BY-Biology Courses

Courses

BY 101. Topics in Contemporary Biology. 3 Hours.  
Selected topics in the current understanding of biological systems,  
ranging from humans to ecosystems. Particular focus on scientific issues  
such as human diseases, genetic engineering, emerging infectious  
diseases, environmental causes of disease, and climate change, as well  
as analysis of these issues as presented in print and electronic media.  
NOTE: Not for biology majors or minors (with BY 102). This course,  
when taken with its corresponding laboratory, meets the Core Curriculum  
requirements for Area III: Natural Sciences.

BY 102. Topics Contemporary Biology Laboratory. 1 Hour.  
Experiments and demonstrations in contemporary biology with strong  
emphasis placed on understanding the systems of the human body.  
Drawing and writing assignments will focus on the structure and function  
of the important systems of the human body. Quantitative Literacy is a  
significant component of this course.

BY 108. Human Population and the Earth's Environment. 3 Hours.  
Influence of human population on Earth's environment. Specific attention  
will be paid to environmental issues such as population growth, climate  
change, water and energy resources, pollution, waste disposal, plant and  
animal extinctions, and food resources. Strong emphasis will be placed  
upon determining solution to the variety of environmental problems facing  
the earth. Lecture and film. Ethics and Civic Responsibility are significant  
components of this course.

BY 109. Laboratory in Environmental Science. 1 Hour.  
Experiments on topics essential to study of environment and which reveal  
complexity of solving environmental problems. Writing, Ethics and Civic  
Responsibility are significant components of this course.  
Prerequisites: BY 108 [Min Grade: D] (Can be taken Concurrently)  
or BY 108 [Min Grade: P] or ENV 108 [Min Grade: D] (Can be taken  
Concurrently) or ENV 108 [Min Grade: P] (Can be taken Concurrently)

BY 111. Extended Topics in Contemporary Biology. 3 Hours.  
Selected topics in contemporary biology of interest to students with  
minimal background in biology. Topics presented in interactive lecture/  
discussion format. This course, when taken with its corresponding  
laboratory, meets the Core Curriculum requirements for Area III: Natural  
Sciences. NOTE: Only general elective credit for biology major or minor.  
Prerequisites: BY 101 [Min Grade: D]

BY 112. Ext Topics Contemporary Biology Laboratory. 1 Hour.  
Further examination, interpretation, and discussion of topics in BY 111.  
Independent and group projects. NOTE: Only general elective credit for  
biology major or minor.  
Prerequisites: BY 111 [Min Grade: D] (Can be taken Concurrently)

BY 115. Human Anatomy. 4 Hours.  
Principles of vertebrate structure with emphasis on gross and microscopic  
human anatomy. Survey of human embryology and evolution. Lecture  
and laboratory.

BY 115L. Human Anatomy Laboratory. 0 Hours.  
Human Anatomy Lab required with BY 115 lecture.

BY 116. Introductory Human Physiology. 4 Hours.  
Integrated functions of human cells, tissues, and organ systems. NOTE:  
Only general elective credit for biology majors or minors. Lecture and  
laboratory.  
Prerequisites: BY 115 [Min Grade: C] and (CH 105 [Min Grade: C] and  
CH 106 [Min Grade: C]) or (CH 115 [Min Grade: C] and CH 116 [Min  
Grade: C]) or CH 114 [Min Grade: C]) or (CH 117 [Min Grade: C] and  
CH 118 [Min Grade: C] or CH 119 [Min Grade: C]) and BY 116L [Min  
Grade: C] (Can be taken Concurrently)

BY 116L. Introductory Human Physiology Laboratory. 0 Hours.  
Human Physiology Lab required with BY 116 lecture.  
Prerequisites: BY 116 [Min Grade: C] (Can be taken Concurrently)

BY 123. Introductory Biology I. 4 Hours.  
Basic chemistry, cell structure and function, metabolism, genetics,  
evolution, bacteria, and protists. For major in biology and related  
fields. Quantitative Literacy and Writing are significant components of  
this course. Lecture and laboratory. Eligible for, enrolled in, or have  
completed MA 106, MA 107, MA 125, or MA 126. This course meets the  
Core Curriculum requirements for Area III: Natural Sciences.  
Prerequisites: MA 106 [Min Grade: C] (Can be taken Concurrently)  
or MA 107 [Min Grade: C] (Can be taken Concurrently) or MA 125  
[Min Grade: C] (Can be taken Concurrently) or MA 225 [Min Grade: C]  
(Can be taken Concurrently) or MA 126 [Min Grade: C] (Can be taken  
Concurrently) or MA 226 [Min Grade: C] (Can be taken Concurrently)  
or MAC 17 or MAAD 24 or MTH 75 or MTH 75 or MTH 75 or MTH 5  
BY 123L. Introductory Biology I Laboratory. 0 Hours.  
Introductory Biology I Lab required with BY 123 lecture.

