focus then switches to the evidence for the evolution of humans and the role of gene regulatory networks in explaining the origin of novel features. The course culminates with a critical look at the role of mass extinctions in evolution and the possibilities of an anthropogenic extinction episode occurring today. Lab fee associated with this course. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement.

BIOL 1260 Sustaining Life I (4 Credits)
A three-quarter sequence for non-majors examining some important biological mechanisms that sustain life -- and "life" in general! Emphasis is placed on the understanding the critical connections between the student's health and the health of the surrounding world. The first quarter begins with a discussion of the defining characteristics of "life" and the basic mechanisms required to sustain it. The course continues with an overview of biological diversity and ends with a focus on the many important connections between food, human health, and environmental health. The second quarter begins by building a basic understanding of how ecosystems function -- including the interactions among living organisms (including humans) and between these living organisms and their environment. The course continues with focused discussions of issues related to the impact of biological diversity on infectious disease and medicine. The third quarter begins with a focus on the importance of biodiversity to biomedical research, especially related to model systems. It then reviews some of the current threats to biodiversity and concludes by exploring some possible solutions that can give hope for sustaining "life" in the future. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement.

BIOL 1261 Sustaining Life II (4 Credits)
A three-quarter sequence for non-majors examining some important biological mechanisms that sustain life -- and "life" in general! Emphasis is placed on the understanding the critical connections between the student's health and the health of the surrounding world. The first quarter begins with a discussion of the defining characteristics of "life" and the basic mechanisms required to sustain it. The course continues with an overview of biological diversity and ends with a focus on the many important connections between food, human health, and environmental health. The second quarter begins by building a basic understanding of how ecosystems function -- including the interactions among living organisms (including humans) and between these living organisms and their environment. The course continues with focused discussions of issues related to the impact of biological diversity on infectious disease and medicine. The third quarter begins with a focus on the importance of biodiversity to biomedical research, especially related to model systems. It then reviews some of the current threats to biodiversity and concludes by exploring some possible solutions that can give hope for sustaining "life" in the future. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement. Prerequisite: BIOL 1260.

BIOL 1262 Sustaining Life III (4 Credits)
A three-quarter sequence for non-majors examining some important biological mechanisms that sustain life -- and "life" in general! Emphasis is placed on the understanding the critical connections between the student's health and the health of the surrounding world. The first quarter begins with a discussion of the defining characteristics of "life" and the basic mechanisms required to sustain it. The course continues with an overview of biological diversity and ends with a focus on the many important connections between food, human health, and environmental health. The second quarter begins by building a basic understanding of how ecosystems function -- including the interactions among living organisms (including humans) and between these living organisms and their environment. The course continues with focused discussions of issues related to the impact of biological diversity on infectious disease and medicine. The third quarter begins with a focus on the importance of biodiversity to biomedical research, especially related to model systems. It then reviews some of the current threats to biodiversity and concludes by exploring some possible solutions that can give hope for sustaining "life" in the future. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement. Prerequisite: BIOL 1260.

BIOL 1270 Living in the Microbial World I (4 Credits)
Students receive an introduction to the world of microbiology, the good, the bad and the ugly. With the help of the press and movie industry, most "human hosts" believe that microorganisms are to be feared, sterilized and/or destroyed. While this is true for a very small number of microbes, the majority is composed of essential and beneficial microorganisms that help the existence of all life on Earth. This first course in the sequence for non-majors is dedicated to raising the awareness of students to the value and need of our unseen partners. Laboratory included. Lab fee associated with this course. Honors only. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement.
BIOL 1271 Living in the Microbial World II (4 Credits)
For such a small size, microorganisms can have a large impact on our human world. This second course in the sequence for non-majors brings a new perspective to students on the role microorganisms, and their associated diseases, have played in turning the tide of war victories, immigration of a country, world politics and more. We tend to believe that humans alone can control their world but sometimes the mightiest of all are our unseen partners. Laboratory included. Lab fee associated with this course. Honors only. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement. Prerequisite: BIOL 1270.

BIOL 1272 Living in the Microbial World III (4 Credits)
In this last course in the sequence for non-majors, students are given an opportunity to challenge their beliefs and understandings of how life came to exist on Earth and the perspective of how humans are the most evolutionarily advanced. Students are guided through time on Earth and examine the development of life and the constant contribution of their unseen partners. Laboratory included. Lab fee associated with this course. Honors only. This course counts toward the Scientific Inquiry: The Natural and Physical World requirement. Prerequisite: BIOL 1271.

