

BIOLOGY (BIOL)

BIOL 53. First-Year Seminar: Biotechnology: Genetically Modified Foods to the Sequence of the Human Genome. 3 Credits.

Restricted to first-year students. Introduction, in a first-year seminar, to recent advances in genetics and cell biology, and discussion and debate concerning how these advances are changing medicine, agriculture, and other aspects of our lives.

Gen Ed: PL.

Grading status: Letter grade.

BIOL 55. First-Year Seminar: The Roots and Flowering of Civilization: A Seminar on Plants and People. 3 Credits.

Restricted to first-year students. The focus of this first-year seminar will be on the transition from hunter-gatherer, the interchange of crops, medicinal and psychoactive plants, and organic vs. industrial farming methods.

Gen Ed: PL.

Grading status: Letter grade.

BIOL 57. First-Year Seminar: Detecting the Future: Human Diseases and Genetic Tests. 3 Credits.

Restricted to first-year students. A first-year seminar focusing on the future of human diseases and genetic tests.

Gen Ed: PL.

Grading status: Letter grade.

BIOL 61. First-Year Seminar: Sea Turtles: A Case Study in the Biology of Conservation. 3 Credits.

Restricted to first-year students. An examination of the biology and conservation of sea turtles, with an emphasis on how current scientific research informs conservation practices.

Gen Ed: PL.

Grading status: Letter grade.

BIOL 62. First-Year Seminar: Mountains Beyond Mountains: Infectious Disease in the Developing World. 3 Credits.

Restricted to first-year students. In this course we will examine the challenges of treating infectious disease in the developing world, and explore the root causes of global health care inequity. Honors version available

Gen Ed: PL, GL.

Grading status: Letter grade.

BIOL 62H. First-Year Seminar: Mountains Beyond Mountains: Infectious Disease in the Developing World. 3 Credits.

Restricted to first-year students. In this course we will examine the challenges of treating infectious disease in the developing world, and explore the root causes of global health care inequity.

Gen Ed: PL, GL.

Grading status: Letter grade.

BIOL 64. First-Year Seminar: Modeling Fluid Flow through and around Organs and Organisms. 3 Credits.

The focus of this FYS will be on organisms living within moving fluids. The natural world is replete with examples of animals and plants whose shape influences flow to their benefit. For example, the shape of a maple seed generates lift to allow for long distance dispersal. The structure of a pinecone helps it to filter pollen from the air. A falcon's form during a dive reduces drag and allows it to reach greater speeds.

Gen Ed: PL.

Grading status: Letter grade.

BIOL 65. First-Year Seminar: Pneumonia. 3 Credits.

Restricted to first-year students. Pneumonia will be a lens to examine a thread of history of biology and medicine. Current research to understand the condition, discover treatment and enact prevention options will be examined.

Gen Ed: PL.

Grading status: Letter grade.

BIOL 81. First-Year Seminar: Intuition, Initiative and Industry: Biologists as Entrepreneurs. 3 Credits.

Successful biologists are necessarily entrepreneurs. This course will explore the parallels between biology and entrepreneurship. We follow these steps: generating ideas, marketing those ideas, testing them, and producing a product.

Gen Ed: CI.

Grading status: Letter grade.

BIOL 89. First Year Seminar: Special Topics. 3 Credits.

Restricted to first-year students. This is a special topics course; content will vary.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics; 6 total credits. 2 total completions.

Grading status: Letter grade.

BIOL 101. Principles of Biology. 3 Credits.

Open to all undergraduates. This course is the prerequisite to most higher courses in biology. An introduction to the fundamental principles of biology, including cell structure, chemistry, and function; genetics; evolution; adaptation; and ecology. (See department concerning Advanced Placement credit.) Three lecture hours a week. Honors version available

Gen Ed: PX.

Grading status: Letter grade.

BIOL 101L. Introductory Biology Laboratory. 1 Credit.

An examination of the fundamental concepts in biology with emphasis on scientific inquiry. Biological systems will be analyzed through experimentation, dissection, and observation. Three laboratory hours a week. Students may not receive credit for both BIOL 101L and BIOL 102L.

Requisites: Pre- or corequisite, BIOL 101.

Gen Ed: CI.

Grading status: Letter grade.

BIOL 101H. Principles of Biology. 3 Credits.

Open to all undergraduates. This course is the prerequisite to most higher courses in biology. An introduction to the fundamental principles of biology, including cell structure, chemistry, and function; genetics; evolution; adaptation; and ecology. (See department concerning Advanced Placement credit.) Three lecture hours a week.

Gen Ed: PX.

Grading status: Letter grade.

BIOL 102L. Introductory Biology Laboratory with Research. 1 Credit.

This Course-based Undergraduate Research Experience (CURE) lab introduces students to the process of science through collaboration on a research project, learning relevant techniques and scientific skills, and presenting research results. Three laboratory hours a week. This lab can be taken in place of BIOL 101L. Students may not receive credit for both BIOL 101L and BIOL 102L.

Requisites: Pre- or corequisite, BIOL 101.

Gen Ed: CI, EE- Mentored Research.

Grading status: Letter grade.

BIOL 113. Issues in Modern Biology. 3 Credits.

For students not majoring in biology. Students who have taken any other course in the Department of Biology may not register for this course. Recent advances in the understanding of major principles in biology. Emphasis on genetics and medicine. Does not count as a course in the major. Three lecture hours a week.

Gen Ed: PL.

Grading status: Letter grade.

BIOL 117. Pre-Health Thrive-1 Considering Health Professions. 1 Credit.

This course provides exposure to a variety of health professions, emphasizing ways health care teams work together (interprofessional interactions). Self-assessments will be utilized to examine articulation between strengths and interests and the skills and competencies required in healthcare careers. Throughout the course, practitioners will provide insight into their professions such as allopathic and osteopathic medicine, podiatric medicine, veterinary medicine, optometry, dentistry, pharmacy, nursing, social work, and occupational therapy. Does not count toward major.

Grading status: Pass/Fail.

BIOL 118. Pre-Health Thrive-2 Pursuing Health Professions. 1 Credit.

This course will provide guidance to plan a path toward a profession of interest by selecting appropriate course, service, and research opportunities to include in a portfolio useful in completing applications. Application preparation and interview skills will be addressed for health professions programs such as allopathic and osteopathic medicine, podiatric medicine, veterinary medicine, optometry, dentistry, pharmacy, nursing, social work, occupational therapy, and many others. This does not count as a course in the major.

Grading status: Pass/Fail.

BIOL 150. First-Year Launch: The Creativity of Science, or Scientific Thinking in Biology. 3 Credits.

This course provides an introduction to the dynamic, creative, and open-ended process that is the scientific method. Through the analysis of news reports and primary scientific literature (covering a range of socially relevant biology topics), students will learn how to understand and interpret data, gain critical analysis skills, and begin to "think like scientists." Enrollment restricted to first-years and transfer students in their first year at UNC (transfer students, email instructor to be enrolled).

Gen Ed: PL.

Grading status: Letter grade.

BIOL 159. Prehistoric Life. 3 Credits.

Fossils and the origin and evolution of life, including micro- and macroevolution, mass extinctions, the evolution of dinosaurs and humans, and scientific perspectives on multicultural creationism.

Gen Ed: PL.

Grading status: Letter grade

Same as: GEOL 159.

BIOL 190. Special Topics in Biology at an Introductory Level. 3 Credits.

Special topics in biology at an introductory level. This course does not count as a course in the biology major.

Grading status: Letter grade.

BIOL 190L. Laboratory in Special Topics in Biology at an Introductory Level. 1 Credit.

Laboratory in special topics in biology at an introductory level. This course does not count as a course in the biology major.

Grading status: Letter grade.

BIOL 195. Introduction to Research. 1 Credit.

The research work must involve at least four hours per week of mentored research in a campus research laboratory. Does not count as a course in the major.

Repeat rules: May be repeated for credit. 2 total credits. 2 total completions.

Grading status: Pass/Fail.

BIOL 201. Ecology and Evolution. 4 Credits.

Principles governing the ecology and evolution of populations, communities, and ecosystems, including speciation, population genetics, population regulation, and community and ecosystem structure and dynamics. Three lecture hours and one recitation-demonstration-conference hour a week. Honors version available

Requisites: Prerequisites, BIOL 101 and CHEM 101 or 102; A grade of C or better in BIOL 101 and CHEM 101 or 102 required.

Gen Ed: PL, QI.

Grading status: Letter grade.

BIOL 201H. Ecology and Evolution. 4 Credits.

Principles governing the ecology and evolution of populations, communities, and ecosystems, including speciation, population genetics, population regulation, and community and ecosystem structure and dynamics. Three lecture hours and one recitation-demonstration-conference hour a week.

Requisites: Prerequisites, BIOL 101 and CHEM 101 or 102; A grade of C or better in BIOL 101 and CHEM 101 or 102 required.

Gen Ed: PL, QI.

Grading status: Letter grade.

