

# BIOLOGICAL SCIENCES

Department Website (<http://www.biol.sc.edu/>)

The field of biological sciences examines the nature of living organisms and how they interact with and create their environment. The Department of Biological Sciences strives to advance knowledge and discoveries in biology, from the cellular and genetic level to the organismal and environmental. Students in our program study the complexities of life on Earth, from DNA and cell functions to the diversity of living organisms and ecosystems, in order to better understand the world.

With our Bachelor of Science degree, students complete first-rate courses and community engagement that will prepare them to achieve their professional and personal goals. A biology degree offers a comprehensive education in the sciences and empowers students with knowledge critical for fields like medicine, management of natural resources, teaching, public health, pre-health\* and more. Our biology minor offers fundamental life science courses that can supplement any major and is ideal for students planning to pursue graduate studies or those interested in careers in the sciences.

\*Pre-health students may especially benefit from the interdisciplinary neuroscience degrees offered at the university.

## Programs

- Biological Sciences, B.S. (<https://academicbulletins.sc.edu/undergraduate/arts-sciences/biological-sciences/biological-sciences-bs/>)
- Biology Minor (<https://academicbulletins.sc.edu/undergraduate/arts-sciences/biological-sciences/biology-minor/>)

## Courses

### BIOL 101 - Biological Principles I (3 Credits)

Introductory survey of macromolecules, cell structure and function, genetics, and molecular biology.

**Carolina Core:** SCI

### BIOL 101A - Biological Principles I (3 Credits)

Introductory survey of macromolecules, cell structure and function, genetics, and molecular biology. Three lecture hours per week. Restricted to students who have credit for BIOL 101L but lack the lecture.

**Prerequisites:** BIOL 101L.

### BIOL 101L - Biological Principles I Laboratory (1 Credit)

(Recommended concurrent with BIOL 101). Experimental examination of basic principles of cell biology, genetics and metabolism. Three hours per week.

**Carolina Core:** SCI

### BIOL 102 - Biological Principles II (3 Credits)

Introductory survey of plant and animal development, physiology, ecology, and evolution.

**Corequisite:** BIOL 102L.

**Carolina Core:** SCI

### BIOL 102A - Biological Principles II (3 Credits)

Introductory survey of plant and animal development, physiology, ecology, and evolution. Three lecture hours per week. Restricted to students who have credit for BIOL 102L but lack the lecture.

**Prerequisites:** BIOL 102L.

### BIOL 102L - Biological Principles II Laboratory (1 Credit)

Experimental examination of structure and function of plant and animal systems, biodiversity, ecology. BIOL 101, BIOL 102, BIOL 101L and BIOL 102L must be completed prior to enrolling in 300-level or above Biology courses.

**Corequisite:** Recommended concurrent with BIOL 102.

**Carolina Core:** SCI

### BIOL 110 - General Biology (4 Credits)

Basic biological concepts and issues for non-biology majors. Credit may not be given for both this course and BIOL 120. Three lecture, two laboratory hours per week.

**Carolina Core:** SCI

### BIOL 110A - General Biology (Audio-Tutorial) (1 Credit)

Addendum to BIOL 110.

### BIOL 120 - Human Biology (3 Credits)

Fundamental principles of human biology. Credit may not be given for both BIOL 110 and BIOL 120. Three lecture hours per week. Not for major credit.

**Carolina Core:** SCI

### BIOL 120L - Laboratory in Human Biology (1 Credit)

Exercises dealing with basic concepts of human biology. Not for major credit.

**Prerequisite or Corequisite:** BIOL 120.

**Carolina Core:** SCI

### BIOL 200 - Plant Science (3 Credits)

An introduction to plant science for the non-major. This course does not carry major credit, and is not designed as a prerequisite for other biology courses. Plant development, physiology, genetics, evolution, and ecology will be considered. Three lecture hours per week.

### BIOL 200L - Plant Science Laboratory (1 Credit)

Laboratory exercises, demonstrations, and audio-visual supplements to BIOL 200. Not for major credit. Two hours per week.

**Prerequisite or Corequisite:** BIOL 200.

### BIOL 202 - Infectious Diseases, Human Health, and Ethics (3 Credits)

An introduction to pathogens including bacteria, viruses, and protozoans. Basic elements of the immune system coupled with discussion of how pathogens cause disease. This information is placed in the context of how scientific research leads to the discovery, treatment, and prevention of the disease. The ethical implications of each pathogen and its treatment strategies are discussed.