BY 124. Introductory Biology II. 4 Hours.  
The course emphasizes the transition from cell, to tissue, to organs  
in multicellular systems. Specific attention in the course will be paid  
to a survey of the various groups of plants, fungi, invertebrates and  
vertebrates. Strong emphasis will be placed on comparing the anatomy  
and physiology of the major organ systems in humans with those of other  
organisms. The course is designed to expand the students understanding  
of the process of scientific writing. Quantitative Literacy and Writing  
are significant components of this course. This course meets the Core  
Curriculum requirements for Area III: Natural Sciences.  
Prerequisites: BY 123 [Min Grade: C]

BY 124L. Introductory Biology II Laboratory. 0 Hours.  
Introductory Biology II Lab required with BY 124 lecture.

BY 201. Climate Change and the Environment. 3 Hours.  
This introductory course will introduce the science of climate change  
and is designed for science and non-science majors. We will discuss the  
empirically driven principles of anthropogenic climate change and why we  
have high certainty that humans have caused this rapid global change.  
Next, we will address the ecological consequences of a changing climate.  
We will cover examples from various environments including polar,  
terrestrial, and ocean ecosystems and study microbial, plant, and animal  
interactions. Finally, we will discuss potential solutions to reduce the  
impact of humans on climate change. This will include local, regional and  
worldwide strategies. Lecture. 3 credit hours.
BY 203. Aging: From Cells to Society. 3 Hours.
Americans born in the 21st century can expect to live 100 years or more. That is what some prominent aging researchers believe. Already, we are living longer than at any time in human history. Does that mean that society can expect to be overwhelmed by Alzheimer’s disease and other diseases of later life as the century progresses? Why do we age anyway? What goes wrong inside our body as we grow older? Why does it happen 5 times as fast in a dog? 30 times as fast in a mouse? What are the prospects for an aging “breakthrough” that might allow us to live much, much longer? What would be the societal impact of such a breakthrough? BY 203 is a course directed to non-majors that will address these and other questions, providing a solid background in the biology of aging, and the social implications of this biology in a rapidly changing world.
Prerequisites: BY 101 [Min Grade: C]

BY 210. Genetics. 3 Hours.
Principles and mechanisms of inheritance; structure, action, and regulation of genes; molecular genetic technology and application to human health and agriculture. Preparation for advanced courses in biology.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C]

BY 211. Genetics for Honors-HON. 3 Hours.
Genetics, a study of heredity, refers to the understanding of how DNA and its products participate in diverse biological processes, molecular pathways and signaling cascades in both prokaryotes and eukaryotes. This CURE-based course is designed to increase student engagement and therefore student learning in this complex but very important discipline of biology hands-on training on a variety of topics. Lecture/lab. 3 credit hours.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C]

BY 213. Phage Genomics I. 4 Hours.
Phage Genomics I is the first semester of a year-long lecture, laboratory, and web-enhanced course designed to provide an authentic research experience for undergraduate students. The course will address themes and techniques from across biology including microbiology, phage genetics, molecular biology, bioinformatics, and electron microscopy. Preqs: completed application (contact biology advisor) and permission of instructor. Freshmen and sophomores only.

BY 214. Phage Genomics II. 4 Hours.
This course is the second semester of a year-long lecture, laboratory, and web-enhanced class designed to provide an authentic research experience for undergraduate students. Students will learn the concepts and procedures for: annotating segments of a unique mycobacteriophage genome to indently open reading frames, genes, and regulatory sequences; compare this bacteriophage genome to other sequenced bacteriophage genomes; compare and analyze amino acid sequences to reveal relationships between species; writing and presentation of scientific results. Freshmen and sophomores only.
Prerequisites: BY 213 [Min Grade: C]

BY 215. Introduction to Genomics. 3 Hours.
This course will feature basic and introductory concepts in –omics, sequencing technologies, applications in prokaryotes and eukaryotes, particularly human genome. Moreover, we will also discuss how the next generation sequencing information can be applicable to human health, agriculture and ecology. Key concepts of computing and data science will also be introduced. This will also include basic bioinformatics and bioinformatics tools in handling and management of genomic data.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and (BY 210 [Min Grade: C] or BY 211 [Min Grade: C])

BY 216. Pathophysiology. 3 Hours.
A course about human diseases emphasizing mechanisms of injury, altered physiology, disease development and progress, clinical assessments, and treatment strategies. Specific topics include diseases on genetic defects, infections, cancers, stress, altered immune actions, nutritional problems, fluid imbalances, hormone control issues, altered blood flow, and pulmonary inadequacies. The course incorporates historical and current case load relevancy and case study analysis.
Prerequisites: BY 116 [Min Grade: C] or BY 409 [Min Grade: C] or BY 124 [Min Grade: C]