BIOL 202. Molecular Biology and Genetics. 4 Credits.

Structure and function of nucleic acids, principles of inheritance, gene expression, and genetic engineering. Three lecture hours and one recitation-demonstration-conference hour a week. Honors version available

Requisites: Prerequisites, BIOL 101 and CHEM 101 or 102; A grade of C or better in BIOL 101 and CHEM 101 or 102 is required.

Gen Ed: PL.

Grading status: Letter grade.

BIOL 202H. Molecular Biology and Genetics. 4 Credits.

Structure and function of nucleic acids, principles of inheritance, gene expression, and genetic engineering. Three lecture hours and one recitation-demonstration-conference hour a week.

Requisites: Prerequisites, BIOL 101 and CHEM 101 or 102; A grade of C or better in BIOL 101 and CHEM 101 or 102 is required.

Gen Ed: PL.

Grading status: Letter grade.

BIOL 205. Cellular and Developmental Biology. 4 Credits.

Fundamentals of cell structure and activity in relation to special functions, metabolism, reproduction, embryogenesis, and with an introduction to the experimental analysis of cell physiology and development. Three lectures and one recitation-demonstration-conference hour a week. Honors version available

Requisites: Prerequisite, BIOL 202; a grade of C- or better in BIOL 202 is required.

Grading status: Letter grade.

BIOL 205H. Cellular and Developmental Biology. 4 Credits.

Fundamentals of cell structure and activity in relation to special functions, metabolism, reproduction, embryogenesis, and with an introduction to the experimental analysis of cell physiology and development. Three lectures and one recitation-demonstration-conference hour a week.

Requisites: Prerequisite, BIOL 202.

Grading status: Letter grade.

BIOL 211. Introduction to Research in Biology. 3 Credits.

Seminar based on current investigations at UNC. Students examine sources of scientific information, explore the logic of investigation, and develop proposals. Students with BIOL 211 credit may take a maximum of three hours of BIOL 395.

Requisites: Prerequisite, BIOL 201 or 202; permission of the instructor for students lacking the prerequisite; Not open to seniors.

Grading status: Letter grade.

BIOL 213. Evolution and Life. 3 Credits.

For students not majoring in biology. Introduction to the scientific study of biological evolution and its applications. The mechanisms that cause evolution and general patterns of evolution during the history of life. Does not count as a course in the major.

Requisites: Prerequisite, BIOL 101; permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 214H. Mathematics of Evolutionary Processes. 3 Credits.

This Course-based Undergraduate Research Experience (CURE) class teaches students how scientists use mathematics to approach questions in evolutionary biology and ecology. Students learn both biological and mathematical concepts, taught using an array of pedagogical approaches. There are two group projects over the course of the semester, one involving the development of an original mathematical model.

Requisites: Prerequisites, BIOL 101 and MATH 231; permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 214. Mathematics of Evolutionary Processes. 3 Credits.

This Course-based Undergraduate Research Experience (CURE) class teaches students how scientists use mathematics to approach questions in evolutionary biology and ecology. Students learn both biological and mathematical concepts, taught using an array of pedagogical approaches. There are two group projects over the course of the semester, one involving the development of an original mathematical model. Honors version available

Requisites: Prerequisites, BIOL 101 and MATH 231; permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 217. The Physician's Garden. 3 Credits.

First-year transfer students only. This course combines human cell biology and classical botany elaborating the mode of action of plant metabolites in humans. Hands-on experience includes visits to a pharmaceutical company, a botanical garden, and maintaining the campus medicinal garden.

Requisites: Prerequisite, BIOL 101.

Grading status: Letter grade.

BIOL 221. Seafood Forensics. 3 Credits.

In this Course-based Undergraduate Research Experience (CURE) class, students will use forensic sciences (primarily DNA barcoding technology) to quantify seafood mislabeling. Students will learn the importance of food labeling as well as its impact on marine ecosystems and human health.

Requisites: Prerequisite, BIOL 101; corequisite, BIOL 221L; permission of the instructor for students lacking the requisites.

Grading status: Letter grade.

BIOL 221L. Seafood Forensics Laboratory. 1 Credit.

In this Course-based Undergraduate Research (CURE) lab, students will use forensic sciences (primarily DNA barcoding technology) to quantify seafood mislabeling. Students will perform experiments based on hypotheses formulated in the co-requisite lecture course.

Requisites: Prerequisite, BIOL 101; corequisite, BIOL 221; permission of the instructor for students lacking the requisites.

Gen Ed: EE- Mentored Research.

Grading status: Letter grade.

BIOL 224H. The Mathematics of Life. 3 Credits.

An accessible treatment of classic mathematical applications to molecules, cells, development, genetics, ecology, and evolution, complementing the material taught in BIOL 201, 202, and 205. Three lecture hours a week.

Requisites: prerequisite, MATH 231; Permission of the instructor for students lacking the prerequisite. Co-requisite, BIOL 224L;

Grading status: Letter grade.

BIOL 224L. The Mathematics of Life Laboratory. 1 Credit.

An accessible treatment of classic mathematical applications to molecules, cells, development, genetics, ecology, and evolution, complementing the material taught in BIOL 201, 202, and 205. This lab component is programming-based.

Requisites: prerequisite, MATH 231; Permission of the instructor for students lacking the prerequisite. Co-requisite, BIOL 224H;

Grading status: Letter grade.

BIOL 226. Mathematical Methods for Quantitative Biology. 3 Credits.

Introduction to quantitative biology with emphasis on applications that use mathematical modeling, linear algebra, differential equations, and computer programming. Applications may include neural networks, biomechanics, dispersion, and systems of biochemical reactions. Three lecture hours a week.

Requisites: Prerequisites, BIOL 201 or 202, and MATH 232 or 283. Corequisite, BIOL 226L.

Gen Ed: QI.

Grading status: Letter grade.

BIOL 226L. Mathematical Methods for Quantitative Biology Laboratory. 1 Credit.

Introduction to quantitative biology with emphasis on applications that use mathematical modeling, linear algebra, differential equations, and computer programming. Applications may include neural networks, biomechanics, dispersion, and systems of biochemical reactions. Three laboratory hours a week.

Requisites: Prerequisites, BIOL 201 or 202, and MATH 232 or 283. Corequisite, BIOL 226.

Grading status: Letter grade.

BIOL 251. Introduction to Human Anatomy and Physiology. 3 Credits.

This course relates the way in which the human body is constructed to the way in which it functions and is controlled. Students may not receive credit for both BIOL 251 and BIOL 252. Only offered through Continuing Studies.

Gen Ed: PX.

Grading status: Letter grade.

BIOL 251L. Human Physiology Virtual Laboratory. 1 Credit.

permission of the instructor for students lacking the prerequisite. This is a course of simulated laboratory measurements exercises using typical data derived from actual physiological measurements on human subjects. Only offered through continuing education. Students may not receive credit for both BIOL 251L and BIOL 252.

Requisites: Pre- or corequisite, BIOL 251;

Grading status: Letter grade.

BIOL 252. Fundamentals of Human Anatomy and Physiology. 3 Credits.

One biology course over 200 recommended. An introductory but comprehensive course emphasizing the relationship between form and function of the body's organ systems. Three lecture hours each week. Students may not receive credit for BIOL 252 and BIOL 251 or BIOL 251L or BIOL 352 or BIOL 353.

Requisites: Prerequisite, BIOL 101. Corequisite, BIOL 252L.

Gen Ed: PX.

Grading status: Letter grade.

BIOL 252L. Fundamentals of Human Anatomy and Physiology Laboratory. 1 Credit.

Organ level human structure and function. Three laboratory hours a week.

Requisites: Prerequisite, BIOL 101, and BIOL 101L or BIOL 102L; Corequisite, BIOL 252; Permission of the instructor for students lacking the pre- or corequisite.

Grading status: Letter grade.

BIOL 253L. Advanced Human Anatomy and Physiology Laboratory. 1 Credit.

In-depth study of physiological mechanisms by hands-on experimentation. Students gain experience in collecting, analyzing, and presenting human physiological data.

Requisites: Prerequisites, BIOL 252 and 252L; corequisite, BIOL 253.

Grading status: Letter grade.

BIOL 253. Advanced Human Anatomy and Physiology. 3 Credits.

In-depth study of physiological mechanisms at molecular, cellular, and system levels of organization. Students will develop analytical and problem solving skills. Intended for preprofessional students requiring a second semester of anatomy and physiology. Can be used as an allied science elective but not a biology elective course for the major or minor.

Requisites: Prerequisites, BIOL 252 and 252L; Corequisite, BIOL 253L.

Grading status: Letter grade.

BIOL 255. The Evolution of Extraordinary Adaptations. 3 Credits.

In this Course-based Undergraduate Research (CURE) class, students will learn how to do science. This includes formulating a question, collecting data, and statistical analysis, to presenting research results. Students will test new hypotheses in ecology and evolution for spectacular adaptations in the Venus flytrap and the scale-eating pupfish using field and laboratory experiments and observations. Honors version available

Requisites: Prerequisite, BIOL 101 and 101L; a grade of B or better in BIOL 101 is required. Corequisite, BIOL 255L.