**Carolina Core:** SCI, VSR

### BIOL 203 - Exploration of Infectious Diseases (1 Credit)

This class goes beyond the classroom to visit sites affected by infectious diseases, like cholera and bubonic plague, in order to put these diseases into context, gaining a deeper understanding of the implications of infectious disease on human health and ethics. This course will experience infectious diseases through the scope of art, literature, and architecture.

**Prerequisites:** D or better in BIOL 202.

### BIOL 206 - Genetics and Society (3 Credits)

(Designed for non-major students.) Genetic principles, emphasizing human heredity. Relevance of recent advances in genetics. Three lecture hours per week.

**Carolina Core:** SCI

**BIOL 208 - Our Hungry World from Malthus to McDonalds (3 Credits)**

Scientific and social issues concerning the interrelationship of culture and agricultural biotic diversity and technology, climate change, resources management, food security, and human health.

**Carolina Core:** SCI, VSR

**BIOL 220 - Elementary Life Science (4 Credits)**

This course will ensure that elementary education majors will understand the fundamental concepts of Biology. Cannot be used for biology major credit.

**Carolina Core:** SCI

**BIOL 232 - Anatomy (3 Credits)**

Functional anatomy of the human body and its relation to disease processes. Not for biology major credit.

**BIOL 232L - Anatomy Laboratory (1 Credit)**

The principles of anatomy as demonstrated by microscopic studies and animal dissection. Three hours per week.

**Corequisite:** BIOL 232.

**BIOL 240 - Applied Human Physiology (3 Credits)**

Fundamentals of functional human biology and knowledge of contemporary medical problems. Not for major credit.

**BIOL 242 - Human Physiology (4 Credits)**

Functional biology of organ systems in the maintenance of the whole organism; homeostatic relationships. Not available for biology major credit. Three lecture and three laboratory hours per week.

**Prerequisites:** BIOL 232.

**BIOL 243 - Human Anatomy and Physiology I (3 Credits)**

Functional anatomy and physiology of the human body, including the integumentary, skeletal, muscular, and nervous systems. Not available for biology major credit. Three lecture hours per week.

**Carolina Core:** SCI

**BIOL 243L - Human Anatomy and Physiology Laboratory (1 Credit)**

The principles of anatomy and physiology as demonstrated by microscopic studies, animal dissection, and physiological experiments. One three-hour laboratory per week.

**Prerequisite or Corequisite:** BIOL 243.

**Carolina Core:** SCI

**BIOL 244 - Human Anatomy and Physiology II (3 Credits)**

Functional anatomy and physiology of the human body, including the cardiovascular, endocrine, excretory, reproductive, digestive, and respiratory systems. Not available for biology major credit. Three lecture hours per week.

**Prerequisites:** BIOL 243.

**Carolina Core:** SCI

**BIOL 244L - Human Anatomy and Physiology Laboratory (1 Credit)**

A continuation of BIOL 243L. One three-hour laboratory per week.

**Corequisite:** BIOL 244

**Carolina Core:** SCI

**BIOL 250 - Microbiology (3 Credits)**

An introduction to bacteria and viruses, emphasizing structure, metabolism, and pathogenesis. Discussion of infectious diseases, antigen-antibody relationships, and anti-microbial agents in chemotherapy. Not available for biology major credit. Three lecture hours per week.

**Prerequisites:** College-level Biology and Chemistry.

**BIOL 250L - Microbiology Laboratory (1 Credit)**

Not available for biology major credit. Three hours per week.

**Prerequisite or Corequisite:** BIOL 250.

**BIOL 260 - Physiology (3 Credits)**

Physiology of human systems especially susceptible to disturbance: immunobiology, circulation, excretion, metabolism, endocrinology, and muscle physiology. Not for biology major credit. Intended for pharmacy students.

**Prerequisites:** BIOL 102.

**BIOL 270 - Introduction to Environmental Biology (3 Credits)**

Basic ecological principles and the impacts of human population growth and technology. Not for major credit.

**Carolina Core:** SCI

**BIOL 270L - Introduction to Environmental Biology Laboratory (1 Credit)**

Demonstrations, data analyses, discussions, and films relating to human ecology, resource use, and environmental impact. Not for major credit. Two hours per week.

**Prerequisite or Corequisite:** BIOL 270.

**Carolina Core:** SCI

**BIOL 301 - Ecology and Evolution (3 Credits)**

Concepts of evolution, populations, and population interactions; communities and ecosystems. Three lecture hours per week.