BY 220. CLOne: Chromatin Laboratory 1. 0-4 Hours.
Students will learn laboratory skills in molecular genetics, with a focuses on generating CRISPR guide RNAs and testing their efficiency in Drosophila cells. The students will be introduced to the scope of the project, read relevant literature, and will conclude their research experience by writing a journal-style report on their results.
Prerequisites: BY 123 [Min Grade: C]

BY 245. Biological Data Interpretation and Analysis. 3 Hours.
The course covers the basics of scientific investigation with an emphasis on understanding what science is, the methods of the scientific process, experimental design, data analysis and interpretation, graphical presentation, and scientific writing. Special emphasis will be placed on the understanding of statistical language and the most common types of data analyses used in biology. Quantitative Literacy is a significant component of this course. Recommend course is taken before junior year.
Prerequisites: BY 124 [Min Grade: C]

BY 255. Invertebrate Zoology. 4 Hours.
Invertebrate phyla, emphasizing evolutionary relationships, biological principles demonstrated by invertebrates, and significance of invertebrates in total ecology. Lecture and laboratory.
Prerequisites: BY 124 [Min Grade: C]

BY 255L. Invertebrate Zoology Laboratory. 0 Hours.
Invertebrate Zoology Lab required with BY 255 lecture.

BY 256. Vertebrate Zoology. 4 Hours.
Comparative approach to the structure, function, ecology, life history, and conservation of vertebrates. Lecture and laboratory.
Prerequisites: BY 124 [Min Grade: C] and CH 115 [Min Grade: C] and (CH 116 [Min Grade: C] or CH 114 [Min Grade: C])

BY 256L. Vertebrate Zoology Laboratory. 0 Hours.
Vertebrate Zoology Lab required with BY 256 lecture.

BY 260. Botany. 4 Hours.
Development, structure, physiology, and diversity of plants, emphasizing vascular plants. Lecture and laboratory.
Prerequisites: BY 124 [Min Grade: C]

BY 260L. Botany Laboratory. 0 Hours.
Botany Lab required with BY 260 lecture.

BY 261. Introduction to Microbiology. 4 Hours.
Cell structure and function, microbial genetics, viruses, and epidemiology and infectious disease. NOTE: Cannot be applied toward requirements for a biology major. Lecture and laboratory.
Prerequisites: BY 123 [Min Grade: C] or (CH 107 [Min Grade: C] and CH 108 [Min Grade: C]) or (CH 237 [Min Grade: C] and CH 238 [Min Grade: C]) or (CH 237 [Min Grade: C] and CH 239 [Min Grade: C]) or (BY 116 [Min Grade: C])

BY 261L. Introduction to Microbiology Laboratory. 0 Hours.
Introduction to Microbiology Lab required with BY 261 lecture.
BY 267. Tropical Ecology. 3 Hours.
Major tropical ecoregions; ecology of terrestrial, aquatic, and marine tropical organisms. Major portion conducted at tropical field station in Caribbean. Lecture and field trips (May session, alternate years). Permission of instructor required.
Prerequisites: BY 124 [Min Grade: C]

BY 268. Galapagos Ecology. 3 Hours.
An overview of the ecology of the Galapagos Island, with an emphasis on the ecology of terrestrial and marine organisms. Major portion of course conducted on the Galapagos Islands. Lecture & field trips. Permission of instructor required.
Prerequisites: BY 124 [Min Grade: C]

BY 269. Rain Forest Ecology. 3 Hours.
Physical and environmental factors that structure rain forest, biodiversity of life, and interactions of its organisms. Prominent biota. Major portion of course taught at tropical field station in Costa Rica. Lecture and field trips (May session, alternate years). Permission of instructor required.
Prerequisites: BY 124 [Min Grade: D]

BY 271. Biology of Microorganisms. 4 Hours.
Microbiology with emphasis on molecular aspects of microbial cell structure, function, and diversity. Host defense mechanisms, infectious disease, and microbial ecology. Preparation for advanced courses in biology. Lecture and laboratory.
Prerequisites: (BY 210 [Min Grade: C] or BY 211 [Min Grade: C]) and CH 117 [Min Grade: C] and (CH 118 [Min Grade: C] or CH 119 [Min Grade: C])

BY 271L. Biology of Microorganisms Laboratory. 0 Hours.
Biology of Microorganisms Lab required with BY 271 lecture.

