

# COURSES FOR BIOLOGICAL SCIENCES

## Biological Sciences Courses

### BSC103 Bama Biology Bootcamp

Hours 1

Bama Biology Bootcamp (B<sup>3</sup>) is a one-week intensive program for incoming Biological Sciences majors and other freshmen enrolled in introductory biology courses. Students will learn study and time management skills that can be used across all classes.

Prerequisite(s) with concurrency: BSC 114 or BSC 118

### BSC108 Intro Biology Non Maj I

N

Hours 4

Lecture and laboratory. Not open to biology majors or minors, or pre-health professions students. Survey of the basic principles of cellular biology, genetics, plant and animal diversity, and evolution. Usually offered fall, spring, and summer. BSC 108 and BSC 109 may be taken in either order.

Natural Science

### BSC109 Intro Biology Non Maj II

N

Hours 4

Lecture and laboratory. Not open to biology majors or minors, or to pre-health professions students. Study of the physiology of living organisms with emphasis on the physiology of humans. Includes an overview of general ecology and animal behavior. Usually offered fall, spring and summer. BSC 108 and BSC 109 may be taken in either order.

Natural Science

### BSC113 Introduction to Principles of Biology

Hours 1

This course will provide students with proven strategies that are designed to improve their ability to study and learn biology. Students will gain skills in time management, inquiry-based learning techniques, logical reasoning, and critical thinking to support understanding and application of biology theory.

### BSC114 Principles Of Biology I

N

Hours 3

For biology majors, biology minors and pre-health professions students. Study of general biological principles, including the chemical basis of life; cellular biology, including cell structure and metabolism, genetics evolution; and a survey of simple organisms, including viruses, bacteria, protista and fungi. Offered fall, spring and summer. NOTE: A student must take both BSC 114 and BSC 115 in order to use either one of the courses to satisfy a portion of the natural science (N) requirement of the University Core Curriculum.

Natural Science

### BSC115 Laboratory Biology I

N

Hours 1

Laboratory Biology I.

Prerequisite(s) with concurrency: BSC 114

Natural Science

### BSC116 Principles Biology II

N

Hours 3

For biology majors, biology minors, and pre-health professions students. Study of the structure, function, and ecology of organisms, including bryophytes, vascular plants, invertebrate animals, and vertebrate animals. Offered fall, spring, and summer. NOTE: A student must take both BSC 116 and BSC 117 in order to use either one of the courses to satisfy a portion of the natural science (N) requirement of the University Core Curriculum.

Prerequisite(s): (Undergraduate level BSC 114 Minimum Grade of C- and Undergraduate level BSC 115 Minimum Grade of C-) or Undergraduate level BSC 118 Minimum Grade of C-

Natural Science

### BSC117 Laboratory Biology II

N

Hours 1

This course is a laboratory course that explores diverse life forms through experimentation and promotes the scientific process through inquiry-based investigation of organism structure and function, while promoting careful observation, analysis of biological problems and an understanding of biological principles.

Prerequisite(s) with concurrency: BSC 116

Natural Science

### BSC118 Honors General Biology I

N, UH

Hours 4

Lecture, discussion period, and laboratory. Thorough study of general biological principles, including the chemical basis of life, cellular biology, genetics, evolution, and a survey of prokaryotic organisms.

Prerequisite(s): Honors attribute or ACT score of 28 or above

Natural Science, University Honors

**BSC120 Honors Gen Biology II**

N, UH

Hours 4

Lecture, discussion period, and laboratory. Thorough study of the structure, function, physiology, and ecology of organisms, including higher and lower plants and vertebrates and invertebrate animals.

Prerequisite(s): (Undergraduate level BSC 114 Minimum Grade of C- and Undergraduate level BSC 115 Minimum Grade of C-) or Undergraduate level BSC 118 Minimum Grade of C- or ACT Composite 28 or SAT Total 1250

Natural Science, University Honors

**BSC215 Human Anatomy & Physiology I**

Hours 4

Lecture, laboratory, and laboratory lecture. Integrated survey of human anatomy and physiology that includes cellular aspects; tissues and skin; the skeletal, muscular, nervous and endocrine systems; and the special senses of sight, hearing, taste, and smell.

Prerequisite(s): BSC 108 or BSC 109 or BSC 118 or BSC 120 or BSC 114 and BSC 115; or BSC 116 and BSC 117; or CH 102 or CH 105 or CH 118

**BSC216 Human Anatomy & Physiology II**

Hours 4

Lecture, laboratory, and laboratory lecture. Integrated survey of human anatomy and physiology that includes the respiratory, circulatory, digestive, urinary, and reproductive systems.

Prerequisite(s): BSC 215

**BSC220 Biol Evol**

Hours 3

An introductory course on the evidence for evolution, mechanisms of evolutionary change, natural and sexual speciation, and common misconceptions about evolution.

**BSC242 Microbiology And Man**

N

Hours 4

For students majoring in nursing, education, and human environmental sciences. Lecture and laboratory. Introduction to microbiology with an emphasis on the relationships between man and protozoa, bacteria, viruses, and fungi. NOTE: Credit will not be granted for both BSC 242 and BSC 310.

Prerequisite(s): CH 101 or CH 100 or CH 104 or CH 117; and CH 102 or CH 105 or CH 118.