**Prerequisites:** BIOL 102 or MSCI 311.

**Graduation with Leadership Distinction:** GLD: Research

**BIOL 301L - Ecology and Evolution Laboratory (1 Credit)**

Experiments, exercises, and demonstrations. Three hours per week.

**Prerequisite or Corequisite:** BIOL 301.

**BIOL 302 - Cell and Molecular Biology (3 Credits)**

Principles of eukaryotic cell structure, molecular organization, and physiology. Genome organization and expression. Cell growth, division, and cell-cell interactions.

**Prerequisites:** C or better in BIOL 101; C or better in BIOL 102 or MSCI 311; C or better in CHEM 112 or CHEM 142.

**Graduation with Leadership Distinction:** GLD: Research

**BIOL 302L - Cell and Molecular Biology Laboratory (1 Credit)**

Experiments, exercises, and demonstrations. Three hours per week.

**Prerequisite or Corequisite:** BIOL 302.

**Experiential Learning:** Experiential Learning Opportunity

**BIOL 303 - Fundamental Genetics (3 Credits)**

Basic principles of transmission and molecular genetics; quantitative inheritance; recombination; biochemical aspects of gene function and regulation; developmental genetics and population genetics. Three lecture hours per week.

**Prerequisites:** C or better in BIOL 101 and BIOL 102 or a C or better in MSCI 311.

**BIOL 303L - Fundamental Genetics Laboratory (2 Credits)**

Observational and experimental examination of principles of genetics and inheritance.

**Prerequisites:** C or better in BIOL 101, BIOL 101L, BIOL 102, and BIOL 102L or a C or better in MSCI 311.

**Prerequisite or Corequisite:** BIOL 303.

**Experiential Learning:** Experiential Learning Opportunity

**BIOL 351 - Introduction to Animal Science (3 Credits)**

Exploration of current careers in the animal industry including a brief overview of the sciences involved in animal production such as genetics and selection, behavior, physiology, reproduction, and nutrition of cattle (beef and dairy), horses, swine, sheep, poultry, and others.

**Prerequisites:** C or better in BIOL 102.

**BIOL 398 - Laboratory Teaching Experience (1 Credit)**

Participation in preparation and teaching of undergraduate biological sciences laboratories.

**Experiential Learning:** Experiential Learning Opportunity

**BIOL 399 - Independent Study (1-6 Credits)**

Contract approved by instructor, advisor, and department head is required for undergraduate students.

**Graduation with Leadership Distinction:** GLD: Research

**BIOL 405 - Cellular and Molecular Neurobiology (3 Credits)**

Cellular and molecular mechanisms underlying the development and functions of the nervous system, such as nervous system patterning, neuronal differentiation/migration, formation of neuronal projections, development of synapses, apoptosis, refinement of neuronal circuits, and how cells and neurons respond to signals from the environment.

**Prerequisites:** BIOL 302.

**BIOL 415 - Comparative Vertebrate Anatomy (4 Credits)**

Phylogenetic and comparative aspects of anatomy, reproduction, and embryology of the vertebrates. Three lecture hours and one three-hour laboratory period per week.

**Prerequisites:** BIOL 102 or MSCI 311.

**BIOL 420 - Survey of the Plant Kingdom (3 Credits)**

Phylogenetic survey of the major plant divisions; consideration of the structure and development of flowering plants.

**Prerequisites:** C or better in BIOL 301.

**BIOL 420L - Survey of the Plant Kingdom Laboratory (1 Credit)**

Three hours per week.

**Prerequisite or Corequisite:** BIOL 420.

**BIOL 423 - Medicinal Botany (3 Credits)**

A survey of plants affecting human health and how they are used historically and in modern times, with emphasis on the biologically active constituents.

**Prerequisites:** C or better in BIOL 301 and BIOL 302.

**BIOL 425 - Plant Form and Function (3 Credits)**

Basic introduction to plants, including cellular biology, energetics, structure-function relationships, development, nutrition, and diversity.

**Prerequisites:** BIOL 302.

**BIOL 425L - Plant Form and Function Laboratory (1 Credit)**

Illustration of principles of introductory botany and plant physiology using experiments, exercises, and demonstrations. Three laboratory hours per week.

**Prerequisite or Corequisite:** BIOL 425.

**BIOL 450 - Principles of Biological Oceanography (3 Credits)**

Principles and methods of measuring production in the sea. Emphasis on the ocean's role in the global carbon budget. Three lecture hours per week. Scheduled field trips are required.