BY 285. Biology Career Readiness Seminar. 1 Hour.
This course is designed to prepare biology majors for a career after graduation. In order to develop the skills and habits needed to succeed professionally, we will investigate what it means to be a professional in biology and look at strategies needed for success. Topics covered will be career exploration, networking, personal branding, career planning, strategic career search, interviewing techniques, and professional etiquette. In addition to these topics which are important for all career paths, strategies for applying to graduate and professional school will be surveyed.

BY 286. Research Skills Seminar. 1 Hour.
This course will provide an introduction to undergraduate research students joining the UAB Department of Biology. The course will guide the students through the process of joining a research lab and prepare them to begin a mentored undergraduate research experience in the following semester. While this course is open to all biology majors, it particularly focused on reaching transfer students to facilitate their engagement in undergraduate research.

BY 311. Molecular Genetics. 3 Hours.
Prokaryotic and eukaryotic gene structure and function.
Prerequisites: BY 210 [Min Grade: C] or BY 211 [Min Grade: C]

BY 314. Embryology. 3 Hours.
Descriptive and experimental studies of vertebrate development at the molecular, cellular and tissue levels.
Prerequisites: CH 117 [Min Grade: C] and CH 118 [Min Grade: C]

BY 327. Histology. 4 Hours.
Microscopic anatomy of cells, tissues, and organs of animals; correlation of structure and function. Techniques and methodology. Lecture and laboratory.
Prerequisites: BY 115 [Min Grade: C] or BY 124 [Min Grade: C]

BY 327L. Histology Laboratory. 0 Hours.
Histology Lab required with BY 327 lecture.

BY 330. Cell Biology. 3 Hours.
Structure and function of the cell, cellular components and major cellular processes. Topics include biological molecules and metabolism, energetics, synthesis and regulation of macromolecules, mechanisms for transcription and translation, membranes and organelles, small molecule transport and intracellular trafficking, cytoskeleton and cell movement, cell signaling, cell cycle, and cancer cell biology.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and CH 235 [Min Grade: C] (Can be taken Concurrently) and CH 234 [Min Grade: C] (Can be taken Concurrently) or CH 236 [Min Grade: C] (Can be taken Concurrently)

BY 340. Animal Nutrition. 3 Hours.
This course is designed for the study of comparative animal nutrition, and is targeted for biology majors with interest in Veterinary and Medical Schools. Topics include: 1. the classification and function of nutrients, 2. the anatomy, physiology and biochemistry of the gastrointestinal system, 3. nutrient procurement, 4. methods of analysis for nutrients and feed, and 5. feed formulation and manufacture.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and BY 210 [Min Grade: C]

BY 351. Plant Biology. 3 Hours.
This course introduces the student to the basic concepts of plant biology including plant diversity, structure, physiology, metabolism, reproduction, genetics, molecular biology, evolution and ecology. It is targeted to Biology Majors. This class brings together knowledge and methodologies from a number of different disciplines to provide students with an intensive and comprehensive plant curriculum from the molecular to the organismal level. In this course, students will be introduced not only to plant biology, but also to plant-specific concepts and techniques in molecular biology and genetics. Lecture. 3 credit hours.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and (BY 210 [Min Grade: C] or BY 211 [Min Grade: C])

BY 362. Neurobiology. 3 Hours.
This course teaches the biological basis of nervous system function, i.e., how the central nervous system is organized, and how neurons, synapses and neuronal circuits function in order to produce behavior. The course also provides the student with basic concepts in mammalian neuroendocrinology and age-related changes in nervous system structure and function.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C]

BY 394. Biology Laboratory Teaching. 1-6 Hour.
Student will assist in instruction of a biology laboratory. Student is required to attend scheduled preparatory sessions each week, assist in teach assigned laboratory section, help develop student assignments such as examinations and/or practicals and assist the laboratory coordinator in other capacities as assigned. Students work under the direction of the course instructor and/or the laboratory coordinator. Student must have completed the course in which the student is assisting with a grade of B or higher. Permission of the instructor is required. May be repeated for credit to a maximum of six semester hours.
BY 395. Special Topics in Biology. 1-4 Hour.
This course will consider topics from the various disciplines in the biological sciences and the topic will differ each term. Course requirements may include lecture, laboratory, readings, discussion, reporting, and internships or fieldwork, which may be conducted on- or off-campus. May be taken more than once for credit.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and (BY 210 [Min Grade: C] or BY 211 [Min Grade: C])

BY 397. Advanced Directed Readings. 1-3 Hour.
Reading and independent study in selected areas under supervision of faculty sponsor. May be repeated for total of three semester hours credit. 12 semester hours of BY with BY GPA of 3.0 and permission of instructor required.