Prerequisite(s) with concurrency: BSC 108 or BSC 109 or BSC 114 or BSC 118 or BSC 215 or BSC 216

Natural Science

**BSC300 Cell Biology**

Hours 3

The course is designed to provide an understanding of the molecular basis of cell function. Topics include metabolism, gene control, cell membranes, and cell-to-cell signaling.

Prerequisite(s): (Undergraduate level BSC 114 Minimum Grade of C- or Undergraduate level BSC 118 Minimum Grade of C-) and (Undergraduate level CH 101 Minimum Grade of C- or Undergraduate level CH 100 Minimum Grade of C- or Undergraduate level CH 117 Minimum Grade of C-) and (Undergraduate level CH 102 Minimum Grade of C- or Undergraduate level CH 118 Minimum Grade of C-)

**BSC301 Cell Biology Laboratory**

Hours 3

A laboratory course that focuses on demonstrating Cell Biology principles and developing competency with basic laboratory equipment, methods, techniques and analyses. The course investigates fundamental processes while promoting observation, analysis of problems, and an understanding of biological principles.

Prerequisite(s): BSC 300

**BSC303 Field Zoology**

Hours 3

A field-based course with lecture and lab combined. A survey of the taxonomy, ecology, and identification of local biota. Offered irregularly.

Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120

**BSC304 Field Botany**

Hours 3

This course will survey the common plants, plant families and plant communities of Alabama through field trips and identification in the laboratory. Development of the identification skills necessary for ecological and wildlife professions, for both native and invasive plants, will be emphasized.

Prerequisite(s): Minimum grade of C- or above in BSC 114 and BSC 115 and BSC 116 and BSC 117 or BSC 118 and BSC 120

**BSC305 Introduction to Neuroscience**

Hours 3

This course covers the biological principles governing how the brain is organized and how it functions. It includes an introductory overview of neurobiology for those interested in biology, psychology, engineering, and pre-health majors. Introduction to Neuroscience provides an integrative view of the field, from the cellular properties of neurons to the organization of complex behavior. Specific topics covered include an overview of nervous system organization, electrical activity of neurons, synaptic transmission, properties of sensory systems, motor control, attention, sleep, memory, and emotion. To illustrate relevant concepts, the course will include discussions on several neurological diseases.

Prerequisite(s): BSC 114 OR BSC 118 with a minimum grade of C-; CH 101 OR CH 117 AND CH 102 OR CH 118 with a minimum grade of C-

**BSC310 Microbiology**

Hours 3

Lecture. Survey course on microorganisms, including protozoa, bacteria, viruses, fungi, and algae. Credit will not be granted for both BSC 310 and BSC 242.

Prerequisite(s): BSC 114; and BSC 115 or BSC 118

Prerequisite(s) with concurrency: CH 231

**BSC311 Microbiology II**

Hours 3

Fundamental course in bacteriology with emphasis on bacterial morphology, physiology, nutrition, and genetics.

Prerequisite(s): BSC 310

Prerequisite(s) with concurrency: CH 232

**BSC312 Microbiology Lab**

Hours 2

General microbiology laboratory to accompany BSC 310.

Prerequisite(s) with concurrency: BSC 310 and CH 231

**BSC313 Gen Bacteriology Lab**

W

Hours 3

Lecture and laboratory. Course presents methods for the isolation, microscopic observation, enumeration, and determination of the biochemical characteristics of bacteria. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): BSC 312

Prerequisite(s) with concurrency: BSC 311

Writing

**BSC314 Dendrology**

Hours 3

This class will be a combination of lectures, field trips, and some inside laboratory plant identification exercises. The majority of the class will be conducted in natural areas surrounding Tuscaloosa. Most class time is dedicated to lab- and field-based activities.

Prerequisite(s): BSC 114 and BSC 115 or BSC 118 and BSC 116 and BSC 117 or BSC 120 or permission of the instructor.

**BSC315 Genetics**

Hours 3

Study of transmission and function of genes, gene organization, regulation of prokaryotic and eukaryotic genes, and applications of genetics.

Prerequisite(s): BSC 114 or BSC 118; and CH 101 or CH 100 or CH 100 or CH 117; and CH 102 or CH 118

**BSC320 Freshwater Studies**

Hours 4

Introduction to freshwater natural history and ecology with specific emphasis on the common freshwater habitats of Alabama.

Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120

**BSC325 Tropical Plant Diversity**

Hours 4

The purpose of this course is to familiarize students with the relevant aspects of tropical ecosystems and tropical plants.

Prerequisite(s): BSC 114 or BSC 118; and BSC 115; and BSC 116 or BSC 120; and BSC 117

**BSC340 Principles of Natural Resources Conservation**

Hours 3

Introduces students to basic principles of natural resources conservation, including fundamental concepts in natural resource conservation and management. Examines humanity's past and present impacts on world environments; the influence of culture and the wants, needs, and desires of human beings will be integrated into the material. Discusses conservation of natural resources, including soil, water, air, forests, rangelands, energy, wildlife and fisheries, based on scientific principles.