**Prerequisites:** MSCI 311, BIOL 301.

**Cross-listed course:** MSCI 450

**BIOL 460 - Advanced Human Physiology (3 Credits)**

Functional physiology of human organ systems.

**Prerequisites:** C or better in BIOL 302 or MSCI 311.

**BIOL 460L - Advanced Human Physiology Laboratory (1 Credit)**

Experiments on organ system functions using different animal models.

**Prerequisite or Corequisite:** BIOL 460 (with a grade of D or better if used as a prerequisite).

**BIOL 461 - Advanced Human Anatomy (3 Credits)**

Structure, function, and development of human anatomy.

**Prerequisites:** C or better in any two of the following: BIOL 301, BIOL 302, or BIOL 303.

**BIOL 461L - Advanced Human Anatomy Laboratory (1 Credit)**

Practical exercises in structure, function, and development of anatomy using digital and animal models.

**Prerequisite or Corequisite:** BIOL 461 (with a grade of D or better if used as a prerequisite).

**BIOL 462 - Advanced Microbiology (3 Credits)**

The taxonomy, morphology, metabolism, genetics, and ecology of microorganisms.

**Prerequisites:** C or better in BIOL 302.

**BIOL 462L - Advanced Microbiology Laboratory (1 Credit)**

Practical exercises with the taxonomy, morphology, metabolism, genetics, and ecology of microorganisms.

**Prerequisite or Corequisite:** D or better in BIOL 462.

**BIOL 465 - Domestic Animal Nutrition (3 Credits)**

Elements of nutrition and animal feeding in veterinary practice. Three lecture hours per week.

**Prerequisites:** BIOL 302.

**BIOL 497 - Undergraduate Seminar in Biological Sciences (1 Credit)**

Student seminars and a survey of research in the fields of Biological Sciences.

**Prerequisites:** BIOL 301, BIOL 302, and BIOL 303, or Instructor's Permission

**BIOL 498 - Introduction to Biological Research (4 Credits)**

Methodologies of biological research with emphasis on hypothesis formation, research design, and data collection, and current issues in biology.

**Prerequisites:** C or higher in any BIOL 300-level or higher laboratory course; C or higher in any two of BIOL 301, BIOL 302, and BIOL 303.

**Graduation with Leadership Distinction:** GLD: Research

**Experiential Learning:** Experiential Learning Opportunity

**BIOL 502 - Environmental Microbiology (3 Credits)**

An overview of the microbial world including a survey of the distribution, functioning, and diversity of microorganisms in natural systems.

Discusses the crucial roles that microorganisms play in ecosystem function, biogeochemical cycles, and environmental quality.

**Prerequisites:** MSCI 102 or BIOL 102, CHEM 112.

**Cross-listed course:** MSCI 503

**BIOL 505 - Developmental Biology (3 Credits)**

An introduction to how cell-cell communication, gene expression, cell division, cytoskeletal dynamics, and interactions with the extracellular matrix result in the differentiation, pattern formation, morphogenesis, and growth necessary to generate a new individual.

**Prerequisites:** C or better in BIOL 302.

**BIOL 505L - Developmental Biology Laboratory I (1 Credit)**

Descriptive and experimental exercises related to embryology. One three-hour laboratory per week.

**Corequisite:** BIOL 505.

**BIOL 506 - Developmental Biology II (3 Credits)**

Molecular aspects of development from gamete formation through tissue and organ differentiation in plants and animals. Three lecture hours per week.

**Prerequisites:** BIOL 505.

**BIOL 506L - Developmental Biology Laboratory II (1 Credit)**

A series of experimentally oriented laboratory exercises will be performed. One three-hour laboratory per week.

**Prerequisite or Corequisite:** BIOL 506.

**BIOL 510 - Invertebrate Zoology (4 Credits)**

Phylogenetic and comparative aspects of anatomy, physiology, reproduction, and embryology of the invertebrates. Three lecture and one three-hour laboratory period per week.

**Prerequisites:** C or better in BIOL 301 or MSCI 311.

**Cross-listed course:** MSCI 510

**Graduation with Leadership Distinction:** GLD: Research

**BIOL 523 - Plant Development (3 Credits)**

Descriptive and molecular examination of the processes and mechanisms used by plants in organogenesis, differentiation, and morphogenesis. Three lecture hours per week.