Grading status: Letter grade.

BIOL 255L. The Evolution of Extraordinary Adaptations Laboratory. 1 Credit.

In this Course-based Undergraduate Research Experience (CURE) lab, students will learn how to do science. This includes formulating a question, collecting data, and statistical analysis, to presenting research results. Students will test new hypotheses in ecology and evolution for spectacular adaptations in the Venus flytrap and the scale-eating pupfish using field and laboratory experiments and observations.

Requisites: Prerequisite, BIOL 101 and 101L; corequisite, BIOL 255.

Grading status: Letter grade.

BIOL 255H. The Evolution of Extraordinary Adaptations. 3 Credits.

In this Course-based Undergraduate Research (CURE) class, students will learn how to do science. This includes formulating a question, collecting data, and statistical analysis, to presenting research results. Students will test new hypotheses in ecology and evolution for spectacular adaptations in the Venus flytrap and the scale-eating pupfish using field and laboratory experiments and observations.

Requisites: Prerequisite, BIOL 101 and 101L; a grade of B or better in BIOL 101 is required. Corequisite, BIOL 255L.

Grading status: Letter grade.

BIOL 256. Mountain Biodiversity. 4 Credits.

Introduction to the new field of biodiversity studies, which integrates approaches from systematics, ecology, evolution, and conservation. Taught at off-campus field station.

Grading status: Letter grade

Same as: ENEC 256.

BIOL 271. Plant Biology. 3 Credits.

Designed for students with an interest in natural sciences. An introduction to the principles of botany including structure, function, reproduction, heredity, environmental relationships, evolution and classification of plants. Three lecture hours a week.

Requisites: Prerequisites, BIOL 101, and BIOL 101L or BIOL 102L; corequisite, BIOL 271L.

Gen Ed: PX.

Grading status: Letter grade.

BIOL 271L. Plant Biology Laboratory. 1 Credit.

Designed for students with an interest in natural sciences. An introduction to the principles of botany including structure, function, reproduction, heredity, environmental relationships, evolution and classification of plants. Three laboratory hours a week.

Requisites: Prerequisites, BIOL 101, and BIOL 101L or BIOL 102L; corequisite, BIOL 271.

Grading status: Letter grade.

BIOL 272. Local Flora. 4 Credits.

Open to all undergraduates. North Carolina's flora: recognition, identification, classification, evolution, history, economics, plant families, ecology, and conservation. Three lecture and three laboratory hours per week.

Requisites: Prerequisites, BIOL 101, and 101L or 102L.

Gen Ed: PX.

Grading status: Letter grade

Same as: ENEC 272.

BIOL 273. Horticulture. 4 Credits.

The cultivation, propagation and breeding of plants, with emphasis on ornamentals. Control of environmental factors for optimal plant growth. Laboratory exercises include plant culture, propagation, pruning, and identification of common ornamentals. Two lecture, one recitation, and three laboratory hours a week.

Requisites: Prerequisite, BIOL 101.

Gen Ed: PX.

Grading status: Letter grade.

BIOL 274. Plant Diversity. 3 Credits.

Survey of major groups of plants emphasizing interrelationships and comparative morphology. Culturing techniques and field work included. Three lecture hours a week.

Requisites: Prerequisites, BIOL 101, and BIOL 101L or BIOL 102L; corequisite, BIOL 274L.

Gen Ed: PX, EE- Field Work.

Grading status: Letter grade.

BIOL 274L. Plant Diversity Laboratory. 1 Credit.

Survey of major groups of plants emphasizing interrelationships and comparative morphology. Culturing techniques and field work included. Three laboratory hours a week.

Requisites: Prerequisites, BIOL 101, and BIOL 101L or BIOL 102L; corequisite, BIOL 274.

Grading status: Letter grade.

BIOL 277. Vertebrate Field Zoology. 3 Credits.

Introduction to the diversity, ecology, behavior, and conservation of living vertebrates. Three lecture hours a week.

Requisites: Prerequisites, BIOL 101, and BIOL 101L or BIOL 102L.

Gen Ed: PX.

Grading status: Letter grade.

BIOL 277L. Vertebrate Field Zoology Laboratory. 1 Credit.

Permission of the instructor for students lacking the corequisite. Study of the diversity of vertebrates in the field. Three laboratory and field hours a week, including one or two weekend trips.

Requisites: Corequisite, BIOL 277;

Gen Ed: EE- Field Work.

Grading status: Letter grade.

BIOL 278. Animal Behavior. 3 Credits.

Introduction to animal behavior with emphases on the diversity and adaptation of behavior in natural conditions. Three lecture hours a week.

Requisites: Prerequisites, BIOL 101, and BIOL 101L or BIOL 102L.

Gen Ed: PX.

Grading status: Letter grade.

BIOL 278L. Animal Behavior Laboratory. 1 Credit.

Techniques of observation and experiments in animal behavior. Three laboratory hours a week.

Requisites: Pre- or corequisite, BIOL 278.

Grading status: Letter grade.

BIOL 279. Seminar in Organismal Biology. 2-3 Credits.

Permission of the instructor. An undergraduate course devoted to consideration of pertinent aspects of a selected organismal biological discipline.

Gen Ed: PL.

Grading status: Letter grade.

BIOL 279L. Topics in Organismal Biology Laboratory. 1-2 Credits.

Permission of the instructor. An undergraduate laboratory course covering aspects of a specific organismal biological discipline. Laboratory reports will be required. Research work is not included in this course.

Grading status: Letter grade.

BIOL 290. Special Topics in Biology. 1-3 Credits.

Permission of the instructor. An undergraduate seminar course devoted to consideration of pertinent aspects of a selected biological discipline. Honors version available

Gen Ed: PL.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics; 9 total credits. 3 total completions.

Grading status: Letter grade.

BIOL 290L. Special Topics in Biology Laboratory. 1-2 Credits.

Permission of the instructor. An undergraduate laboratory course covering aspects of a specific biological discipline. Laboratory reports will be required. Research work is not included in this course.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics; 6 total credits. 3 total completions.

Grading status: Letter grade.

BIOL 290H. Special Topics in Biology. 1-3 Credits.

Permission of the instructor. An undergraduate seminar course devoted to consideration of pertinent aspects of a selected biological discipline.

Gen Ed: PL.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics; 9 total credits. 3 total completions.

Grading status: Letter grade.

BIOL 291. Teaching Apprentice in Biology. 1 Credit.

Permission required. 3.0 or higher in course taught. Experience includes preparations, demonstrations, assistance, and attendance at weekly meetings. Apprentices will not be involved in any aspects of grading. May be repeated for credit.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics; 3 total credits. 3 total completions.

Grading status: Pass/Fail.

BIOL 292. Teaching Assistant in Biology. 2 Credits.

Permission required. 3.0 in course taught. Experience includes weekly meetings, preparations, demonstrations, instruction, and grading. May be repeated for credit. Six hours per week.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics; 6 total credits. 3 total completions.

Grading status: Pass/Fail.

BIOL 293. Undergraduate Internship in Biology. 3 Credits.

Permission of the instructor. Biology majors only. The sponsored, off-campus work must involve at least 135 hours. Does not count as a course in the major.

Requisites: Prerequisite, BIOL 201 or 202.

Gen Ed: EE- Academic Internship.

Grading status: Letter grade.

BIOL 294. Service Learning in Biology: APPLES. 1-2 Credits.

Permission of the instructor. APPLES service-learning component for students enrolled in biology courses. Does not count as a course in the major. Honors version available

Gen Ed: EE- Service Learning.

Grading status: Letter grade.

BIOL 294H. Service Learning in Biology: APPLES. 1-2 Credits.

Permission of the instructor. APPLES service-learning component for students enrolled in biology courses. Does not count as a course in the major.

Gen Ed: EE- Service Learning.

Grading status: Letter grade.

BIOL 296. Directed Readings in Biology. 1-3 Credits.

Permission of the instructor. Extensive and intensive reading of the literature of a specific biological field directly supervised by a member of the biology faculty. Written reports on the readings, or a literature review paper will be required. Cannot be used as a course toward the major.

Honors version available

Grading status: Letter grade.

BIOL 296H. Directed Readings in Biology. 1-3 Credits.

Permission of the instructor. Extensive and intensive reading of the literature of a specific biological field directly supervised by a member of the biology faculty. Written reports on the readings, or a literature review paper will be required. Cannot be used as a course toward the major.

Grading status: Letter grade.

BIOL 350. Oceanography. 3 Credits.

Required preparation, major in a natural science or two courses in natural sciences. Studies origin of ocean basins, seawater chemistry and dynamics, biological communities, sedimentary record, and oceanographic history. Term paper. Students lacking science background should see MASC 101. Students may not receive credit for both MASC 101 and MASC 401.