Prerequisite(s): (BSC 114 and BSC 115 or BSC 118) OR (BSC 116 and BSC 117 or BSC 120)

**BSC360 Plant Biology**

W

Hours 4

Lecture and laboratory. This course is designed to provide you with comprehensive exposure to the subject of plant biology. You will learn about the structure, function, systematics, evolution and ecological roles of plants including algae, mosses, liverworts, ferns, gymnosperms and angiosperms. If you are a person who has over-specialized in zoology or human biology, this course will expand your horizons significantly. As a study of producers (plants!), this course will examine these organisms that are essential to life because of their position at the energy and elemental intake portion of the energy pyramid and the food web! Human survival is dependent on plants. At the end of this course students should take away an appreciation for the extensive role plants play in our ecosystem as well as our everyday life. The course will consist of lectures, laboratory experiments, group discussions and other activities relating to course material. Registration is required for both lecture and laboratory. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120

Writing

### **BSC371 Biology of Lower Plants**

*W*

Hours 4

4 Cr Hours. Lecture and Laboratory. This course is designed to provide you with comprehensive exposure to the subject of biology of lower plants. You will learn about the morphology, systematics, evolution, economic significance and ecological roles of the lower plants including cyanobacteria, algae, mosses, liverworts, fern allies and ferns with emphasis in their diversity in the southeastern USA. If you are a person who has over-specialized in zoology or human biology, this course will expand your horizons significantly. This course will examine these organisms that are essential to life because of their position at the energy pyramid and the food web, the negative effect on the environment and human health, and their commercial importance. At the end of this course students should take away an appreciation for the extensive diversity and roles the lower plants play in our ecosystem as well as our everyday life. The course will consist of lectures, laboratory experiments, group discussions and other activities relating to course material. Registration is required for both lecture and laboratory. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): BSC 114/BSC 115 and BSC 116/BSC 117, or BSC 118 and BSC 120

Writing

### **BSC373 Vertebrate Zoology**

Hours 4

Introductory course in the study of vertebrate zoology. Subjects included are principles of systematics and nomenclature, a survey of vertebrate taxa, the species concept, analysis of taxonomic characters, and an introduction to zoogeography and behavior. Credit will not be granted for both BSC 373 and MS 452.

Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120

### **BSC380 Introduction to Probability and Statistics for Biologists**

*C*

Hours 3

This course will provide an introduction to probability and statistical methods that are commonly used in the biological sciences. Practical, real-world examples from biology, ecology, and natural resources management will be used throughout the course. This course is aimed at 300-level students who intend to work with biological data, or anyone interested in statistics. Computing proficiency is required for a passing grade in this course.

Prerequisite(s): MATH 112 or MATH 115 or MATH 125 or MATH 145

Computer Science

### **BSC385 Ecology and Evolution**

Hours 3

This course introduces the student to two fundamental disciplines in biology – ecology and evolution. We introduce the student to the processes common to both disciplines and show how these have shaped the diversity and organization of life on this planet.

Prerequisite(s): MATH 112 or MATH 115 or MATH 121 or MATH 125 or MATH 145; and BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120

### **BSC386 General Ecology Lab**

Hours 3

A discussion and problem solving-based course focusing on ecological issues. Emphasis is placed on integration and practical application of ecological concepts. Students will explore theories and practice ecology at different scales of biological organization: individual, populations, species interactions, community organization and environmental processes.

Prerequisite(s): BSC 385

### **BSC390 Honors Thesis Research**

*UH*

Hours 1-8

Individual research conducted under the direction of an advisor and reported in an acceptable thesis. May be repeated over two to four semesters for a maximum 8 hours.

Prerequisite(s): BSC 315 and BSC 300 and BSC 385

University Honors

### **BSC391 Tutorial In Biol Science**

Hours 1-2

Survey of the literature relating to a topic approved by the supervising faculty member; not to include laboratory or field research. A formal paper and/or examination is required. May be taken for one credit hour in each of two consecutive semesters, or for one or two credit hours in any one semester. Offered according to demand.

Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120

### **BSC393 Biology Outreach**

*EXP, W*

Hours 2

Survey of literature, design of active learning projects and teaching science concepts to elementary students to encourage and enrich young children's interest in science. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course. A maximum of 4 hours credit may be applied to the requirements for the biology or microbiology major.

Prerequisite(s): BSC 114; and BSC 115 or BSC 116 or BSC 118; and BSC 117 or BSC 120

Experiential Learning, Writing

**BSC396 Resident Study**

Hours 1-6

Prerequisite: Written approval from the department office prior to registration. Credit awarded is determined by the extent of the student's participation but may not exceed 6 hours.

Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120

**BSC398 Undergraduate Research***EXP*

Hours 1-4

Independent research or research participation. A maximum of 4 hours credit for BSC 398 may be applied to the requirements of the biology and microbiology majors; an additional 4 hours may be taken as elective credit and applied to the 120-hour requirement.

Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120

Experiential Learning

**BSC399 Presentation of UG Research***EXP, W*

Hours 2

Exploration of the process of presenting research results in different written formats including: abstract, poster, and full journal article. How the needs for clear presentation and response to peer review can inform the experimental process will also be covered. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): BSC 398

Experiential Learning, Writing

**BSC400 Vertebrate Funct Morphol**

Hours 4

Recommended for pre-health professions students. The course focuses on the comparative anatomy of vertebrates with a broad evolutionary perspective on functional, physiological, and performance implications of anatomy. The laboratory involves hands-on activities focused on the identification of anatomical features in major groups of vertebrates. Some emphasis is given to mammals, but the course provides a comprehensive survey of vertebrates.

Prerequisite(s): BSC 114 and BSC 115; or BSC 118; and BSC 116 and BSC 117; or BSC 120; and BSC 300

**BSC401 Molecular Ecology**

Hours 3

This course examines how variation in nucleic acid or protein sequences allow organisms or populations to function within, and adapt to, their environment.