**Prerequisites:** C or better in BIOL 302 and BIOL 303.

**BIOL 523L - Plant Developmental Laboratory (1 Credit)**

Experiments utilizing a genetic approach to the study of plant development. Three laboratory hours per week.

**Corequisite:** BIOL 523.

**BIOL 524 - Mycology (4 Credits)**

Taxonomy and morphology of fungi; cultivation, life histories, and economic importance; all classes and major orders considered. Three lecture hours per week.

**Prerequisites:** BIOL 301.

**BIOL 525 - Marine Plants (4 Credits)**

Diversity, distribution, physiology, ecology, evolution, and economic importance of marine algal, seagrass, and mangrove communities. Three lecture and three laboratory hours per week. Scheduled field trips are required.

**Prerequisites:** BIOL 301 or MSCI 311.

**Cross-listed course:** MSCI 525

**BIOL 526 - The Fall Flora (4 Credits)**

Two lecture and four laboratory hours per week.

**Prerequisites:** BIOL 301.

**BIOL 527 - The Spring Flora (4 Credits)**

Two lecture and four laboratory hours per week.

**Prerequisites:** BIOL 301.

**BIOL 528 - The Summer Flora (4 Credits)**

Two lecture and four laboratory hours per week.

**Prerequisites:** BIOL 301.

**BIOL 530 - Histology (4 Credits)**

An introduction to the tissues that make up the human body. The microscopic anatomy of tissues is examined and discussed in terms of function and physiology. Three lecture hours and four laboratory hours per week.

**BIOL 531 - Parasitology (4 Credits)**

Parasites of biological, economic, and public health importance. Three lecture and three laboratory hours per week.

**Prerequisites:** 300 level Biology course or equivalent.

**Cross-listed course:** ENHS 661, EPID 661

**BIOL 534 - Animal Behavior (3 Credits)**

A comparative survey of behavior patterns of animals from protists to humans and the physiological mechanisms underlying behavior.

**Prerequisites:** BIOL 301 or MSCI 311.

**BIOL 534L - Animal Behavior Laboratory (1 Credit)**

Observational and experimental methods used in classifying animal behavior patterns and in determining underlying control mechanisms. One three-hour laboratory per week.

**Prerequisite or Corequisite:** BIOL 534.

**BIOL 535 - Fishery Management (3 Credits)**

Management and conservation of aquatic and marine resources, with emphasis on fisheries. Data procurement and analysis; commercial and recreational fisheries; sociological, political, legal, and environmental factors that affect fishery management; and fish biodiversity.

**Prerequisites:** BIOL 301.

**Cross-listed course:** MSCI 535

**BIOL 536 - Ichthyology (4 Credits)**

Phylogeny, morphology, behavior, and ecology of fishes. Three lecture and 3 laboratory hours plus three field trips to be arranged.

**Prerequisites:** BIOL 301 or MSCI 311.

**Cross-listed course:** MSCI 536

**Graduation with Leadership Distinction:** GLD: Research

**BIOL 537 - Aquaculture (3 Credits)**

Introduction to the practical and scientific aspects of the commercial culture of freshwater and marine organisms. Three lecture hours per week. One all-day field trip required.

**Prerequisites:** BIOL 301 or MSCI 311.

**Cross-listed course:** MSCI 537

**BIOL 538 - Behavior of Marine Organisms (4 Credits)**

The identification of behavioral adaptations of estuarine and marine organisms: their ecology, physiology, development, and evolutionary history; field observations.

**Prerequisites:** BIOL 101 and BIOL 102 or MSCI 311.

**Cross-listed course:** MSCI 538

**Graduation with Leadership Distinction:** GLD: Research

**BIOL 541 - Biochemistry (3 Credits)**

Description of biological macromolecules and major metabolic pathways.

**Prerequisites:** C or higher in CHEM 334.

**Cross-listed course:** CHEM 550

**BIOL 541L - Biochemistry Laboratory (1 Credit)**

Experiments and demonstrations illustrating the principles of biochemistry. Three laboratory hours per week.

**Prerequisite or Corequisite:** C or higher in CHEM 550 or BIOL 541 or CHEM 555 or BIOL 545.

**Cross-listed course:** CHEM 550L

**BIOL 543 - Comparative Physiology (3 Credits)**

An integrative and comparative study of the structure, function, and evolution of the physiological systems of animals. Three lecture hours per week.

**Prerequisites:** BIOL 302 or MSCI 311.

**BIOL 543L - Comparative Physiology Laboratory (1 Credit)**

Laboratory exercises to illustrate principles from BIOL 543. Three hours per week.