BIOL 1990 Independent Study (1-5 Credits)
BIOL 1992 Directed Study (1-10 Credits)

BIOL 2010 General Ecology (4 Credits)
Topics in ecosystems, population and community ecology, as well as behavioral ecology. Prerequisite: BIOL 1010. Co-requisite: BIOL 2011.

BIOL 2011 General Ecology Lab (1 Credit)

BIOL 2050 Conservation Biology (4 Credits)
Biological diversity explained, including endangered species small populations, habitat fragmentation and other causes of species extinction. Also preservation and management of biological diversity. Prerequisite: BIOL 1011. Co-requisite: BIOL 2051.

BIOL 2051 Conservation Biology Lab (1 Credit)
Exercises and experimentation to compliment the lecture. Co-requisite: BIOL 2050.

BIOL 2090 Biostatistics (4 Credits)
Statistics in biological research. Computer-aided statistical analysis and hypothesis testing focusing on experiments and data unique to the biological sciences. Cross listed with BIOL 4090.

BIOL 2120 Cell Structure and Function (4 Credits)
Chemical composition of cells; structure and function of cell organelles; interrelationship of cellular unit with its environment; mechanisms of energy conversion within cells; functions of excitability, contractility and cell growth. Prerequisites: BIOL 1010, BIOL 1011 or BIOL 1220, BIOL 1221. Corequisite: BIOL 2121 lab section. CHEM 1010 prerequisite or corequisite.

BIOL 2121 Cell Structure & Function Lab (1 Credit)
Exercises and experimentation to complement lecture material. Lab fee associated with this course. Co-requisite: BIOL 2120.

BIOL 2200 Medical Terminology (3 Credits)
This course presents fundamentals and applications of medical terminology using online learning modules and assessment. This review and application of human anatomy and physiology is suitable for students who have completed introductory biology (BIOL 1010 or its equivalent) and who are working toward a career in medicine or for whom communication with health care providers is essential. Students study basic anatomy and physiology at a level that is intermediate between introductory and advanced courses, discover the medical history behind medical terminology, analyze medical case studies, and work to develop skills for clear and concise articulation of the basic concepts of anatomy and physiology behind medical diagnosis and treatment. This mastery of medical terminology helps to build a strong foundation for advanced coursework in anatomy and physiology. Prerequisite: BIOL 1010 or equivalent with instructor approval.

BIOL 2450 Human Anatomy (5 Credits)
Detailed structural analysis of the tissues, organs and organ systems of the human body. Four lectures and one 3-hour laboratory each week. Lab fee associated with this course. Prerequisites: BIOL 1010, BIOL 1011.

BIOL 2510 General Genetics (4 Credits)
Mechanisms of heredity with application to all forms of life. One 3-hour laboratory per week. Lab fee associated with this course. Prerequisites: BIOL 1010, BIOL 1011. Recommended prerequisite: BIOL 2120. Corequisite: BIOL 2511.

BIOL 2511 General Genetics Lab (1 Credit)
The laboratory component of BIOL 2510.

BIOL 2600 Vertebrate Zoology I (4 Credits)
Evolutionary history, morphology, physiology and ecology of fish, amphibians and reptiles. Laboratory exercises focus on the structure and function of the vertebrate body, especially those of the skeletal, muscle and organ systems. Prerequisites: BIOL 1010, BIOL 1011 or permission of instructor.