Prerequisite(s): BSC 315 Minimum Grade of C- and BSC 385 Minimum Grade of C-

**BSC403 Intro To Bsc Instruction**

Hours 2

Prerequisites: BSC 114:115 or BSC 118, BSC 116:117 or BSC 120, and junior or senior standing, formal application, and a satisfactory interview.

Prerequisite(s): BSC 114 and BSC 115; or BSC 118; BSC 116 and BSC 117; or BSC 120

**BSC404 Honors Bsc Instruction***UH*

Hours 2

Prerequisites: BSC 114:115 or BSC 118, BSC 116:117 or BSC 120, and junior or senior standing, Honors attribute, formal application, and a satisfactory interview.

Prerequisite(s): BSC 114 and BSC 115; or BSC 118; and BSC 116 and BSC 117; or BSC 120

University Honors

**BSC407 Honors Seminar In Bsc***UH*

Hours 1

Seminar and discussion. In the first semester, students present seminars based on the current literature. In the second semester, students present seminars derived from their honors theses. A maximum of 2 hours of credit for BSC 407 may be applied to the requirements of the biology or microbiology major. Offered according to demand.

University Honors

**BSC409 Pre-Health Apprenticeship I***EXP*

Hours 2

This course provides a one semester apprenticeship at a local health care facility and is intended for all pre-health professional students. This course also has a service learning component. It does not count as applicable hours for the biology major or minor.

Experiential Learning

**BSC410 Pre-Health Apprenticeship II***EXP*

Hours 2

This course provides a one semester apprenticeship at a local health care facility and is intended for all pre-health professional students. This course also has a service learning component. It does not count as applicable hours for the biology major or minor.

Experiential Learning

**BSC411 Phage Discovery Laboratory***EXP*

Hours 3

A research-based laboratory course that isolates and characterizes bacterial viruses (phages) using modern microbiology, microscopy, and molecular biology techniques.

Prerequisite(s): Minimum grade of C- in BSC 310 and BSC 312.

Experiential Learning

### **BSC412 Limnology**

Hours 3

Study of freshwater environments and the organisms that live in lakes, ponds, and streams.

Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120

### **BSC413 Cave Biology**

Hours 3

This class focuses on biology related to caves and subterranean habitats, including biodiversity, ecology, evolution, microbiology, conservation, and applications to human health.

Prerequisite(s): Minimum grade of C- or above in BSC 114 and BSC 115 or BSC 118 and BSC 116 and BSC 117 or BSC 120 and BSC 315 and BSC 385

### **BSC414 Marine Biogeography and Evolution**

Hours 3

Although the study of biogeography and evolution isn't fundamentally different in the ocean than it is on land, important differences exist in the history and pace of discovery, as well as in the mode and tempo of how biodiversity is generated, distributed, and maintained across geographic space. In this course we will focus on historical and contemporary biogeography in the marine realm, and compare and contrast evolutionary processes between marine and terrestrial ecosystems. There will be a special focus on the origin of marine biodiversity hotspots, geological processes & extinction, ocean currents, temperature gradients, depth gradients, the relative contribution of allopatric and sympatric speciation, gene flow, and effective population sizes.

Prerequisite(s): Minimum grade of C- or above in BSC 114 and BSC 115 or BSC 118 and BSC 116 and BSC 117 or BSC 120 and BSC 315 and BSC 385

### **BSC415 Wetland Ecology**

Hours 3

An in-depth analysis of wetland ecology emphasizing the biology and ecology of vascular plants, including plant adaptations to anaerobic soils, reproductive adaptations, habitat and plant zonation, and the role of plants in ecosystem function. Offered in alternate years.

Prerequisite(s): BSC 385

### **BSC416 Disease Ecology**

Hours 3

This class will focus on the study of host-pathogen interactions within the context of their environment and evolution.

Prerequisite(s): ((BSC 114 Minimum Grade of C- and BSC 115 Minimum Grade of C-) or BSC 118 Minimum Grade of C-)) and (( BSC 116 Minimum Grade of C- and BSC 117 Minimum Grade of C-) or (BSC 120 Minimum Grade of C-)) and BSC 385 Minimum Grade of C-

### **BSC417 Environmental Modeling**

EXP

Hours 3

An integrated study of quantitative principles and computer-based solution techniques important for understanding environmental systems and for environmental problem solving.

Prerequisite(s): MATH 125 and CH 101 or CH 100 or CH 117; and CH 102 or CH 118 and BSC 385

Experiential Learning

### **BSC418 Comparative Neuroanatomy**

Hours 3

This course covers the study of the general principles of neuroanatomy across invertebrates and vertebrates, including their evolutionary relationships, brain morphology, and cellular biology. Anatomy will be learned via hands-on dissection and illustrations of various neural structures from flies to sheep.

Prerequisite(s): Minimum grade of C- or better in BSC 300 and BSC 385

### **BSC419 Evolutionary Genomics**

Hours 3

Evolutionary Genomics explores fundamental aspects of genome structure and function in an evolutionary context. Course topics range from chromatin structure evolution to whole genome duplication, and explores how these genomic traits impact the evolution of different organisms.

Prerequisite(s): BSC 315 Minimum Grade of C- and BSC 385 Minimum Grade of C-

### **BSC420 Principles Of Systematics**

Hours 4

Introduction to the principles, methods, and applications of systematics to analysis of morphological and molecular data. Includes introduction to biological classifications and nomenclature.