**Corequisite:** BIOL 543.

**BIOL 545 - Biochemistry/Molecular Biology I (3 Credits)**

Essentials of modern biochemistry. First semester of a two-semester course. Three lecture hours per week.

**Prerequisites:** C or higher in CHEM 334.

**Cross-listed course:** CHEM 555

**BIOL 546 - Biochemistry/Molecular Biology II (3 Credits)**

Essentials of modern biochemistry and molecular biology. Three lecture hours per week.

**Prerequisites:** C or higher in BIOL 302.

**Cross-listed course:** CHEM 556

**BIOL 549 - Plant Physiology (4 Credits)**

A general survey of the major physiological processes in plants. Two lecture and four laboratory hours per week.

**Prerequisites:** BIOL 302 and BIOL 425.

**BIOL 550 - Bacteriology (3 Credits)**

Introduction to bacteria and viruses emphasizing ultrastructure, physiology, genetics, and growth. Discussion of public health, industrial, and environmental microbiology. Three lecture hours per week.

**Prerequisites:** BIOL 302 or MSCI 311.

**Corequisite:** BIOL 550L.

**Graduation with Leadership Distinction:** GLD: Research

**BIOL 550L - Bacteriology Laboratory (1 Credit)**

Three laboratory hours per week.

**Corequisite:** BIOL 550.

**BIOL 552 - Population Genetics (3 Credits)**

An introduction to the principles of population genetics, with emphasis on the origin, maintenance, and significance of genetic variation in natural populations.

**Prerequisites:** C or better in BIOL 301 or MSCI 311.

**Cross-listed course:** MSCI 552

**Graduation with Leadership Distinction:** GLD: Research

**BIOL 553 - Genomics (3 Credits)**

Current concepts and applications of genomics, addressing questions from throughout biological inquiry.

**Prerequisites:** BIOL 301, BIOL 303.

**BIOL 558 - Stem Cells and The Physiological Environment (3 Credits)**

Discussion of how physiological factors, like nutritional status, influence systemic signals to alter stem cell activity, and the physiological stimuli that impact stem cell activity in a variety of organisms (from worms to humans).

**Prerequisites:** C or higher in BIOL 302.

**BIOL 570 - Principles of Ecology (3 Credits)**

Interactions of organisms and the environment; ecosystem structure and functions. Three lecture hours per week.

**Prerequisites:** BIOL 301 or MSCI 311.

**BIOL 570L - Principles of Ecology Laboratory (1 Credit)**

Three hours per week.

**Prerequisite or Corequisite:** BIOL 570.

**BIOL 571 - Conservation Biology (3 Credits)**

Principles of conservation biology. Importance of biodiversity, causes of decline and extinction, and restoration and conservation policy in terrestrial and aquatic ecosystems.

**Prerequisites:** C or better in BIOL 301.

**Cross-listed course:** ENVR 571

**BIOL 572 - Freshwater Ecology (3 Credits)**

Quantitative study of the population, community and evolutionary ecology of freshwater habitats (lakes, ponds, rivers, streams, wetlands). Includes mandatory fieldtrips.

**Prerequisites:** C or better in BIOL 301.

**Cross-listed course:** ENVR 572



**BIOL 573 - Insect Ecology (4 Credits)**

Processes governing insect ecology (distribution, abundance, population regulation, community assembly, and diversity patterns across the globe), and investigations of the life-history, behavior, and development of South Carolina insects.

**Prerequisites:** C or higher in BIOL 301 or MSCI 311, or permission of the instructor.

**BIOL 574 - Marine Conservation Biology (3 Credits)**

Exploration of how human activities affect marine natural populations, species, communities and ecosystems, including threats to biodiversity; approaches to marine conservation; and ecological and evolutionary responses to anthropogenic disturbance.

**Prerequisites:** BIOL 301.

**Cross-listed course:** MSCI 574

**BIOL 575 - Marine Ecology (3 Credits)**

Structure, dynamics, and interactions between populations and communities in marine ecosystems. Attendance at designated departmental seminars is required. Three lecture hours per week.

**Prerequisites:** CHEM 111 and BIOL 301 or MSCI 311.

**Cross-listed course:** MSCI 575

**BIOL 575L - Marine Ecology Laboratory (1 Credit)**

Laboratory and field exercises in coastal environments. Three hours per week plus field trips.