BIOL 2610 Vertebrate Zoology II (4 Credits)
Evolutionary history, morphology, physiology and ecology of birds and mammals. Laboratory exercises focus on the structure and function of the vertebrate body, especially those of the skeletal, muscle and organ systems. Prerequisites: BIOL 1010, BIOL 1011 or permission of instructor.
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
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<tr>
<td>BIOL 2992</td>
<td>Directed Study (1-10 Credits)</td>
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<tr>
<td>BIOL 3010</td>
<td>Evolution and Speciation (4 Credits)</td>
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<td>Theories and supporting evidence explaining evolution from origin of universe to complex interrelationships of species. Prerequisites: BIOL 1010, BIOL 1011 and BIOL 2510.</td>
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<tr>
<td>BIOL 3020</td>
<td>Aquatic Ecology (4 Credits)</td>
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<td>An introduction to the ecology of fresh-water and marine organisms including aquatic adaptations, community organization, food chains, nutrient cycling and man's impact on aquatic ecosystems. Prerequisite: BIOL 2010 or instructor's permission.</td>
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<td>BIOL 3025</td>
<td>Science and the Law (2,4 Credits)</td>
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<td>In its broadest definition, forensic science represents a fusion of the natural sciences, criminology, and jurisprudence. The field of forensic pathology in particular focuses on the investigation of sudden, unnatural, unexplained or violent deaths. Using the most authoritative books available and a multimedia lecture format, students in this course will gain an introductory understanding of the pathophysiology of wounding and death as well as the clinical antemortem symptomology of physical abuse, neglect and extrajudicial wounding. Students will also learn about the processes responsible for the decomposition of corpses as well as the use of molecular and geometric tools for the reconstruction of crime scenes from bloodstain evidence. Finally, students will learn how to integrate a variety of forensic tools in investigation of sexual assault, serial killers, traffic fatalities and mass deaths. prerequisites: BIOL 1010, BIOL 1011.</td>
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<td>BIOL 3030</td>
<td>Alpine Ecology (4 Credits)</td>
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<td>Ecology of alpine and subalpine regions of Colorado; organization and distribution of communities and populations, succession, energy flow, nutrient cycling, population adaptations in life-history physiology, behavior and morphology. Prerequisite: BIOL 2010.</td>
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<td>BIOL 3035</td>
<td>Invasive Species Ecology (4 Credits)</td>
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<td>This course investigates those plants and animal species that have dramatically expanded their ranges and cause ecological harm. Topics covered include the mechanisms of ecological impacts across the globe, how invasive species are used to test basic ecological theory, the application of this research for managing real species, and related issues such as the debate within the scientific community about the term &quot;invasive.&quot; We use a case-study approach, and students have the opportunity to go into the field as a class to observe the real invasions and learn sampling methods.</td>
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<td>BIOL 3044</td>
<td>Coral Reef Ecology (3 Credits)</td>
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<td>Ecology of coral reefs; organization and distribution of reefs; review of reef organisms and their interactions with each other and their physical environment; threats to coral reef conservation. Prerequisite: BIOL 2010 or BIOL 2050.</td>
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<td>BIOL 3045</td>
<td>Coral Reef Ecology Lab (1 Credit)</td>
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<td>Ecology of coral reefs laboratory to supplement lecture material; travel to the Caribbean over spring break to observe coral reefs firsthand; introduction to research methods. Prerequisite: SCUBA certification and permission of instructor.</td>
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<td>BIOL 3055</td>
<td>Ecology of the Rockies (4 Credits)</td>
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<td>A week in residence at the Mt. Evans Field Station prior to the start of fall quarter includes field projects dealing with ecology and environmental issues. On campus classes involve data analysis and interpretation and formal scientific communication. Themes include terrestrial and aquatic ecosystems, taxonomic groups ranging from conifer stands to aquatic insects and mountain goats. Lab fee associated with this course. Prerequisite: BIOL 2010 or permission of instructor.</td>
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<tr>
<td>BIOL 3060</td>
<td>Tropical Ecology (3 Credits)</td>
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<td>Biological composition of tropical ecosystems; biodiversity, biogeochemistry; causes and biological consequences of tropical deforestation; ecologically based approaches toward sustainable tropical forest use. Includes laboratory. Prerequisite: BIOL 2010.</td>
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<td>BIOL 3070</td>
<td>Ecological Field Methods (4 Credits)</td>
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<td>Series of field exercises for students to learn principles and procedures of field methodology, data analysis and technical writing in ecology; problems drawn from population, community and ecosystem ecology. Lab fee associated with this course. Prerequisite: BIOL 2010.</td>
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<td>BIOL 3085</td>
<td>Insect Ecology (4 Credits)</td>
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<td>A general introduction to insect biology and the science of entomology. Arthropods are the most diverse group of animals on Earth and insects account for more than half of all known living organisms. This course explores the biodiversity of insects on Earth, insect morphology and physiology. The evolutionary history and taxonomy of key orders of insects is emphasized as well as the importance of insects to our everyday lives. Prerequisites: BIOL 1010 and BIOL 1011.</td>
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<td>BIOL 3090</td>
<td>Microbial Ecology (4 Credits)</td>
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<td>Interactions among microorganisms and their environment. Impact of ecological principles on microbial diseases, pollutant degradation, nutrient cycles and global change. Prerequisites: BIOL 1010, BIOL 1011.</td>
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<td>BIOL 3095</td>
<td>Global Change Ecology (4 Credits)</td>
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<td>Over the past century, the mean surface temperature of our planet has increased slightly less than 1°C. While this may seem like a small increment, this change is already profoundly affecting Earth's organisms and ecological communities, and predictions for the impacts of continued change range from severe to catastrophic. Humans are also changing the environment through alteration of nutrient and water regimes. Topics include cause of climate change, comparison to past climatic change, human contribution to change and effect on organisms, communities and ecosystems. Prerequisites: BIOL 1010 and BIOL 1011.</td>
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BIOL 3100 Histology: Medical Microanatomy (4 Credits)
Microscopic organization of tissues and organs; correlation of organization of organs with functions and pathologies; emphasis on mammalian systems. Includes laboratory. Lab fee associated with this course. Prerequisite: BIOL 2120.