Prerequisite(s): BSC 315 Minimum Grade of C- and BSC 385 Minimum Grade of C-

### **BSC421 Personalized and Genetic Medicine**

Hours 3

This course will examine biological techniques that are advancing medical research and care. Topics include personalized medicine, direct-to-consumer genetic testing, predictive medicine, pharmacogenomics, and preimplantation genetic diagnosis. It will also explore concomitant ethical, legal, and societal ramifications related to many of these discoveries, such as ownership of biological material, informed consent for human experimentation, the burden of knowledge regarding genetic information, eugenics, and the Genetic Information Non-Discrimination Act.

Prerequisite(s): BSC 300 and BSC 315

### **BSC422 Biology of Cancer**

Hours 3

This course is an introduction to the biological principals that explain the origins, development, pathology, and treatment of cancer. Students will work in teams assigned to particular types of cancer and will investigate what is known on various topics as related to that type of cancer.

Prerequisite(s): BSC 300 minimum grade of C- and BSC 315 minimum grade of C-



**BSC423 Honors Personalized and Genetic Medicine**

UH

Hours 3

This course will examine biological techniques that are advancing medical research and care. Topics include personalized medicine, direct-to-consumer genetic testing, predictive medicine, pharmacogenomics, and preimplantation genetic diagnosis. It will also explore concomitant ethical, legal, and societal ramifications related to many of these discoveries, such as ownership of biological material, informed consent for human experimentation, the burden of knowledge regarding genetic information, eugenics, and the Genetic Information Non-Discrimination Act.

Prerequisite(s): BSC 300 Minimum Grade of B and BSC 315 Minimum Grade of B

University Honors

**BSC424 Human Physiology**

Hours 3

Topics covered are the digestive, nervous, reproductive, immune, muscular, blood, cardiovascular, respiratory, urinary, and body-fluid systems. May be taken with BSC 425 or separately.

Prerequisite(s): BSC 300

**BSC425 Human Physiology Lab**

Hours 2

Hands-on experience for understanding the principles and mechanisms of physiological processes of the human body. Major emphases on organ system performance, whole-body metabolism, and energetics.

Prerequisite(s): BSC 424

Prerequisite(s) with concurrency: BSC 424

**BSC426 Computational Biology Lab**

EXP

Hours 3

Computational Biology Lab introduces the programming skills, statistical methods and conceptual foundations necessary to pursue computational analysis and modeling of biological systems. This course is designed for biology students, and it is not expected that students will have prior with experience with computing or programming.

Prerequisite(s): Minimum grade of C- or better in BSC 315 OR BSC 310 OR BSC 385.

Experiential Learning

**BSC427 Parasitology**

W

Hours 3

This course will cover all aspects of the biology of parasitic organisms, emphasizing current research on the ecology, natural history, significance and systematics of animal parasites. The course will explore parasites that infect humans as well as host/parasite interactions of species infesting a range of invertebrate and vertebrate hosts.

Prerequisite(s): EN 103 minimum grade of C- AND BSC 385 minimum grade of C-

Writing

**BSC428 Biology Of Fishes**

W

Hours 4

Lecture and laboratory. Survey of the structure, function, ecology, and classification of fishes. Offered in alternate years. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): BSC 385

Writing

**BSC429 Neurophysiology**

Hours 3

How do brains work? This course aims to provide an in-depth examination of quantitative, physical and chemical principles that govern nervous system function. Topics covered include electrical properties of cells, ionic homeostasis, action potential generation, synaptic transmission and the generation of stereotypic activity patterns in neural circuit and systems.

Prerequisite(s): BSC 300 with a grade of C- or better

**BSC430 Introduction to Pharmacology**

Hours 3

This course will cover the basic principles of pharmacology including mechanisms of drug action and drug absorption, distribution, metabolism, and excretion.

Prerequisite(s): BSC 300 Minimum Grade of C- and CH 231 Minimum Grade of C-

**BSC431 Pathogenic Microbiology**

Hours 3

Study of microorganisms related to health and disease with emphasis on molecular mechanism of pathogenesis. Offered in alternate years.

Prerequisite(s): BSC 310

**BSC434 Plant Systematics**

Hours 4

Lecture and laboratory. Characteristics and distribution of the major families of vascular plants as well as practice in the collection and identification of flowering plants. One weekend field trip required. Offered in alternate years.

Prerequisite(s): BSC 360

**BSC435 Immunology**

Hours 4

Thorough exploration of various aspects of modern immunology at the molecular and cellular levels.

Prerequisite(s): BSC 310

**BSC437 Epidemiology of Pathogens**

Hours 3

This course will acquaint students with the principles of epidemiology and provide an understanding of the applications of epidemiology to public health and global disease burden. Major concepts include introductions into the various applications of epidemiological studies; discrimination between epidemics caused by infectious organisms, genetic backgrounds, and human behavior; and examples of how epidemiology can be applied in a clinical setting.

Prerequisite(s): Minimum grade of C- or above in BSC 310

**BSC439 Bch/Molecular Biology Lab**  
*EXP*

Hours 3

Students participate in the generation of new knowledge, thus the experiments vary. Techniques taught include agarose gel electrophoresis, cycle sequencing, sequence analysis, plasmid purification, restriction endonuclease digestion, gel purification of DNA, ligation, transformation, primer design, PCR, gene knockouts, protein fusions, and enzyme assays.