BY 398. Undergraduate Research. 1-3 Hour.
Research project under supervision of faculty sponsor. May be repeated for a total of 3 semester hours credit. 12 semester hours of BY with GPA of 3.0 and permission of instructor required.

BY 405. Microbial Physiology. 3 Hours.
Microbial structure and function, growth, metabolism, and regulation of cellular activity.
Prerequisites: BY 271 [Min Grade: C]

BY 407. Microbial Ecology. 3 Hours.
This course examines microorganisms in their natural habitats, with a focus on soil and aquatic ecosystems as well as symbiotic interactions between microbes and animals and plants. Students will learn both theory and practical techniques for studying microbial ecology, including hands-on exposure to modern bioinformatic analysis methods for microbial communities. 3 credit hours.
Prerequisites: BY 271 [Min Grade: C]

BY 409. Principles of Human Physiology. 4 Hours.
The lecture and laboratory course uses humans as a model system to investigate physiological processes occurring at cell, tissue, organ, and system levels. Additionally the use of experimental examples and laboratory experiments and the interpretation of data will be used to understand all aspects of productivity. The class is designed to improve scientific writing skills related to research experiment. Writing and Quantitative Literacy are significant components of this course. Foundation in anatomy recommended (BY 115 or BY 256).
Prerequisites: (BY 210 [Min Grade: C] or BY 211 [Min Grade: C]) and CH 237 [Min Grade: C] and (CH 238 [Min Grade: C] or CH 239 [Min Grade: C])

BY 409L. Principles of Human Physiology Laboratory. 0 Hours.
Human Physiology Lab required with BY 408 and BY 409 lecture.

BY 410. Comparative Animal Physiology. 3 Hours.
Comparative examples to illustrate general principles of physiology; study of how animals function in their environment.
Prerequisites: BY 256 [Min Grade: C]

BY 411. Advanced Human Anatomy. 4 Hours.
Regional study of human gross anatomy by dissection of human donor bodies.
Prerequisites: BY 115 [Min Grade: C]

BY 412. 21st Century Gene Editing. 3 Hours.
The course will cover basic concepts of molecular genetics, including an introduction to the DNA biology (structure and function), the use of model organisms and experimental approaches for molecular genetic analysis and an understanding of human genetic disorders and possible genetic therapies. The first part of the course, while dealing with introductory material through lectures and discussions, will give students a hands-on experience with well-known molecular techniques like DNA isolation and polymerase chain reaction (PCR), and how these techniques are used in the context of gene editing. The participants will also have direct exposure to working with zebrafish (Danio rerio) embryos (<3 days old, therefore exempt from detailed IACUC regulations) and roundworms (C. elegans) as an alternate model system to use the CRISPR-Cas9 technology. These broadly applicable techniques will be reiterated in the second part of the course with a special emphasis on the CRISPR-Cas9 technology. The activities involved in these two parts will provide an opportunity for rich discussion on fundamental concepts in biology and chemistry, the process of scientific experimentation, and the nature of evidence.
Prerequisites: (BY 210 [Min Grade: C] or BY 211 [Min Grade: C]) and CH 235 [Min Grade: C](Can be taken Concurrently) and CH 236 [Min Grade: C](Can be taken Concurrently)

BY 414. Advanced Cell Biology. 3 Hours.
This course will focus on understanding cell signaling, function, and dynamics, which is the core of modern cell biology topics. This course is targeted for senior undergraduate students who are interested in current topics of Cell Biology and have successfully completed undergraduate courses in genetics and cell biology. Topics include the cellular organization and function, cell cycle, autophagy, apoptosis, stem cell and cellular signaling pathways. This course also includes reading of primary literature and writing a research proposal.
Prerequisites: BY 210 [Min Grade: C] and BY 330 [Min Grade: C]

BY 416. Cellular Physiology. 3 Hours.
Biochemical and thermodynamic aspects of cellular energy metabolism. Foundation in physiology recommended (BY 124, BY 116, BY 409 or BY 410).
Prerequisites: BY 330 [Min Grade: C] and CH 237 [Min Grade: C] (Can be taken Concurrently) and CH 238 [Min Grade: C] (Can be taken Concurrently) or CH 239 [Min Grade: C]

BY 419. Reproductive Physiology. 3 Hours.
Comparative reproductive physiology in mammals, with emphasis on humans.
Prerequisites: BY 256 [Min Grade: C] and CH 235 [Min Grade: C] and (CH 236 [Min Grade: C] or CH 234 [Min Grade: C])

BY 420. General Endocrinology. 3 Hours.
The central theme of this course is the role of hormone chemical messengers in the regulation of physiological processes. Topics include structure of endocrine cells and glands, hormone synthesis and chemistry, physiological effects of hormones, and mechanisms of hormone action. Emphasis is placed on vertebrate systems, but instructive invertebrate systems are also considered.
Prerequisites: BY 256 [Min Grade: C]

BY 426. Evolutionary Medicine. 3 Hours.
An evolutionary approach to issues relating to human health and disease.
Prerequisites: (BY 116 [Min Grade: C] or BY 409 [Min Grade: C]) and BY 330 [Min Grade: C]
**BY 429. Evolution. 3 Hours.**
The course includes the history of evolutionary thought and modern evolutionary theory. Discussions cover (but are not limited to) the history of life, mechanisms of evolutionary change, sexual selection, adaptation, speciation, and molecular evolution. Students will also be introduced to historical and contemporary studies of evolution on a wide variety of topics and organisms.