BIOL 3110 Special Topics: Biology (1-5 Credits)
Topics of special interest to teaching/research faculty of department presented as needed to complement and expand existing curriculum. May be repeated for credit.

BIOL 3120 General Microbiology (4 Credits)
Fundamental principles of microorganisms in the world and in disease; role of bacteria in biological phenomena. Includes laboratory. Lab fee associated with this course. Prerequisite: BIOL 2120.

BIOL 3130 Molecular Evolution (4 Credits)
Evolution of macromolecules and reconstruction of evolutionary history of genes and organisms. Prerequisite: BIOL 2510.

BIOL 3135 Topics in Cell Motility (4 Credits)
Fibrous elements of the cytoskeleton and associated proteins and their role in cellular motility is examined in detail. The physical forces involved in cellular motility function is applied in understanding cellular motility behavior. Prerequisite: BIOL 2120.

BIOL 3145 Cellular and Molecular Biology of Cancer (2-4 Credits)
This course examines the mechanisms that underlie the development and progression of cancer. The cellular and molecular events that drive uncontrolled cell proliferation and eventual metastasis of tumors are discussed. Prerequisite: BIOL 2120.

BIOL 3150 Intracellular Dynamics (4 Credits)
Focuses on spatial and temporal control of intracellular processes with an emphasis on neuronal and endocrine cells. Topics include vesicular traffic, protein targeting, dynamics and spatial organization of signaling complexes. Emphasis on modern techniques of cell and molecular biology with examples from primary literature. Prerequisite: BIOL 2120.

BIOL 3160 Biophysics: Ion Channels & Disease (4 Credits)
Examines ion channel structure and function and the ways in which this information provides insight into human disease. The focus is on the use of biophysical techniques in combination with molecular and genetic analysis of channel genes. General Physics recommended. Prerequisite: BIOL 2120.

BIOL 3200 Invertebrate Evolution (4 Credits)
Introduction to remarkable diversity of invertebrate life, both in terms of numbers of species, novel body plan and physiological adaptations. Includes laboratory. Prerequisites: BIOL 1010, BIOL 1011.

BIOL 3230 Nutrition (3 Credits)
Investigation of metabolism, all nutrients and various applications of nutrition to sports and healthy living. Prerequisite: BIOL 3250.

BIOL 3250 Human Physiology (5 Credits)
Functional relationships of human organ systems with coordinated laboratory activities and experiments that demonstrate and test physiological principles. Lab fee associated with this course. Prerequisites: BIOL 1010, BIOL 1011.

BIOL 3260 Nutrition (3 Credits)
From physiological and biochemical perspectives, this course explores the relationships of energy metabolism, nutrients, vitamins and minerals to human health. Prerequisite: BIOL 3250.

BIOL 3300 Biodiversity-Flowering Plants (4 Credits)
Basic techniques and principles of systematics with application to the origin, evolution, radiation, classification and biodiversity of flowering plants (angiosperms). Lab fee associated with this course. Prerequisites: BIOL 1010, BIOL 1011 or GEOG 1201, GEOG 1202, GEOG 1203 or instructor's permission.

BIOL 3400 Ornithology (4 Credits)
Biology of birds with emphasis on ecology and behavior; field and laboratory work to stress bird identification and ecological relationships of birds. Lab fee associated with this course. Prerequisites: BIOL 1010, BIOL 1011.