Prerequisite(s): BSC 450

Experiential Learning

**BSC441 Developmental Biology**

Hours 3

The course provides basic information about events in developing animal systems, emphasizing cellular, molecular, and genetic research approaches to the study of development.

Prerequisite(s): BSC 300 and BSC 315

**BSC442 Integrated Genomics**  
Hours 4

An advanced discovery-based laboratory course designed to introduce the process of gene discovery and integrate modern genomics techniques and bioinformatic database usage.

Prerequisite(s): BSC 300 and BSC 315

Prerequisite(s) with concurrency: BSC 315

**BSC444 General Virology**  
Hours 3

A survey of viruses, viral replication, and viral pathogenesis, including bacterial, animal, and plant viruses. The role of viruses in molecular biology is emphasized.

Prerequisite(s): BSC 300 or BSC 310

**BSC445 Honors Endocrinology**

*UH, W*

Hours 3

A detailed examination of the vertebrate endocrine system that uses a comparative approach to explore intricate relationships between the brain, endocrine glands, hormones and target organs. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): ( (BSC 114 Minimum Grade of C- and BSC 115 Minimum Grade of C-) or BSC 118 Minimum Grade of C-) and ( (BSC 116 Minimum Grade of C- and BSC 117 Minimum Grade of C-) or BSC 120 Minimum Grade of C-) and BSC 300 Minimum Grade of C-

University Honors, Writing

**BSC446 Honors Animal Behavior**  
*UH, W*

Hours 3

This course is designed to provide modern perspectives on the study of animal behavior, pulling from fields as diverse as evolutionary biology, ecology, neurobiology and economics. However there will be a historical undercurrent which will illustrate the roots of this truly interdisciplinary field. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): ((BSC 114 Minimum Grade of C- and BSC 115 Minimum Grade of C-) or BSC 118 Minimum Grade of C-) and ((BSC 116 Minimum Grade of C- and BSC 117 Minimum Grade of C-) or BSC 120 Minimum Grade of C-) and BSC 385 Minimum Grade of C-

University Honors, Writing

**BSC448 Animal Behavior**  
*W*

Hours 3

This course is designed to provide modern perspectives on the study of animal behavior, pulling from fields as diverse as evolutionary biology, ecology, neurobiology and economics. However there will be a historical undercurrent which will illustrate the roots of this truly interdisciplinary field. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): BSC 114 and BSC 115 or BSC 118; or BSC 116 and BSC 117 or BSC 120; and BSC 385

Writing



**BSC449 Endocrinology**

W

Hours 3

A detailed examination of the vertebrate endocrine system that uses a comparative approach to explore intricate relationships between the brain, endocrine glands, hormones and target organs. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120; and BSC 300

Writing

**BSC450 Fundamentals of Biochemistry**

Hours 3

A one-semester survey of protein structure, enzymes, bioenergetics, metabolism and its regulation. Designed for advanced undergraduate students.

Prerequisite(s): BSC 300 minimum grade of C- and CH 232 minimum grade of C-

**BSC451 Molecular Biology**

Hours 3

A one-semester survey of molecular biology that emphasizes gene structure, function, and regulation of expression. Offered spring semester.

Prerequisite(s): BSC 311 or BSC 315; and BSC 450; and CH 462 or

**BSC453 Biochemistry Lab**

EXP

Hours 3

This course is an advanced laboratory course which will introduce students to some basic concepts and common modern techniques used in biochemical/molecular biology/cell biology research. A broad spectrum of techniques will be presented to students, including native protein purification from animal tissue, chromatography, electrophoresis, characterization of molecular weight and sequences of the purified protein through mass spectrometry, enzymatic kinetics studies, and spectroscopic analysis. For students who have interest and aspire to pursue a research career in biochemistry, cell biology, molecular biology, immunology and/or other related biological science areas, this course will provide basic training and experience for a smooth start for their future laboratory work.

Prerequisite(s): Minimum grade of C- or better in BSC 300 AND CH 232

Prerequisite(s) with concurrency: BSC 450

Experiential Learning

**BSC455 Chemical Ecology**

Hours 3

Chemical interactions underlie and generate the biotic environment in which we live. This course will examine chemical interactions between organisms that can happen on different levels, from cell-cell interactions, intraspecific and multitrophic-level interactions to community-wide interactions and ecological processes.

Prerequisite(s): BSC 385 Minimum Grade of C- and CH 231 Minimum Grade of C-

**BSC456 Microbial Ecology**

Hours 3

Study of microorganisms in the environment, with emphasis on their roles in energy transformations, biogeochemical cycles, and biotic interactions.

Prerequisite(s): BSC 310 or BSC 385

**BSC458 Drug Discovery Laboratory**

EXP

Hours 3

A research-based laboratory course that focuses on the identification of new drug leads from natural products using modern pharmacognosy, phytochemistry and phytopharmacology techniques.