**Prerequisites:** BY 210 [Min Grade: C] or BY 211 [Min Grade: C]

**BY 431. Principles of DNA Technology. 3 Hours.**
Manipulation of genes and their regulation; techniques used in recombinant DNA technology. Lecture.

**Prerequisites:** (BY 210 [Min Grade: C] or BY 211 [Min Grade: C]) and BY 311 [Min Grade: C]

**BY 432. Biological Information Resources. 3 Hours.**
The National Center for Biological Information (NCBI) website is a treasure house of information and tools for researchers in all areas of modern Biology. The goal of this course is to provide guidance for students who wish to become familiar with the NCBI website through an online learning experience. They will learn many of the features available at this site and will gain experience using some of the tools. The course will be taught online consisting of 1) Guidelines for navigating through NCBI, 2) NCBI tutorials with sample questions to be answered online wherever appropriate, and 3) assignments and exams to be answered online.

**Prerequisites:** BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and (BY 210 [Min Grade: C] or BY 211 [Min Grade: C]) and BY 311 [Min Grade: C]

**BY 433. Advanced Molecular Genetics. 3 Hours.**
Molecular genetics of eukaryotic organisms, including analysis of the features and nature of eukaryotic genomes, genes, nucleosomes, and chromosomes; processes involved, such as transcription, splicing, transposition, and signal transduction. The role of molecular biology in cell growth and cancer. Lecture.

**Prerequisites:** BY 311 [Min Grade: C]

**BY 434. Functional Genomics and Systems Biology. 3 Hours.**
Systems biology is an inter-disciplinary study underlying complex biological processes as integrated systems of many interacting components. This course will give students a foundation in understanding complex biological interactions at the molecular, network and genomic level. This course will cover state-of-the-art high throughput established and novel approaches used in genome sequencing, transcriptomics, proteomics and metabolomics to obtain, integrate and analyze complex data. The students will also get familiar with knowledge on experimental perturbation of genomes, gene regulatory networks, comparative genomics and evolution, basic bioinformatics. This course will be a combination of text based lectures and discussions of the current literature relevant to Functional Genomics and Systems Biology.

**Prerequisites:** BY 210 [Min Grade: C] or BY 211 [Min Grade: C]

**BY 435. Natural History of Vertebrates. 4 Hours.**
Lecture and field study of adaptations of vertebrate classes for survival in particular environments. Survey and classification of local vertebrates. Lecture and laboratory.

**Prerequisites:** BY 256 [Min Grade: C]

**BY 435L. Natural History of Vertebrates Laboratory. 0 Hours.**
Natural History of the Vertebrates Lab required with BY 435 lecture.

**BY 436. Biological Processes in Aging. 3 Hours.**
The #1 threat to human health – far greater than cancer, heart disease, and Alzheimer’s disease combined – is aging. Aging is also a fascinating biological puzzle. Why do we, and virtually every other species, age in the first place? Why can’t nature simply maintain the body it built? This course will introduce you to the fascinating process of biological aging, its impact on human and animal life, how it evolved, and the manner in which its biology is investigated, the cellular and molecular process that underlie aging, and how efforts to slow human aging are progressing. We will cover the history of exceptionally long human and animal lives and also delve into current and historical approaches to alter the rate of aging in humans with an emphasis on current promising research areas. In covering this material we will also encounter some of the many colorful scientists who have worked on the problem of aging as well as the past and current frauds and charlatans who are just trying to make a buck off of people’s fear of death and disability.

**Prerequisites:** BY 123 [Min Grade: C] and BY 210 [Min Grade: C]

**BY 437. Epigenetics. 3 Hours.**
This course provides a survey of the field of epigenetics, introducing the student to the diverse areas of epigenetic research in a variety of eukaryotic systems. The course combines lectures with discussion of primary literature and research talks from invited faculty speakers working in epigenetics. In addition to providing an overview of the field of epigenetics, this course emphasizes working with primary scientific literature and the development of critical reading skills. Recommended that Molecular Genetics be completed prior to enrollment.