Grading status: Letter grade

Same as: MASC 401, ENVR 417, GEOL 403.

BIOL 390. Special Topics in Biology. 1-3 Credits.

Special topics course. Content and topics will vary each semester.

Repeat rules: May be repeated for credit. 9 total credits. 3 total completions.

Grading status: Pass/Fail.

BIOL 395. Undergraduate Research in Biology. 1-3 Credits.

Permission of the instructor. Majors only. Hands-on research in the laboratory and/or field involving the study of biology. Requires written paper (first semester) or research poster (second semester). Up to five total hours counts as a lecture course. Six total hours counts as a biology elective with laboratory. Honors version available

Requisites: Prerequisite, BIOL 201 or 202.

Gen Ed: EE- Mentored Research.

Repeat rules: May be repeated for credit. 6 total credits. 3 total completions.

Grading status: Letter grade.

BIOL 395H. Undergraduate Research in Biology. 1-3 Credits.

Permission of the instructor. Majors only. Hands-on research in the laboratory and/or field involving the study of biology. Requires written paper (first semester) or research poster (second semester). Up to five total hours counts as a lecture course. Six total hours counts as a biology elective with laboratory.

Requisites: Prerequisite, BIOL 201 or 202.

Gen Ed: EE- Mentored Research.

Repeat rules: May be repeated for credit. 6 total credits. 3 total completions.

Grading status: Letter grade.

BIOL 402. Infectious Disease in the Developing World. 3 Credits.

We will explore the challenges of infectious disease in the developing world, focusing on tuberculosis, HIV, and malaria. We will also examine the economics of different approaches to health care.

Requisites: Prerequisites, BIOL 202 and 205.

Grading status: Letter grade.

BIOL 409L. Art and Science: Merging Printmaking and Biology. 1 Credit.

Permission of the instructor. This is the lab component of ARTS 409 that brings together art majors and science majors to combine theory and practical learning in a biology laboratory, which focusing primarily on microscopic life and biological motion, with printmaking. Does not count as an elective towards the biology major.

Requisites: Prerequisite, BIOL 201, BIOL 202, or a 200-level ARTS course; corequisite, ARTS 409.

Grading status: Letter grade.

BIOL 410. Principles and Methods of Teaching Biology. 4 Credits.

This Makerspace designed course will develop the knowledge and skills teachers need to implement inquiry-based biology instruction: rich, conceptual knowledge of biology and mastery of inquiry-based teaching methods. Does not count as a laboratory course.

Requisites: Prerequisites, two of the three biology core courses: BIOL 201, 202, and/or 205.

Gen Ed: EE- Field Work.

Grading status: Letter grade.

BIOL 421L. Microbiology Laboratory with Research. 2 Credits.

Sterile technique, bacterial growth, physiology, genetics and diversity, and bacteriophage. Research in bacterial genetics.

Requisites: Pre- or corequisite, BIOL 422.

Gen Ed: EE- Mentored Research.

Grading status: Letter grade.

BIOL 422. Microbiology. 3 Credits.

Bacterial form, growth, physiology, genetics, and diversity. Bacterial interactions including symbiosis and pathogenesis (animal and plant). Use of bacteria in biotechnology. Brief introduction to viruses.

Requisites: Prerequisite, BIOL 202; permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 422L. Microbiology Laboratory. 1-2 Credits.

Sterile technique, bacterial growth and physiology, bacterial genetics, bacteriophage, and bacterial diversity.

Requisites: Pre- or corequisite, BIOL 422.

Grading status: Letter grade.

BIOL 423. Genetics Experiments. 3 Credits.

This is a Course-based Undergraduate Research Experience (CURE) combination course/lab. Using genetics and genome biology, students will study DNA repair and chromosome stability using yeast as a model system in a cutting edge research laboratory.

Requisites: Prerequisite, BIOL 202; corequisite, BIOL 423L.

Grading status: Letter grade.

BIOL 423L. Genetics Experiments Laboratory. 1 Credit.

This is a Course-based Undergraduate Research Experience (CURE) combination course/lab. Using genetics and genome biology, students will study DNA repair and chromosome stability using yeast as a model system in a cutting edge research laboratory.

Requisites: Prerequisite, BIOL 202; corequisite BIOL 423.

Gen Ed: EE- Mentored Research.

Grading status: Letter grade.

BIOL 424. Microbial Ecology. 3 Credits.

Class emphasizes the creativity of the scientific process, using primary scientific literature as a framework to discuss topics in microbial ecology, including microbial diversity, distributions, genomics, and co-evolution; host-microbe and microbe-microbe interactions; nutrient cycling; and degradation of plant matter and biofuels.

Requisites: Prerequisites, BIOL 201 and 202; permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 425. Human Genetics. 3 Credits.

Pedigree analysis, inheritance of complex traits, DNA damage and repair, human genome organization, DNA fingerprinting, the genes of hereditary diseases, chromosomal aberrations, cancer and oncogenes, immunogenetics and tissue transplants. Three lecture hours a week.

Requisites: Prerequisite, BIOL 202; permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 426. Biology of Blood Diseases. 3 Credits.

An introduction to the biology and pathophysiology of blood and the molecular mechanisms of some human diseases: anemias; leukemias; hemorrhagic, thrombotic, and vascular disorders; and HIV disease/AIDS. Honors version available

Requisites: Prerequisite, BIOL 205; Permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade

Same as: PATH 426.

BIOL 426H. Biology of Blood Diseases. 3 Credits.

An introduction to the biology and pathophysiology of blood and the molecular mechanisms of some human diseases: anemias; leukemias; hemorrhagic, thrombotic, and vascular disorders; and HIV disease/AIDS.

Requisites: Prerequisite, BIOL 205; permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade

Same as: PATH 426H.

BIOL 427. Human Diversity and Population Genetics. 3 Credits.

Permission of the instructor for students lacking the requisites. Specifically, it addresses questions of human origins, population structure, and genetic diversity. This course investigates the facts, methods, and theories behind human population genetics, evolution, and diversity.

Requisites: Pre- or corequisites, BIOL 201 and 202;

Grading status: Letter grade.

BIOL 430. Introduction to Biological Chemistry. 3 Credits.

The study of cellular processes including catalysts, metabolism, bioenergetics, and biochemical genetics. The structure and function of biological macromolecules involved in these processes is emphasized. Honors version available

Requisites: Prerequisites, BIOL 101, and CHEM 262 or 262H.

Grading status: Letter grade

Same as: CHEM 430.

BIOL 430H. Introduction to Biological Chemistry. 3 Credits.

The study of cellular processes including catalysts, metabolism, bioenergetics, and biochemical genetics. The structure and function of biological macromolecules involved in these processes is emphasized.

Requisites: Prerequisites, BIOL 101, and CHEM 262 or 262H.

Grading status: Letter grade

Same as: CHEM 430H.

BIOL 431. Biological Physics. 3 Credits.

How diffusion, entropy, electrostatics, and hydrophobicity generate order and force in biology. Topics include DNA manipulation, intracellular transport, cell division, molecular motors, single molecule biophysics techniques, nerve impulses, neuroscience.

Requisites: Prerequisites, PHYS 116 and 117, or PHYS 118 and 119.

Grading status: Letter grade

Same as: PHYS 405, BMME 435.

BIOL 434. Molecular Biology. 3 Credits.

Advanced studies in molecular biology from an experimental approach.

Requisites: Prerequisites, BIOL 202 and CHEM 261; permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 436. Plant Genetics, Development, and Biotechnology. 3 Credits.

Recent advances in plant molecular biology, genetics, development, and biotechnology, and their potential relevance to agriculture. The course will include lectures, reading and discussions of papers from the primary literature, and student presentations. Honors version available

Requisites: Prerequisite, BIOL 271 or 202; Permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 436H. Plant Genetics, Development, and Biotechnology. 3 Credits.

Recent advances in plant molecular biology, genetics, development, and biotechnology, and their potential relevance to agriculture. The course will include lectures, reading and discussions of papers from the primary literature, and student presentations.

Requisites: Prerequisite, BIOL 271 or 202; Permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 439. Introduction to Signal Transduction. 3 Credits.

This course presents an introduction to signal transduction pathways used by higher eukaryotes. Several signaling paradigms will be discussed to illustrate the ways that cells transmit information. Three lecture hours per week.

Requisites: Prerequisites, BIOL 202 and 205; permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 441. Vertebrate Embryology. 3 Credits.

Principles of development with special emphasis on gametogenesis, fertilization, cleavage, germ layer formation, organogenesis, and mechanisms, with experimental analysis of developmental processes. Three lecture hours a week.

Requisites: Prerequisite, BIOL 205 or 252; permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 441L. Vertebrate Embryology Laboratory. 1 Credit.

Descriptive and some experimental aspects of vertebrate development. Three laboratory hours a week.

Requisites: Pre- or corequisite, BIOL 441.

Grading status: Letter grade.

BIOL 442. Self Assembly in Cell Biology. 3 Credits.