Prerequisite(s): BSC 450 Minimum Grade of C- And CH 237 Minimum Grade of C-

Experiential Learning

**BSC460 Human Developmental Biology**

W

Hours 4

Lecture and laboratory. Development of the human embryo and fetus, including molecular, physiological, and structural aspects of morphogenesis, and functional development. Offered in alternate years. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120; and BSC 300

Writing

**BSC461 Ecohydrology**

W

Hours 3

Ecohydrology is the interdisciplinary study of how water flows through and interacts with ecosystems. In this course, students will explore fundamental concepts in hydrology; plant-water interactions and their impact on the structure and function of ecosystems; the movement of materials and energy through watersheds; and ecohydrologic concepts in natural resource management. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): (BSC 114 AND BSC 115) OR BSC 118; AND (BSC 116 AND BSC 117) OR BSC 120; AND BSC 385

Writing

**BSC462 Biological Barriers in Health and Disease**

Hours 3

The biological barriers offer a formidable separation between various compartments in the body or to the environment. Often times these are cellular barriers that when functioning properly, allow for normal healthy tissue function. However, when these barriers fail, complications such as infection, cancer, cystic fibrosis, and other diseases can occur. This course will examine the various physical and cellular barriers with special emphasis on human and biologically relevant model systems, to study their function in health and dysfunction in disease.

Prerequisite(s): BSC 300 with a C- or better grade

**BSC464 Biology Of Algae**

W

Hours 4

Freshwater and marine algae: their structure, development, taxonomy, and distribution. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): BSC 360 or BSC 310

Writing

**BSC465 Prin Of Toxicology**

Hours 3

The study of adverse effects of chemicals on living organisms and methods for predicting the likelihood of such effects, including descriptive, mechanistic, and regulatory aspects.

Prerequisite(s): BSC 300 and BSC 315

**BSC467 Honors Data Management and Visualization in R**

EXP, UH

Hours 3

An introduction to the R computing environment with emphasis on data management and visualization.

Prerequisite(s): BSC 300 Minimum Grade of B or BSC 310 Minimum Grade of B or BSC 385 Minimum Grade of B

Experiential Learning, University Honors

**BSC469 Histology Of Vertebrates**

Hours 4

Lecture and laboratory. Identification of tissue types and components, histogenesis and function of tissues.

Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120; and BSC 300

**BSC470 Principles of Population Genetics**

Hours 3

Population genetics is the study of how evolutionary forces (genetic drift, natural selection, mutation, and gene flow) affect allele and genotype frequencies in populations. Population genetics is a field with a rich theoretical history that has allowed scientists to make predictions about these evolutionary processes. With the advent of massive amounts of genetic data in many species, it is now possible to test these predictions, and a solid foundation in theory, its expectations, and assumptions is crucial for interpreting results from genetic analyses. Students should expect to learn how evolutionary forces acting on individuals affect patterns of inheritance and ultimately drive the changes we see between species.

Prerequisite(s): BSC 315 minimum grade of C- and BSC 385 minimum grade of C- or permission of the instructor.

**BSC471 Plant Physiology**

W

Hours 3

A general survey for upper-level undergraduate students covering all aspects of plant physiology including plant transport, translocation of sugars in plants, plant biochemistry, plant metabolism, plant growth and development, photosynthesis, nitrogen fixation, flowering and plant hormones. The course will consist of lectures, in-class experiments, group discussions, presentations and other activities relating to course material. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): BSC 300 and BSC 360

Writing

**BSC472 Mycology**

W

Hours 4

Lecture and laboratory. Introduction to the fungi and their biology, including aspects of their structure and function, taxonomy, genetics, and ecology. Offered in alternate years. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): BSC 310

Writing

**BSC473 Bioinformatics**

W

Hours 3

Bioinformatics BSC 473/573 covers the tools and approaches necessary to perform computational analysis of large datasets. We will focus on analyzing high-throughput sequencing data although the tools we will learn are applicable to a wide range of modern biological questions. Specific topics include operating in a UNIX/bash shell environment, scripting, genome assembly, alignment, and algorithms. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): Grade of C- or higher in BSC 315 Genetics.

Writing

**BSC475 General Entomology**

W

Hours 4

Lecture and laboratory. Survey of the structure, function, classification, and habits of insects. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): BSC 385

Writing

**BSC476 Aquatic Insects**

Hours 4

Lecture and laboratory. Survey of aquatic insects with emphasis on their identification, life histories, and ecology. Offered in alternate years.

Prerequisite(s): BSC 385

**BSC477 Invertebrate Zoology**

Hours 4

This course is designed to provide students with comprehensive exposure to the subject of invertebrate zoology. Students will learn about the diversity, taxonomy, systematics, ecology, evolution, structure, and function of invertebrates. Students will cover all animal phyla from Annelida to Xenacoelomorpha and explore diversity within phyla based on available exemplars. Students will learn about the field of invertebrate zoology in light of information gained through the use of traditional tools like electron microscopy and histology as well as new tools like genomics and evolutionary developmental biology ("evo-devo"). Students who enjoy going to zoos and aquariums should like this course. Registration is required for both lecture and laboratory. Credit will not be granted for both BSC 477 and MS 408.

Prerequisite(s): ( ( BSC 114 Minimum Grade of C- and BSC 115 Minimum Grade of C-) or BSC 118 Minimum Grade of C-) and ( ( BSC 116 Minimum Grade of C- and BSC 117 Minimum Grade of C-) or BSC 120 Minimum Grade of C-) and BSC 385 Minimum Grade of C-

**BSC478 Microbiomes in Health and Disease**

Hours 3

This class focuses on the study of host-microbiome interactions within the context of their environment, evolution, and global health.