**Prerequisites:** BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and (BY 210 [Min Grade: C] or BY 211 [Min Grade: C])

**BY 440. Immunology. 3 Hours.**
Imune system and functions of host humoral and cellular immune responses. Mechanisms of antigen and antibody reactions and basic immunological methods.

**Prerequisites:** BY 271 [Min Grade: C] and BY 330 [Min Grade: C]

**BY 442. Experimental Phycology. 4 Hours.**
The course uses Algae as a model system to investigate various experimental approaches to assessing productivity with specific emphasis placed on classification, respiration, photosynthesis, growth and nutrient limitation. Additionally the use of experimental examples and laboratory experiments and the interpretation of data will be used to understand all aspects of productivity. Designed to improve scientific writing skills related to research experiments. Quantitative Literacy is a significant component of this course.

**Prerequisites:** BY 124 [Min Grade: C] and CH 117 [Min Grade: C] and (CH 118 [Min Grade: C] or CH 119 [Min Grade: C])

**BY 442L. Experimental Phycology Laboratory. 0 Hours.**
Experimental Phycology Lab required with BY 442 lecture.

**Prerequisites:** BY 124 [Min Grade: C] and CH 117 [Min Grade: C] and (CH 118 [Min Grade: C] or CH 119 [Min Grade: C])

**BY 448. Psychoneuroimmunology. 3 Hours.**
How neuroendocrine and immune systems communicate with each other. Regulatory processes mediated by interactions between these systems and application to diseases.

**Prerequisites:** BY 440 [Min Grade: C]

**BY 450. Plant Physiology. 3 Hours.**
Metabolic activities and growth processes of plants, with emphasis on photosynthesis, respiration, germination, dormancy, and hormones; physiological phenomena associated with phases of development. Lecture.

**Prerequisites:** CH 210 [Min Grade: C]
BY 456. Comparative Vertebrate Anatomy. 4 Hours.
Study of the anatomical systems of vertebrates in an evolutionary and functional context. Covers form, function, development and phylogeny of vertebrates, with overviews of organ systems, and the major adaptive events of vertebrate evolution. Labs complement lectures with dissections of representative species, and surveys of specializations in other forms. Lecture and laboratory.
Prerequisites: BY 124 [Min Grade: C]

BY 456L. Comparative Vertebrate Anatomy Lab. 0 Hours.
Comparative Vertebrate Anatomy Lab required with BY 456 lecture.
Prerequisites: BY 124 [Min Grade: C]

BY 460. Advanced Invertebrate Zoology. 3 Hours.
This course takes an in-depth look at aspects of the biology of the Echinodermata and Crustacea. The course format includes lectures, guest lectures, and student critiques of papers from the scientific literature. There is a field trip to Blunt Springs to search for echinoderm fossils. Lecture and student projects.
Prerequisites: BY 255 [Min Grade: C]

BY 467. Population Ecology. 3 Hours.
The course covers the structure and dynamics of populations with an emphasis on understanding how reproduction, mortality and dispersal interact to control fluctuations in population size and structure. Special emphasis will be placed on the use of computer models and interpretation of data to address specific applications in conservation biology and natural resource management. Quantitative literacy is a significant component of this course.
Prerequisites: BY 124 [Min Grade: C]

BY 468. Ecological Genetics. 3 Hours.
This intensive course will introduce students to the genetic tools of modern population biology – which ones are available, practical, and useful for particular questions – and how these genetic analyses have been applied to a wide variety of ecological topics, including: dispersal, life histories, recruitment, habitat and mate choice, local selection, genetic differentiation, the conservation of biodiversity, and speciation. Importantly, this course is an opportunity to become proficient at applying molecular tools to bolster ecological studies. Time will be spent in lectures and learning practical coding and data analyses.
Prerequisites: BY 210 [Min Grade: C]

BY 470. Ecology. 3 Hours.
The study of interactions between organisms and their environment. An introduction to ecological processes at individual, population, community, and ecosystem levels and their relevance to current environmental problems. Lecture.
Prerequisites: BY 255 [Min Grade: C] or BY 256 [Min Grade: C] or BY 260 [Min Grade: C] or BY 271 [Min Grade: C]

BY 474. Chemical Ecology. 3 Hours.
Study of chemical interactions between organisms or between organisms and their environment. Topics include chemical signaling between organisms, sensing of the chemical environment, and chemical defenses against predators, pathogens, biofuellers, or competitors. Students will be introduced to these topics in wide variety of terrestrial and aquatic habitats, with a special emphasis on marine organisms.
Prerequisites: BY 124 [Min Grade: C] and CH 235 [Min Grade: C]

BY 475. Comparative Developmental Biology. 3 Hours.
Mechanisms of development with emphasis on comparative biology.
Prerequisites: BY 210 [Min Grade: C] or BY 211 [Min Grade: C]

BY 480. Emergency Medicine Internship. 3 Hours.
This semester-long internship is designed to provide undergraduate students with an authentic hands-on medical research experience. The course will allow students the opportunity to assist faculty members and residents of the UAB Department of Emergency Medicine in their clinical research studies. Specifically, students will be involved in patient recruitment for the study, determine patient eligibility, reading information about the studies to patients, and collecting data regarding patient history. Students will also have the methodology associated with clinical research. Junior or senior standing, minimum GPA of 3.5, completed application and acceptance into the internship program required.