BIOL 3410 Animal Behavior (4 Credits)
This class examines animal behavior from an evolutionary and ecological perspective. The course provides the background needed to understand behavioral evolution, including a focus on the inheritance of behavior, natural selection, sexual selection, and kin selection. This class studies the evolution of a variety of behaviors, including communication and displays, mate choice, parental care, cooperation, mating systems, social behavior, habitat selection, foraging, and anti-predator behavior. The emphasis is on theoretical principles, design of experiments, and interpretation of data. Prerequisites: BIOL 1010 and BIOL 1011.

BIOL 3560 Molecular Biology Laboratory (4 Credits)
Laboratory based course that covers techniques in gene excision, cloning and reinsertion and gene sequencing. Lab fee associated with this course. Prerequisite: BIOL 2510.

BIOL 3570 Proteins in Biological Systems (3 Credits)
Proteins considered in their biological setting; protein synthesis and degradation; survey of protein functions in vivo; evolution of proteins; introduction to protein biotechnology. Prerequisites: BIOL 2120, CHEM 2451, CHEM 2452 and CHEM 2453.
BIOL 3610 Developmental Biology (4 Credits)
Processes and mechanisms of development, exemplified by higher animal embryogenesis, with consideration of microbial model systems. Prerequisite: BIOL 2510.

BIOL 3620 Vertebrate Embryology (4 Credits)
Development processes in placental mammals; analysis of vertebrate cyto-differentiation and morphogenesis. Laboratory on embryonic anatomy of amphibians, birds and mammals. Prerequisites: BIOL 1010, BIOL 1011 and BIOL 2120.

BIOL 3630 Cell Biology of Development (4 Credits)
Every organism has a stereotypical shape, but how does this shape arise? This course examines the cellular and molecular mechanisms that direct the forming of body and tissue shape. Prerequisite: BIOL 2120.

BIOL 3640 Introductory Neurobiology (4 Credits)
Organization and function of vertebrate central nervous system; nature of action potential, biochemistry of neurotransmitters, neuropeptides, functional anatomy of nervous system, phylogeny of nervous system. Prerequisite: BIOL 2120.

BIOL 3641 Systems Neuroscience (4 Credits)
Structure and function of the brain and spinal cord, emphasis on functional systems including sensory perception, motor control and consciousness. Prerequisite: BIOL 3640.

BIOL 3642 Pharmacology (4 Credits)
How psychoactive drugs exert their effects on the nervous system; drugs of abuse and drugs used in the treatment of psychiatric and neurodegenerative disorders. Prerequisite: BIOL 2120.

BIOL 3643 Developmental Neurobiology (4 Credits)
This course investigates the mechanisms involved in the maturation of neurons, and signals that direct neurons to their proper position in the central nervous system. Prerequisite: BIOL 3640.

BIOL 3644 Neuromuscular Pathophysiology (4 Credits)
Cellular and molecular basis for normal nerve and muscle functions and the alteration of these functions by toxins, trauma and diseases of the brain, nerves and muscles; how specific insults produce clinical symptoms and pathology. Prerequisite: BIOL 2120.

BIOL 3646 Seminar: Cognitive Neuroscience (2 Credits)
This seminar is the capstone course for the neuroscience portion of the cognitive neuroscience program. Seminar topics include but are not limited to neurological disorders, model systems in neuroscience and sensory systems.

BIOL 3650 Endocrinology (4 Credits)
Mechanisms of hormone action, evolution of vertebrate endocrine systems, analysis of function integration of hormonal responses in maintenance of homeostasis. Prerequisite: BIOL 2120.

BIOL 3655 Molecular Neuroendocrinology (4 Credits)
Advanced laboratory course that uses anatomical/immunological, biochemical and molecular approaches to analyze neuroendocrine pathways in the hypothalamus/pituitary system. Lab fee associated with this course. Prerequisites: BIOL 3650 and instructor's permission.

BIOL 3670 Molecular Immunology (4 Credits)
Organs, cells and molecules that underlie mammalian immune response; relationship of immune system to disease. Prerequisite: BIOL 2510.

BIOL 3680 Advanced Techniques in Cell Biology (4 Credits)
Advanced laboratory course that covers current techniques used in cell biology research. Lab fee associated with this course. Prerequisite: BIOL 2120.