In this class, we will read and discuss together the primary literature to understand how self-assembly in cell biology is harnessed in normal cells and goes awry in disease. A secondary goal will be for students to develop numeracy in cell biology so as to understand cell processes in a quantitative framework.

Requisites: Prerequisite, BIOL 205 and one additional course in biology numbered above BIOL 205.

Grading status: Letter grade.

BIOL 443. Developmental Biology. 3 Credits.

An experimental approach to an understanding of animals and plants. The approach covers developmental processes, molecular, genetic, cell biological and biochemical techniques, with an emphasis on the molecules involved in development.

Requisites: Prerequisites, BIOL 205 and CHEM 261; permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 444. Molecular Basis of Disease. 3 Credits.

This course investigates the biological causes behind human diseases via critical thinking and analysis of experimental research outcomes.

It approaches topics from a research perspective similar to a graduate seminar. Topics covered include genetic/inherited diseases, metabolic diseases, immunological disorders, infectious diseases, cancer, cardiovascular diseases, and neurological diseases.

Requisites: Prerequisite, BIOL 205.

Grading status: Letter grade.

BIOL 445. Cancer Biology. 3 Credits.

Selected examples will be used to illustrate how basic research allows us to understand the mechanistic basis of cancer and how these insights offer hope for new treatments.

Requisites: Prerequisites, BIOL 202 and 205.

Grading status: Letter grade.

BIOL 446. Unsolved Problems in Cellular Biology. 3 Credits.

A survey of areas of current interest in cytology, embryology, and genetics with concentration on problems that remain unsolved but that appear to be near solution. Three lecture and discussion hours a week.

Requisites: Prerequisite, BIOL 205; permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 447. Cell Biology: Beyond Core Basics. 1 Credit.

Modern methods in cell biology.

Requisites: Prerequisite, BIOL 205; co-requisite, BIOL 447L; Required preparation, a grade of C+ or better in BIOL 205.

Grading status: Letter grade.

BIOL 447L. Cell Biology: Beyond Core Basics Laboratory. 3 Credits.

Modern methods in cell biology lab.

Requisites: Prerequisite, BIOL 205; co-requisite, BIOL 447; Required preparation, a grade of C+ or better in BIOL 205.

Grading status: Letter grade.

BIOL 448. Advanced Cell Biology. 3 Credits.

An advanced course in cell biology, with emphasis on the biochemistry and molecular biology of cell structure and function. Three lecture hours a week.

Requisites: Prerequisite, BIOL 205; permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 449. Introduction to Immunology. 3 Credits.

This course provides a general overview of the evolution, organization, and function of the immune system. Instruction will be inquiry-based with extensive use of informational and instructional technology tools.

Requisites: Prerequisite, BIOL 205; permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade

Same as: MCRO 449.

BIOL 450. Neurobiology. 3 Credits.

Recommended preparation, BIOL 205. Survey of neurobiological principles in vertebrates and invertebrates, including development, morphology, physiology, and molecular mechanisms. Three lectures a week.

Grading status: Letter grade.

BIOL 451. Comparative Physiology. 3 Credits.

An examination of the physiology of animals using a comparative approach. Both invertebrate and vertebrate animals are discussed in order to elucidate general principles.

Requisites: Prerequisites, BIOL 101, and BIOL 101L or BIOL 102L, and PHYS 104 or 114 or 116, and PHYS 105 or 115 or 117.

Grading status: Letter grade.

BIOL 451L. Comparative Physiology Laboratory. 1 Credit.

The fundamental principles of physiology are explored using physical models, animal experiments, and non invasive experiments on humans, reinforcing the understanding of concepts presented in lecture.

Requisites: Pre- or corequisite, BIOL 451.

Grading status: Letter grade.

BIOL 452. Marine Microbial Symbioses: Exploring How Microbial Interactions Affect Ecosystems and Human Health. 3 Credits.

Course material covers host-microbe and microbe-microbe interactions found in marine ecosystems, including beneficial and parasitic relationships among viruses, microbes, marine animals, and humans.

Limited to upper-level undergraduate science majors and graduate students.

Gen Ed: PL.

Grading status: Letter grade

Same as: MASC 446.

BIOL 454. Evolutionary Genetics. 3 Credits.

The roles of mutation, migration, genetic drift, and natural selection in the evolution of the genotype and phenotype. Basic principles are applied to biological studies. Three lecture hours a week.

Requisites: Prerequisites, BIOL 201 and 202; permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 455. Behavioral Neuroscience. 3 Credits.

The neurobiological basis of animal behavior at the level of single cells, neural circuits, sensory systems, and organisms. Lecture topics range from principles of cellular neurobiology to ethological field studies.

Requisites: Prerequisite, BIOL 205; Permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 456. Marine Phytoplankton. 3 Credits.

Permission of the instructor. For junior and senior science majors or graduate students. Biology of marine photosynthetic protists and cyanobacteria. Phytoplankton evolution, biodiversity, structure, function, biogeochemical cycles and genomics. Harmful algal blooms, commercial products, and climate change. Three lecture/practical session hours per week.

Grading status: Letter grade

Same as: MASC 444, ENEC 444.

BIOL 457. Marine Biology. 3 Credits.

Recommended preparation, BIOL 201 or 475. A survey of plants and animals that live in the sea: characteristics of marine habitats, organisms, and the ecosystems will be emphasized. Marine environment, the organisms involved, and the ecological systems that sustain them.

Gen Ed: PL.

Grading status: Letter grade

Same as: MASC 442.

BIOL 458. Sensory Neurobiology and Behavior. 3 Credits.

Recommended preparation, BIOL 205. An exploration of sensory systems and sensory ecology in animals. Topics range from neurophysiological function of sensory receptors to the role of sensory cues in animal behavior.

Grading status: Letter grade.

BIOL 459. Field Biology at Highlands Biological Station. 1-4 Credits.

Content varies. Summer field biology at the Highlands Biological Station focuses on the special faunal and floristic processes and patterns characteristic of the southern Appalachian mountains. Five lecture and three to five laboratory and field hours per week, depending on credit.

Requisites: Prerequisite, BIOL 101; permission of the instructor for students lacking the prerequisite.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics; 8 total credits. 2 total completions.

Grading status: Letter grade.

BIOL 461. Fundamentals of Ecology. 4 Credits.

Students will develop a comprehensive understanding of the field of ecology, including modern and emerging trends in ecology. They will develop literacy in the fundamental theories and models that capture ecological processes; emphasis will also be placed on the relevance of ecology and ecological research for human society.

Requisites: Prerequisite, BIOL 201.

Grading status: Letter grade

Same as: ENEC 461.

BIOL 462. Marine Ecology. 3 Credits.

Survey of the ecological processes that structure marine communities in a range of coastal habitats. Course emphasizes experimental approaches to addressing basic and applied problems in marine systems.

Requisites: Prerequisite, BIOL 201 or 475.

Gen Ed: PL.

Grading status: Letter grade

Same as: MASC 440.

BIOL 463. Field Ecology. 4 Credits.

Application of ecological theory to terrestrial and/or freshwater systems. Lectures emphasize quantitative properties of interacting population and communities within these systems. Required laboratory teaches methodology applicable for analysis of these systems. Projects emphasize experimental testing of ecological theory in the field. Two lecture and six field hours a week.

Requisites: Prerequisite, BIOL 201.

Gen Ed: EE- Field Work.

Grading status: Letter grade.

BIOL 464. Global Change Ecology. 3 Credits.

Responses of plants, animals, and communities to climate and other global changes, emphasizing ecology, physiology, behavior, and evolution. Investigation of past responses and tools for predicting future responses.

Requisites: Prerequisite, BIOL 201.

Grading status: Letter grade.

BIOL 465. Global Biodiversity and Macroecology. 3 Credits.

We will explore global patterns of diversity of plants, animals, fungi, and microbes, and the insights gained by taking a statistical approach to describing these and other broad-scale ecological patterns.

Requisites: Prerequisite, BIOL 201; permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 469. Behavioral Ecology. 3 Credits.

BIOL 278 recommended but not required and can be taken concurrently. Behavior as an adaptation to the environment. Evolution of behavioral strategies for survival and reproduction. Optimality and games that animals play. Three lecture hours a week. .

Requisites: Prerequisite, BIOL 201.

Grading status: Letter grade.

BIOL 471. Evolutionary Mechanisms. 3 Credits.

Introduction to mechanisms of evolutionary change, including natural selection, population genetics, life history evolution, speciation, and micro- and macroevolutionary trends. Three lecture hours a week.

Requisites: Prerequisites, BIOL 201 and 202; Corequisite, BIOL 471L; Permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 471L. Evolutionary Mechanisms Laboratory. 1 Credit.

Introduction to mechanisms of evolutionary change, including natural selection, population genetics, life history evolution, speciation, and micro- and macroevolutionary trends. Three laboratory hours a week.

Requisites: Prerequisites, BIOL 201 and 202; Corequisite, BIOL 471; Permission of the instructor for students lacking the requisites.