**Prerequisite or Corequisite:** MSCI 575 or BIOL 575.

**Cross-listed course:** MSCI 575L

**BIOL 576 - Marine Fisheries Ecology (3 Credits)**

Interdisciplinary examination of the distribution, reproduction, survival, and historical variation of the principal commercial marine fisheries.

**Prerequisites:** BIOL 301.

**Cross-listed course:** MSCI 576

**BIOL 577 - Ecology of Coral Reefs (4 Credits)**

Structure, productivity, and biodiversity of coral reefs, emphasizing their sensitivity, stability, and sustainability. Taught as an extended field experience with daily lectures and guided research activities.

**Prerequisites:** BIOL 301 or MSCI 311.

**Cross-listed course:** MSCI 577

**BIOL 588 - Genomic Data Science (3 Credits)**

This course focuses on quantitative knowledge for interdisciplinary applications in genetics as well as hands-on experience in analyzing genetic data. In this course, students will have programming exercises in using analysis tools to conduct genome-wide analysis, annotation, and interpretation of genetic data using R/Bioconductor packages.

**Prerequisites:** C or better in STAT 201 or higher.

**Cross-listed course:** STAT 588

**BIOL 599 - Topics in Biology (1-3 Credits)**

Current developments in biological sciences. Readings and research on selected topics. Course content varies and will be announced in the schedule of classes by title.

**BIOL 610 - Hallmarks of Cancer (3 Credits)**

Survey of current concepts regarding the molecular and genetic factors that regulate the origin and progression of cancer. Readings based on current primary literature.

**Prerequisites:** BIOL 302 and BIOL 303.

**BIOL 612 - Virology - Classical and Emerging Concepts (3 Credits)**

Advanced study of viruses with regard to biochemical, molecular, pathological, epidemiological, and biotechnological aspects. Focus on animal viruses with particular emphasis on human pathogens.

**Prerequisites:** C or better in BIOL 302.

**BIOL 614 - Stem Cell Biology (3 Credits)**

Focuses on the understanding of how stem cells can be used to make fundamental biological discoveries with a special focus in neuroscience.

**Prerequisites:** C or better in BIOL 302.

**BIOL 620 - Immunobiology (3 Credits)**

Basic immunological concepts including antibody structure, function, and genetics; cellular immunology; transplantation; hypersensitivity; autoimmunity; and immunity to infectious diseases.

**Prerequisites:** BIOL 302.

**BIOL 625 - Medical Mycology (3 Credits)**

Advanced study of infectious diseases caused by fungi. Etiology, symptoms, and treatment of fungi related illnesses.

**Cross-listed course:** ENHS 625

**BIOL 627 - Marine Phytoplankton (3 Credits)**

Examines the physiology and ecology of phytoplankton, including environmental controls on community composition, primary productivity, and detection and characterization of water quality (eutrophication) and harmful algal blooms.

**Prerequisites:** MSCI 102 or MSCI 450 or BIOL 450.

**Cross-listed course:** MSCI 627

**BIOL 630 - Biology of Birds (3 Credits)**

Biology of birds at molecular, organismal, and population levels, emphasizing unique adaptations of the class of Aves.

**Prerequisites:** BIOL 301, BIOL 302, and BIOL 303.

**BIOL 633 - Biology of Human Neurodevelopmental Disorders (3 Credits)**

An overview of neurodevelopmental disorders, focusing on the known genetic and environmental mechanisms leading to altered nervous system function. Discussion for each disorder will include how the nervous system is altered, the underlying biological mechanisms, and current/future treatments. Includes discussion of scientific journal articles.

**Prerequisites:** C or higher in BIOL 302.

**BIOL 634 - Biology of Neurological Diseases (3 Credits)**

Advances in molecular and cellular neurobiology that bring new understanding for human neurological disease.

**Prerequisites:** BIOL 302 and SCHC 330 or BIOL 405.

**BIOL 635 - Neurophysiology (4 Credits)**

Descriptive and experimental aspects of the neural basis of behavior, emphasizing cellular and molecular mechanisms. Two lecture and six laboratory hours per week. Three lecture hours per week.

**Prerequisites:** BIOL 302.

**BIOL 640 - Microbial Ecology (3 Credits)**

Interactions of microorganisms with each other, with more complex organisms, and with their environments. Three lecture hours per week.

**Prerequisites:** BIOL 550 and either BIOL 301 or MSCI 311.

**BIOL 641 - Biophysical Ecology (3 Credits)**

This course examines how the mechanisms by which animals and plants interact with their physical environments influence organismal physiology.