Prerequisite(s): BSC 310 Minimum Grade of C-

**BSC480 Plant Ecology**

W

Hours 3

This course will examine the ecology of plants at different levels: individual, population and community. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): BSC 385 OR BSC 360

Writing

**BSC481 Foundations in Advanced Biostatistics with Applications to R EXP**

Hours 3

This course provides an overview to common statistical methods used in biological research, using case studies from biology, ecology, and natural resources management. The overarching objective of this course is to give students the ability to use and effectively evaluate biological data. We will demonstrate and conduct statistical analyses with an emphasis on utilizing the statistical computing language, R, to apply statistical concepts to biological and ecological data.

Prerequisite(s): BSC 380

Experiential Learning

**BSC482 Conservation Biology**

Hours 3

A thorough examination of the principles of conservation biology.

Prerequisite(s): BSC 385

**BSC483 Evolution**

Hours 3

Thorough investigation of evolution, including population genetics, molecular evolution, adaptation, and speciation.

Prerequisite(s): BSC 385 and BSC 315

**BSC484 Aquatic Biology Seminar**

Hours 1

Review and discussion of current topics in aquatic biology.

Prerequisite(s): BSC 320 and BSC 385; and BSC 412 or BSC 490

**BSC485 Foundations in Forest Resources and Conservation**

Hours 4

This course provides an introduction to the foundational ideas of forest resources and conservation. The course includes a history of the forestry profession and a variety of perspectives to develop students' knowledge of forestry field and research methods. This course also helps students develop an understanding and appreciation of the diversity of forest resources both here in Alabama and globally.

Prerequisite(s): (BSC 114 minimum grade of C- or BSC 118 minimum grade of C-) and (BSC 116 minimum grade of C- or BSC 120 minimum grade of C-) and BSC 340 minimum grade of C- or BSC 385 minimum grade of C-.

**BSC487 Biogeography**

Hours 3

Examination of the ecological and historical factors influencing the geographic distribution of plants and animals. Offered alternate years.

Prerequisite(s): BSC 385

**BSC488 Research Seminars in Biology**

*EXP*

Hours 1

This course is a one-hour weekly seminar where students will be exposed to current research being performed in the UA Department of Biological Sciences and at other institutions. Students will gain exposure and familiarity with research and current methodology being used in the fields of Ecology, Evolution and Systematics, Animal Behavior and Physiology, Microbiology and Cell and Molecular Biology.

Prerequisite(s): 6 hours or more of BSC or MS courses at the 300-400 levels.

Experiential Learning

**BSC490 Stream Ecology**

Hours 4

Lecture and laboratory. Thorough study of the structural (physical and biological) and functional attributes (energy flow, nutrient cycling, community structure) characteristic of stream and river ecosystems. Offered in alternate years.

Prerequisite(s): BSC 385

**BSC494 Honors Signal Transduction Neuroby**

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Hours 3

An advanced undergraduate seminar on current topics related to signal transduction as it pertains to the molecular basis of neurobiology and development. Offered in alternate years.

Prerequisite(s): BSC 315 Minimum Grade of B and BSC 450 Minimum Grade of B

University Honors

**BSC497 Special Topics**

*SP*

Hours 1-4

A biological sciences topic not covered in other courses. The credit hours and format are determined as appropriate to the topic, and a course title is added to the schedule of classes. Offered according to demand.

Prerequisite(s): BSC 114; and BSC 115 or BSC 118; and BSC 116; and BSC 117 or BSC 120

Special Topics Course

**MS304 Marine Geology**

Hours 4

Credit earned in this course may not be applied to the requirements of the biological sciences major or minor. Field sampling techniques, laboratory analysis of sediments, topography, sediments, and history of the world oceans.

**MS306 Marine Biology**

Hours 4

Survey of the invertebrates, vertebrates, and marine plants as communities, with emphasis on local examples.

**MS408 Marine Invertebrate Zoology**

Hours 4

Comparative study of the major marine invertebrate phyla, protozoa through protochordates. The focus is on their morphology, physiology, ecology, and phylogenetic relationships. Credit will not be granted for both MS 408 and BSC 477.

Prerequisite(s): BSC 114 AND BSC 115 OR BSC 118 AND BSC 116 AND BSC 117 OR BSC 120 with a grade of C- or higher

**MS419 Marine Ecology**

Hours 4

Bioenergetics, community structure, population dynamics, predation, competition, and specialization in marine ecosystems.

**MS433 Coastal Zone Management**

Hours 2

Review of ecological features, physical management policies for coastal communities, and a description of relevant federal and state programs.

**MS448 Intro Oceanography**

Hours 4

A general introduction to the oceans, with emphasis on chemical, physical, and geological processes and their relation to biological systems.

**MS452 Marine Vertebrate Zoology**

Hours 4

A survey of marine vertebrates, with an in-depth, comprehensive treatment of the systematics, zoogeography, and ecology of marine fishes. Field and laboratory work will stress the vertebrate fauna of the northern Gulf of Mexico with a major emphasis on fishes. Credit will not be granted for both MS 452 and BSC 373.

Prerequisite(s): BSC 114 AND BSC 115 OR BSC 118 AND BSC 116 AND BSC 117 OR BSC 120 with a grade of C- or higher

**MS453 Marine Botany**

Hours 4

Reproduction, taxonomy, systematics, distribution, and ecology of the major marine plant groups.

**MS497 Special Topics**

*SP*

Hours 1-4

A marine science topic not covered in other courses. The credit hours and format are determined as appropriate to the topic. Offered according to demand and instructor availability.

Special Topics Course