BIOL 3700 Topics in Ecology (1-4 Credits)
Topics vary; may include plant, animal, biochemical, alpine or aquatic; one topic per quarter. May be repeated for credit. Taught from original literature. Prerequisite: one quarter of undergraduate ecology and/or instructor's permission.

BIOL 3701 Topics in Genetics (1-4 Credits)
Topics vary; may include genetic methods, molecular genetics, human genetics, chromosomes or population genetics; one topic per quarter. May be repeated for credit. Taught from original literature. Prerequisite: BIOL 2510 and/or instructor's permission.

BIOL 3702 Advanced Topics in Regulatory Biology (1-4 Credits)
Topics vary; may include endocrinology, physiology or immunology; one topic per quarter. May be repeated for credit. Taught from original literature. Prerequisite: varies with topic and instructor; instructor’s permission usually required.

BIOL 3703 Advanced Topics in Developmental Biology (1-4 Credits)
Topics vary; may include gene expression in development, developmental immunogenetics, developmental biochemistry or aging; one topic per quarter. May be repeated for credit. Taught from original literature. Prerequisite: instructor’s permission.

BIOL 3704 Advanced Topics in Cell Biology (1-4 Credits)
Topics vary; may include supramolecular structure, microscopy, membranes and techniques. May be repeated for credit. Taught from original literature. Prerequisites: varies with course and instructor; instructor’s permission usually required.
BIOL 3705 Advanced Topics in Molecular Biology (1-4 Credits)
Topics vary, but may include biochemistry, supramolecular structure and function, molecular genetics, membrane biology. May be taken more than once for credit. Taught from original literature. Prerequisite: varies with course and instructor; instructor's permission usually required.

BIOL 3706 Topics in Evolution (1-4 Credits)
Topics vary, but may include molecular evolution, plant evolution and animal evolution. Prerequisite: instructor's permission.

BIOL 3707 Advanced Topics in Conservation Biology (1-4 Credits)

BIOL 3800 Human Molecular Biology (4 Credits)
Molecular basis of heredity and genetic control, using in-vitro systems and microbial and eukaryotic models; molecular basis of heredity and genetic regulation considering in-vitro systems as well as prokaryotic and eukaryotic models. Prerequisite: BIOL 2510.

BIOL 3870 Medical Ethics (4 Credits)
This course presents knowledge and discussion of ethical issues that arise from advances in the biomedical sciences and medicine. Several specific ethical issues and policies related to methodologies and procedures, emerging medical technologies, treatment decisions, doctor-patient relationship, informed consent, medical experimentation / clinical research, and health care reform. Prerequisites: BIOL 1010, BIOL 1011, and BIOL 2010 or instructor approval.

BIOL 3910 Viruses & Infectious Human Diseases (4 Credits)
Organization of viruses at the molecular level with consideration of diseases that these agents cause in humans. The mechanism of action of viruses is a major theme of the course. Prerequisite: BIOL 2510. Recommended prerequisite: BIOL 3800.

BIOL 3920 Forensic Pathology (2-4 Credits)
In its broadest definition, forensic science represents a fusion of the natural sciences, criminology and jurisprudence. The field of forensic pathology in particular focuses on the investigation of sudden, unnatural, unexplained or violent deaths. Using the most authoritative books available and a multimedia lecture format, students in this course gain an introductory understanding of the pathophysiology of wounding and death as well as the clinical antemortem symptomology of physical abuse, neglect and extrajudicial wounding. Students also learn about the processes responsible for the decomposition of corpses as well as the use of molecular and geometric tools for the reconstruction of crime scenes from bloodstain evidence. Finally, students learn how to integrate a variety of forensic tools in investigations of sexual assault, serial killers, traffic fatalities and mass deaths. Prerequisite: BIOL 2120 or permission of instructor.

BIOL 3950 Undergraduate Research (1-10 Credits)
Participation in faculty research programs by agreement between student and faculty member. Maximum of 5 quarter hours of BIOL 3950 and/or BIOL 3991 may be applied to the 45-quarter-hour requirement for a major in biological sciences.

BIOL 3991 Independent Study (1-10 Credits)
Topic in biology studied under faculty supervision. Student's responsibility to identify faculty supervisor before registering for class. Maximum of 5 quarter hours of BIOL 3991 and/or BIOL 3950 may be applied toward the 45-quarter-hour requirement for a major in biological sciences.

BIOL 3992 Directed Study (1-10 Credits)

BIOL 3995 Independent Research (1-10 Credits)