Grading status: Letter grade.

BIOL 472. Introduction to Plant Taxonomy. 4 Credits.

Introduction to the taxonomy of vascular plants. Principles of classification, identification, nomenclature, and description. Laboratory and field emphasis on phytography, families, description, identification, and classification of vascular plant species. Three lecture and three laboratory hours a week.

Requisites: Prerequisites, BIOL 271 and/or 272; permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 473L. Mammalian Morphology Laboratory. 1 Credit.

Laboratory includes a detailed dissection of a representative mammal, emphasizing the common structure of mammals. Opportunity for independent investigation of specific functional adaptations of specialized forms.

Requisites: Corequisite, BIOL 473.

Grading status: Letter grade.

BIOL 473. Mammalian Morphology and Adaptation. 3 Credits.

An in-depth examination of the morphological adaptations of mammals. Particular attention will be given to osteology, the locomotor system, and craniofacial structures.

Requisites: Corequisite, BIOL 473L.

Grading status: Letter grade.

BIOL 474. Evolution of Vertebrate Life. 3 Credits.

Evolutionary history of the vertebrates. Emphasis on anatomical, physiological, behavioral adaptations accompanying major transitions: the move from water to land, the development of complex integrating systems. Honors version available

Requisites: Prerequisite, BIOL 201 or 202; permission of the instructor for students lacking the prerequisite.

Gen Ed: PL.

Grading status: Letter grade.

BIOL 474L. Vertebrate Structure and Evolution Laboratory. 1 Credit.

Vertebrate comparative anatomy of organ systems and their evolution with emphasis on human anatomy. Three laboratory hours a week.

Requisites: Pre- or corequisite, BIOL 474.

Grading status: Letter grade.

BIOL 474H. Evolution of Vertebrate Life. 3 Credits.

Evolutionary history of the vertebrates. Emphasis on anatomical, physiological, behavioral adaptations accompanying major transitions: the move from water to land, the development of complex integrating systems.

Requisites: Prerequisite, BIOL 201 or 202; permission of the instructor for students lacking the prerequisite.

Gen Ed: PL.

Grading status: Letter grade.

BIOL 475. Biology of Marine Animals. 3 Credits.

Required preparation, one additional course in biology. An introduction to the major animal phyla emphasizing form, function, behavior, ecology, evolution, and classification of marine invertebrates. Three lecture and three laboratory hours per week.

Requisites: Prerequisites, BIOL 101, and BIOL 101L or BIOL 102L; co-requisite, BIOL 475L.

Grading status: Letter grade.

BIOL 475L. Biology of Marine Animals Laboratory. 1 Credit.

This lab serves as an introduction to the major animal phyla emphasizing form, function, behavior, ecology, evolution, and classification of marine invertebrates.

Requisites: Prerequisites, BIOL 101, and BIOL 101L or BIOL 102L; co-requisite, BIOL 475.

Grading status: Letter grade.

BIOL 476. Avian Biology. 3 Credits.

A study of avian evolution, anatomy, physiology, neurobiology, behavior, biogeography, and ecology. Three lecture hours a week.

Requisites: Prerequisites, BIOL 101, and BIOL 101L or BIOL 102L; corequisite, BIOL 476L.

Grading status: Letter grade.

BIOL 476L. Avian Biology Laboratory. 1 Credit.

Techniques for the study of avian evolution, ecology, and behavior with emphasis on North Carolina birds. Three laboratory or field hours a week, including one or two weekend field trips.

Requisites: Corequisite, BIOL 476.

Grading status: Letter grade.

BIOL 479. Topics in Organismal Biology at an Advanced Level. 3 Credits.

Topics in organismal biology at an advanced undergraduate or graduate student level.

Grading status: Letter grade.

BIOL 479L. Laboratory in Organismal Biology: Advanced Topics. 1-2 Credits.

Laboratory in topics in organismal biology for advanced undergraduates and graduate students.

Grading status: Letter grade.

BIOL 480. Discoveries in Prevention and Cure of Infectious Disease in London. 3 Credits.

This is a Burch summer honors course taught in London. We will examine three major discoveries relating to infectious disease (vaccination, transmission via water, and antibiotics) and one major epidemic (plague) which led to no scientific response and explore how the thought of the time influenced scientific research. Honors version available

Requisites: Prerequisite, BIOL 202.

Grading status: Letter grade.

BIOL 480H. Discoveries in Prevention and Cure of Infectious Disease in London. 3 Credits.

This is a Burch summer honors course taught in London. We will examine three major discoveries relating to infectious disease (vaccination, transmission via water, and antibiotics) and one major epidemic (plague) which led to no scientific response and explore how the thought of the time influenced scientific research.

Requisites: Prerequisite, BIOL 202.

Grading status: Letter grade.

BIOL 490. Advanced Topics in Biology. 3 Credits.

Permission of the instructor. Content will vary. Three lecture and discussion hours per week by visiting and resident faculty. Honors version available

Repeat rules: May be repeated for credit. 12 total credits. 4 total completions.

Grading status: Letter grade.

BIOL 490H. Advanced Topics in Biology. 3 Credits.

Permission of the instructor. Content will vary. Three lecture and discussion hours per week by visiting and resident faculty.

Repeat rules: May be repeated for credit. 12 total credits. 4 total completions.

Grading status: Letter grade.

BIOL 495. Undergraduate Research in Biology. 1-3 Credits.

Permission of the instructor. Biology majors only. A continuation of the hands-on research in the laboratory and/or field that was started in BIOL 395. A final written paper is required each term. May be repeated. Does not count as a course in the major. Pass/fail credit only. Honors version available

Requisites: Prerequisite, BIOL 395.

Repeat rules: May be repeated for credit. 12 total credits. 4 total completions.

Grading status: Pass/Fail.

BIOL 495H. Undergraduate Research in Biology. 1-3 Credits.

Permission of the instructor. Biology majors only. A continuation of the hands-on research in the laboratory and/or field that was started in BIOL 395. A final written paper is required each term. May be repeated. Does not count as a course in the major. Pass/fail credit only.

Requisites: Prerequisite, BIOL 395.

Repeat rules: May be repeated for credit. 12 total credits. 4 total completions.

Grading status: Pass/Fail.

BIOL 501. Ethical Issues in Life Sciences. 3 Credits.

Permission of the instructor. A consideration and discussion of ethical issues in life sciences including cloning humans, genetic engineering, stem cell research, organ transplantation, and animal experimentation. Counts as a course numbered below 400 for biology major requirements.

Grading status: Letter grade.

BIOL 514. Evolution and Development. 3 Credits.

The course examines the mechanisms by which organisms are built and evolve. In particular, it examines how novel and complex traits and organisms arise from interactions among genes and cells. Honors version available

Requisites: Prerequisites, BIOL 201, 202, and 205; permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 514H. Evolution and Development. 3 Credits.

The course examines the mechanisms by which organisms are built and evolve. In particular, it examines how novel and complex traits and organisms arise from interactions among genes and cells.

Requisites: Prerequisites, BIOL 201, 202, and 205; permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 524. Strategies of Host-Microbe Interactions. 3 Credits.

There is great variety in how microbes colonize and live with their hosts. The course will summarize strategies of pathogenicity, symbiosis, commensalism and mutualism. Evolutionary, cellular, and molecular aspects will be analyzed.

Requisites: Prerequisite, BIOL 205; Permission of the instructor for students lacking the prerequisite.

Gen Ed: Cl.

Grading status: Letter grade.

BIOL 525. Analysis and Interpretation of Sequence-Based Functional Genomics Experiments. 3 Credits.

Practical introduction to functional genomics experiments, such as RNA-seq and ChIP-seq, and computational techniques for the analysis of these data derived from high-throughput sequencing. Interpretation of results will be stressed. Basic knowledge of molecular biology, beginning level computational skills, and familiarity with basic statistical concepts are expected. Three lecture hours a week.

Requisites: Prerequisites, BIOL 202, COMP 110 or 116, and STOR 155; corequisite, BIOL 525L.

Grading status: Letter grade.

BIOL 525L. Analysis and Interpretation of Sequence-Based Functional Genomics Experiments Laboratory. 1 Credit.

Computer lab will provide students with experience using computational software for analysis of functional genomics experiments. Basic knowledge of molecular biology, beginning level computer skills, and familiarity with basic statistical concepts are expected. One laboratory hour a week.

Requisites: Prerequisites, BIOL 202, COMP 110 or 116, and STOR 155; corequisite, BIOL 525.

Grading status: Letter grade.

BIOL 526. Computational Genetics. 4 Credits.

Introduction to computational principles underlying sequence alignment and phylogenetics, genome assembly and annotation, analysis of gene function, and other bioinformatics applications. Includes a one-hour computer laboratory. Honors version available

Requisites: Prerequisites, BIOL 202, STOR 155, and one of BIOL 226, COMP 110, or COMP 116; permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 526H. Computational Genetics. 4 Credits.