**Prerequisites:** BIOL 301, MATH 141 or MATH 122.

**BIOL 650 - Biochemical Evolution (3 Credits)**

Advanced study of related aspects of biological evolution. Role of life from physical and chemical precursors, biochemical basis of adaptation to ecological pressures, and biochemical aspects of the origins and maintenance of biodiversity.

**Prerequisites:** BIOL 301, BIOL 302, BIOL 303.

**BIOL 651 - Limnology (4 Credits)**

A study of the aquatic environment and its biota. Three lecture and four laboratory hours per week.

**Prerequisites:** BIOL 301.

**BIOL 652 - Evolutionary Biology (3 Credits)**

An advanced course in evolutionary biology, including natural selection, neutral evolution, molecular evolution population genetics, quantitative genetics, sexual selection, speciation, human evolution, and the evolution of disease.

**Prerequisites:** BIOL 301 and BIOL 303.

**BIOL 653 - Bioinformatics (3 Credits)**

Studies of the principles of genetics and molecular biology as applied to adaptive evolution of genes and genomes.

**Prerequisites:** BIOL 302, BIOL 303.

**BIOL 654 - Speciation (3 Credits)**

Speciation as the source of biological diversity. Analysis of genetic and ecological models of speciation using primary literature.

**Prerequisites:** C or better in BIOL 301 and BIOL 303.

**BIOL 655 - Biotechnology (3 Credits)**

Studies in molecular biology and genetics with emphasis on the use of newly developed techniques in biotechnology. Three lecture hours per week.

**Prerequisites:** BIOL 302 and BIOL 303.

**BIOL 656 - Experimental Biotechnology (4 Credits)**

Techniques used in biotechnology will be employed in the context of an experimental project. Twelve laboratory hours per week.

**Prerequisites:** BIOL 302, BIOL 302L.

**BIOL 660 - Biology of Mammals (4 Credits)**

Evolution, systematics, genetics, ecology, and adaptation of mammals. Emphasis on native South Carolina species. Two lectures and one two-hour laboratory per week, plus five field trips to be arranged.

**Prerequisites:** BIOL 301 or MSCI 311.

**BIOL 662 - Signal Transduction and Pathogenesis (3 Credits)**

Signaling pathways involved in human diseases, such as cancer, AIDS, autoimmune diseases and diabetes, and cellular processes involving apoptosis, cell cycle, cell-cell adhesion, growth factors, hormones, G protein-coupled receptors, cytokines and immune response.

**Prerequisites:** BIOL 302 and BIOL 303.

**BIOL 665 - Human Molecular Genetics (3 Credits)**

Molecular mechanisms underlying gene action and differentiation in man; the genetic bases for human variability and inborn metabolic errors leading to inherited diseases.

**Prerequisites:** BIOL 302 and BIOL 303.

**BIOL 667 - Molecular and Genetic Mechanisms of Disease****Pathogenesis (3 Credits)**

An advanced examination of the molecular mechanisms underlying gene action in humans. Current literature illustrating the genotype-phenotype relationship in human disease pathogenesis will be discussed.

**Prerequisites:** BIOL 302 and BIOL 303.

**BIOL 668 - Metabolic Biochemistry of Human Disease (3 Credits)**

Core concepts of biochemistry as applied to human health and disease.

**Prerequisites:** C or higher in CHEM 555/BIOL 545 or CHEM 550/BIOL 541.

**Cross-listed course:** CHEM 655

**BIOL 670 - Plant Ecology (3 Credits)**

Structure and dynamics of plant populations and communities, including life histories, adaptations, and plant interactions. Three lecture hours per week.

**Prerequisites:** BIOL 301.

**BIOL 670L - Plant Ecology (1 Credit)**

Laboratory and field exercises in plant ecology. Four hours per week.

**Prerequisite or Corequisite:** BIOL 670.

**BIOL 671 - Plant Responses to the Environment (3 Credits)**

Physiological, molecular, and genetic examination of induced plant responses to various biotic and abiotic environmental stresses.

**Prerequisites:** BIOL 302.

**BIOL 690 - Ultramicroscopy (3 Credits)**

Theoretical and practical aspects of scanning and transmission electron microscopy, digital image acquisition and energy dispersive x-ray spectroscopy. Two lecture and one laboratory hour per week, plus a research project to be arranged.

**Prerequisites:** BIOL 302 or MSCI 311.