BY 485. Special Topics in Biology. 0-4 Hours.
This course will consider topics from the various disciplines in the biological sciences and the topic will differ each term. Course requirements may include lecture, laboratory, readings, discussion, reporting, and internships or fieldwork, which may be conducted on- or off-campus. May be taken more than once for credit.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and (BY 210 [Min Grade: C] or BY 211 [Min Grade: C])

BY 488. Instructional Teaching Practicum. 1 Hour.
This course is specially designed to introduce students to the learning and teaching of biology in the college classroom. We will begin our discussions with exploring current issues in biology education and the need for a reform in the light of different teaching methodologies. It will then be followed upon by easily implementable strategies for your respective weekly group discussions. These sessions will be in the form of a series of four/five workshops followed by monthly check-in dates.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C]

BY 489. Chromatin Biology Research Lab. 0-3 Hours.
This Classroom Undergraduate Research Experience is designed for students transferring to UAB and introduces them to original research in a classroom setting. The students will learn laboratory skills in molecular genetics by producing the reagents such as plasmid constructs or recombinant proteins. The students will be introduced to the scope of the project, read relevant literature, and will conclude their research experience by writing a journal-style report on their results. Thus, this course promotes proficiency in laboratory skills, writing of laboratory reports, and scientific literacy.

BY 490. Bio Capstone: Human Physiology. 4 Hours.
Physiological processes occurring at cell, tissue, organ, and system levels in mammals with emphasis on humans. Students that enroll in this capstone experience will be expected to do additional work to fulfill their biology capstone requirement. Lecture and Laboratory. Foundation in anatomy recommended (Human Anatomy or Vertebrate Zoology).
Prerequisites: BY 210 [Min Grade: C] or BY 211 [Min Grade: C] and CH 237 [Min Grade: C] and (CH 238 [Min Grade: C] or CH 239 [Min Grade: C])

BY 491. Biology Capstone - Evolution. 4 Hours.
The course introduces the history of evolutionary thought and modern evolutionary theory. Discussions cover (but are not limited to) the history of life, mechanisms of evolutionary change, sexual selection, adaptation, speciation, and molecular evolution. Students will be introduced to historical and contemporary studies of evolution on a wide variety of topics and organisms. Students that enroll in this class as their capstone experience are expected to do writing and ethics assignments to fulfill their capstone requirement.
BY 492. Biology Capstone - Undergraduate Research. 4 Hours.
Research project under supervision of faculty sponsor. Student must enroll for 4 credit hours and must have senior standing. Students who enroll in this course as their capstone experience will be required to do additional work to fulfill their biology capstone requirement.

BY 493. Biology Capstone - Honors Research. 4 Hours.
Research project under supervision of faculty sponsor. You must enroll in 4 credit hours and you must have senior standing. Students that identify this course as their capstone experience will be required to do additional work to fulfill their biology capstone requirement.

BY 495. Special Topics in Biology. 0-4 Hours.
This course will consider topics from the various disciplines in the biological sciences and the topic will differ each term. Course requirements may include lecture, laboratory, readings, discussion, reporting, and internships or fieldwork, which may be conducted on- or off-campus. May be taken more than once for credit.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and (BY 210 [Min Grade: C] or BY 211 [Min Grade: C])

BY 496. Fundamentals of Clinical Research. 3 Hours.
Issues relevant to the conduct of clinical research: ethics, hypothesis testing, study design, and data collection and management. Lecture and clinical interaction with patients. Prerequisites: Junior or Senior level biology majors; 15 hours of biology credit with a 3.5 GPA in biology courses, and permission of instructor.

BY 498. Honors Research. 1-6 Hour.
Research project for students admitted to Honors Research Program. Two or three terms required during which minimum of 6 semester hours must be earned. Grade assigned at completion of program. 18 hours of biology with minimum GPA of 3.5 in biology classes and admission to Honors Research Program required.

BY 499. Biology Seminar. 1 Hour.
Student presentations and discussions. Subject matter varies by term. See current class schedule for topic. Senior standing and permission of instructor required.