Introduction to computational principles underlying sequence alignment and phylogenetics, genome assembly and annotation, analysis of gene function, and other bioinformatics applications. Includes a one-hour computer laboratory.

Requisites: Prerequisites, BIOL 202, STOR 155, and one of BIOL 226, COMP 110, or COMP 116; permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 527. Seminar in Quantitative Biology. 3 Credits.

Seminar in quantitative biology for advanced students. The course counts as a quantitative biology course for the major.

Requisites: Prerequisites, COMP 110 or COMP 116, and MATH 232 or MATH 283; Permission of the instructor for students lacking the prerequisites.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics; 12 total credits. 4 total completions.

Grading status: Letter grade.

BIOL 527L. Laboratory in Quantitative Biology. 1 Credit.

Laboratory in quantitative biology for advanced students. The laboratory will involve mathematical analysis and modeling of biological systems and processes.

Repeat rules: May be repeated for credit. 4 total credits. 4 total completions.

Grading status: Letter grade.

BIOL 528. Quantitative Personalized Genomics. 3 Credits.

Personalized medicine, specifically using genetic markers to improve outcomes and minimize side effects (pharmacogenomics) requires the development and application of advanced computational and quantitative techniques. Students will develop computational skills to address contemporary genomic and statistical problems.

Requisites: Prerequisites, BIOL 202 and one of COMP 116, COMP 110, BIOL 226/BIOL 226L; Corequisite, BIOL 528L; permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 528L. Quantitative Personalized Genomics Laboratory. 1 Credit.

Personalized medicine, specifically using genetic markers to improve outcomes and minimize side effects (pharmacogenomics) requires the development and application of advanced computational and quantitative techniques. Students will develop computational skills to address contemporary genomic and statistical problems in a lab setting.

Requisites: Prerequisites, BIOL 202 and one of COMP 116, COMP 110, BIOL 226/BIOL 226L; Corequisite, BIOL 528; permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 529. Clinical and Counseling Aspects of Human Genetics. 3 Credits.

Topics in clinical genetics including pedigree analysis, counseling/ethical issues, genetic testing, screening, and issues in human research. Taught in a small group format. Active student participation is expected.

Requisites: Prerequisite, BIOL 425; permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade

Same as: GNET 635.

BIOL 532. Recent Discoveries in Molecular Biology. 3 Credits.

This course examines recent insights into molecular and cellular processes obtained through modern experimental approaches. Extensive reading of primary literature, discussed in a seminar format.

Requisites: Prerequisites, BIOL 202, and either BIOL 205 or a 400-level BIOL course; Permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 534. Mathematical Modeling in the Life Sciences. 3 Credits.

Requires some knowledge of computer programming. Model validation and numerical simulations using ordinary, partial, stochastic, and delay differential equations. Applications to the life sciences may include muscle physiology, biological fluid dynamics, neurobiology, molecular regulatory networks, and cell biology.

Requisites: Prerequisite, MATH 383.

Gen Ed: QI.

Grading status: Letter grade

Same as: MATH 564.

BIOL 535. Molecular Biology Techniques. 4 Credits.

Permission of the instructor. Recommended preparation, BIOL 434. Experiments with bacterial phage, nucleic acid isolation and properties, recombinant DNA techniques, and DNA sequencing. Additional hours in laboratory will be necessary to complete assignments.

Grading status: Letter grade.

BIOL 537. Biotechnology and Synthetic Biology. 3 Credits.

Recent advances in biotechnology and synthetic biology, and their potential relevance to medicine, agriculture, and engineering. The course will include lectures, reading and discussions of papers from the primary literature, and student projects and presentations.

Requisites: Prerequisite, BIOL 202.

Grading status: Letter grade.

BIOL 542. Light Microscopy for the Biological Sciences. 3 Credits.

Permission of the instructor. Introduction to various types of light microscopy, digital and video imaging techniques, and their application in biological sciences.

Requisites: Prerequisite, BIOL 205 for undergraduates.

Grading status: Letter grade.

BIOL 551. Comparative Biomechanics. 3 Credits.

Recommended preparation, PHYS 105. The structure and function of organisms in relation to the principles of fluid mechanics and solid mechanics.

Requisites: Prerequisites, BIOL 101, and BIOL 101L or BIOL 102L, and PHYS 104 or PHYS 116.

Grading status: Letter grade.

BIOL 552. Behavioral Endocrinology. 3 Credits.

Undergraduates need permission of the instructor to enroll. The study of the interactions among hormones, the brain, and behavior from how hormones shape the development and expression of behaviors to how behavioral interactions regulate endocrine physiology.

Grading status: Letter grade.

BIOL 553. Mathematical and Computational Models in Biology. 3 Credits.

This course introduces analytical, computational, and statistical techniques, such as discrete models, numerical integration of ordinary differential equations, and likelihood functions, to explore various fields of biology.

Requisites: Prerequisites, BIOL 201 and 202, MATH 231, and either MATH 232 or STOR 155; Co-requisite, BIOL 553L/MATH 553L; permission of the instructor for students lacking the requisites.

Gen Ed: QI.

Grading status: Letter grade

Same as: MATH 553.

BIOL 553L. Mathematical and Computational Models in Biology Laboratory. 1 Credit.

This lab introduces analytical, computational, and statistical techniques, such as discrete models, numerical integration of ordinary differential equations, and likelihood functions, to explore various fields of biology.

Requisites: Prerequisites, BIOL 201 and 202, MATH 231, and either MATH 232 or STOR 155; Co-requisite, BIOL 553/MATH 553; Permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade

Same as: MATH 553L.

BIOL 555. Paleobotany: An Introduction to the Past History of Plants. 3 Credits.

An introduction to the fossil record of plants, investigating how plants originated and changed through geological time to produce the modern flora. Both macrofossils and microfossils will be considered. Three lecture hours a week.

Requisites: Prerequisites, BIOL 202, and one other BIOL course above 200; corequisite, BIOL 555L; permission of the instructor for students lacking the requisites.

Gen Ed: EE- Field Work.

Grading status: Letter grade

Same as: GEOL 555.

BIOL 555L. Paleobotany: An Introduction to the Past History of Plants Laboratory. 1 Credit.

The laboratory involves learning how to locate, collect, prepare, and analyze fossil plants; it also provides fossils that illustrate topics covered in lecture. Students will be involved in field trips to fossil sites and museums to learn about fossil curation and display of fossils for public education. Three laboratory hours a week.

Requisites: Prerequisites, BIOL 202 and one other BIOL course above 200; corequisite, BIOL 555.

Grading status: Letter grade.

BIOL 561. Ecological Plant Geography. 3 Credits.

Description of the major vegetation types of the world including their distribution, structure, and dynamics. The principal causes for the distribution of plant species and communities, such as climate, soils, and history will be discussed.

Requisites: Prerequisite, BIOL 101 or GEOG 110; Permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 562. Statistics for Environmental Scientists. 4 Credits.

Introduction to the application of quantitative and statistical methods in environmental science, including environmental monitoring, assessment, threshold exceedance, risk assessment, and environmental decision making.

Requisites: Prerequisite, STOR 155.

Grading status: Letter grade

Same as: ENEC 562.

BIOL 563. Statistical Analysis in Ecology and Evolution. 4 Credits.

Application of modern statistical analysis and data modeling in ecological and evolutionary research. Emphasis is on computer-intensive methods and model-based approaches. Familiarity with standard parametric statistics is assumed.

Requisites: Prerequisites, MATH 231 and STOR 151; Permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade

Same as: ENEC 563.

BIOL 565. Conservation Biology. 3 Credits.

The application of biological science to the conservation of populations, communities, and ecosystems, including rare species management, exotic species invasions, management of natural disturbance, research strategies, and preserve design principles. Honors version available

Requisites: Prerequisite, BIOL 201; Permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 565H. Conservation Biology. 3 Credits.

The application of biological science to the conservation of populations, communities, and ecosystems, including rare species management, exotic species invasions, management of natural disturbance, research strategies, and preserve design principles.

Requisites: Prerequisite, BIOL 201; Permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 567. Evolutionary Ecology. 3 Credits.

Advanced consideration of the evolution of form and function. May include issues in life-history evolution, evolutionary physiology, evolutionary morphology, and the evolution of complexity. Three lecture hours per week.

Requisites: Prerequisite, BIOL 471; Permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 568. Disease Ecology and Evolution. 3 Credits.

Recommended preparation, one course above 400 in ecology or evolution. An advanced class covering the causes and consequences of infectious disease at the levels of whole organisms, populations, communities, and ecosystems.

Requisites: Prerequisites, BIOL 201 and MATH 231; Permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 579. Organismal Structure and Diversity in the Southern Appalachian Mountains. 4 Credits.

Permission of the instructor. An examination of the field biology of selected fungi, plants, or animals of the Appalachian Mountains. The morphology, taxonomy, ecology, life history, and behavior of the organisms will be explored both in the laboratory and in the field.

Grading status: Letter grade.

BIOL 590. Advanced Special Topics in Biology. 3 Credits.

Special topics in biology for advanced undergraduate students and graduate students.

Repeat rules: May be repeated for credit. 12 total credits. 4 total completions.

Grading status: Letter grade.

BIOL 590L. Laboratory in Advanced Special Topics in Biology. 1 Credit.

Laboratory at an advanced level in special topics in biology. Students should have had considerable previous laboratory experience.

Repeat rules: May be repeated for credit. 2 total credits. 2 total completions.

Grading status: Letter grade.

BIOL 602. Professional Development Skills for Ecologists and Biologists. 3 Credits.

The goal of this course is to help students who intend to become professional ecologists or biologists acquire critical skills and strategies needed for achieving their career goals.

Grading status: Letter grade

Same as: ENEC 602.

BIOL 604. Laboratory Practices for New Investigators. 1 Credit.

Required preparation, participation in an ongoing laboratory research project. Permission of the instructor. A seminar course designed to introduce students to approaches and methods needed in carrying out an independent research project in a particular focus area of biology. For advanced undergraduates and graduate students.

Repeat rules: May be repeated for credit. 2 total credits. 2 total completions.

Grading status: Letter grade.

BIOL 605. Reading and Writing Scientific Literature. 1 Credit.

A seminar course designed to introduce students to how to read and write scientific papers. For advanced undergraduates and graduate students.

Requisites: Prerequisite, BIOL 201 or 202.

Repeat rules: May be repeated for credit. 2 total credits. 2 total completions.

Grading status: Letter grade.

BIOL 620. Bacterial Genetics with Emphasis on Pathogenic and Symbiotic Interactions. 3 Credits.

Required preparation, a course in microbiology, a course in molecular biology numbered above 300, or research experience in microbiology or molecular biology. Molecular genetics of bacteria. The emphasis will be on pathogenic and symbiotic interactions of bacteria with eukaryotes, although other aspects of bacterial genetics will be considered.

Grading status: Letter grade.

BIOL 621. Principles of Genetic Analysis I. 3 Credits.

Prerequisite for undergraduates, BIOL 202. Permission of the instructor for undergraduates. Genetic principles of genetic analysis in prokaryotes and lower eukaryotes.

Grading status: Letter grade

Same as: GNET 621.

BIOL 622. Principles of Genetic Analysis II. 4 Credits.

Principles of genetic analysis in higher eukaryotes; genomics.

Requisites: Prerequisite, BIOL 621.

Grading status: Letter grade

Same as: GNET 622.

BIOL 624. Developmental Genetics. 3 Credits.

Permission of the instructor for undergraduates. Genetic and molecular control of plant and animal development. Extensive reading from primary literature.

Grading status: Letter grade

Same as: GNET 624.

BIOL 625. Seminar in Genetics. 2 Credits.

Permission of the instructor for undergraduates. Current and significant problems in genetics. May be repeated for credit.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics; 12 total credits. 6 total completions.

Grading status: Letter grade

Same as: GNET 625.

BIOL 631. Advanced Molecular Biology I. 3 Credits.

Required preparation for undergraduates, at least one undergraduate course in both biochemistry and genetics. DNA structure, function, and interactions in prokaryotic and eukaryotic systems, including chromosome structure, replication, recombination, repair, and genome fluidity. Three lecture hours a week.

Grading status: Letter grade

Same as: GNET 631, BIOC 631, MCRO 631.

BIOL 632. Advanced Molecular Biology II. 3 Credits.

Required preparation for undergraduates, at least one undergraduate course in both biochemistry and genetics. The purpose of this course is to provide historical, basic, and current information about the flow and regulation of genetic information from DNA to RNA in a variety of biological systems. Three lecture hours a week.

Grading status: Letter grade

Same as: GNET 632, BIOC 632, MCRO 632.

BIOL 639. Seminar in Plant Molecular and Cell Biology. 1 Credit.

Permission of the instructor. May be repeated for credit. Current and significant problems in plant molecular and cell biology are discussed in a seminar format. Can count as BIOL elective credit in the major if combined with other 600-level courses for a total of three credit hours.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics; 12 total credits. 12 total completions.

Grading status: Letter grade.

BIOL 642. Advanced Studies of Cell Division. 3 Credits.

An advanced course in cell and molecular biology integrating genetic, biochemical, and structural aspects of the cell cycle. Principles derived from a variety of biological systems. Extensive reading of classic papers as well as recent literature.

Requisites: Prerequisite, BIOL 205; permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 643. Molecular Mechanisms of the Cytoskeleton. 3 Credits.

This seminar examines the cytoskeletal systems of eukaryotes and prokaryotes via primary literature. Architectures of cytoskeletal components are compared and contrasted along with their regulators, nucleators, and molecular motors.

Requisites: Prerequisites, BIOL 205 and CHEM 430; permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade.

BIOL 648. Palynology. 5 Credits.

Permission of the instructor. A consideration of various aspects of palynology, including the morphology, structure, development, systematics, evolution, preparation techniques, and analysis of living and fossil pollen grains, spores, and other palynomorphs. Two lecture and six laboratory hours a week.

Grading status: Letter grade.

BIOL 649. Seminar in Cell Biology. 2 Credits.

May be repeated for credit. Can count as BIOL elective credit in the major if combined with other 600-level courses for a total of three credit hours.

Requisites: Prerequisite, BIOL 205; permission of the instructor for students lacking the prerequisite.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics; 12 total credits. 6 total completions.

Grading status: Letter grade.

BIOL 650. Animal Cognition. 3 Credits.

For advanced undergraduates and graduate students. The goal of the course is to gain an in-depth understanding of animal cognition in the context of evolution and neurobiology with an emphasis on recent research.

Grading status: Letter grade.

BIOL 657. Biological Oceanography. 4 Credits.

For graduate students; undergraduates need permission of the instructor. Marine ecosystem processes pertaining to the structure, function, and ecological interactions of biological communities; management of biological resources; taxonomy and natural history of pelagic and benthic marine organisms. Three lecture and one recitation hours per week. Two mandatory weekend fieldtrips.

Gen Ed: PL.

Grading status: Letter grade

Same as: MASC 504, ENVR 520.

BIOL 659. Seminar in Evolutionary Biology. 2 Credits.

Permission of the instructor. Advanced studies in evolutionary biology. Can count as BIOL elective credit in the major if combined with other 600-level courses for a total of three credit hours.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics; 12 total credits. 6 total completions.

Grading status: Letter grade.

BIOL 661. Plant Ecology. 4 Credits.

Consideration of terrestrial, vascular plant ecology including environmental physiology, population dynamics, and community structure. Laboratory stresses collection and interpretation of field data. Three lecture and three laboratory hours a week.

Requisites: Prerequisite, BIOL 201.

Gen Ed: EE- Field Work.

Grading status: Letter grade.

BIOL 662. Field Plant Geography. 2 Credits.

Intensive literature and field study of the plant geography and ecology of a selected region. Weekly seminar-style discussion followed by approximately nine days' field experience. May be repeated for credit.

Requisites: Prerequisites, BIOL 661 or 561 and permission of the instructor.

Grading status: Letter grade.

BIOL 669. Seminar in Ecology. 1-3 Credits.

May be repeated for credit.

Requisites: Prerequisite, BIOL 201; permission of the instructor for students lacking the prerequisite.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics; 12 total credits. 12 total completions.

Grading status: Letter grade

Same as: ENEC 669.

BIOL 680. Advanced Seminar in Recent Biological Research and Methods. 1 Credit.

Permission of the instructor. The course will cover topics and experimental approaches of current interest. Students will learn intellectual and practical aspects of cutting-edge topics in biology. It will meet for one hour per week, in a lecture and discussion format.

Repeat rules: May be repeated for credit. 3 total credits. 3 total completions.

Grading status: Letter grade.

BIOL 690. Advanced Special Topics with an Emphasis on Recent Research. 3 Credits.

Permission of the instructor. Special topics in biology with an emphasis on recent research. For advanced undergraduates and graduate students.

Repeat rules: May be repeated for credit. 6 total credits. 2 total completions.

Grading status: Letter grade.

BIOL 692H. Senior Honors Thesis in Biology. 3 Credits.

Permission of a faculty research director and three credit hours of BIOL 395 in the same laboratory required. Must be taken in the final semester of senior year. Fall and spring only.

Gen Ed: CI, EE- Mentored Research.

Grading status: Letter grade.

BIOL 701. Overview of Biology. 1-2 Credits.

Biology faculty will present individual research presentations followed by discussion.

Grading status: Letter grade.

BIOL 703. Recent Advances in Biology. 1-3 Credits.

A consideration of the methods and literature involved in the latest advances in selected areas of biology.

Repeat rules: May be repeated for credit.

Grading status: Letter grade.

BIOL 704. Seminars in Biophysics. 2 Credits.

Permission of the instructor. Students present seminars coordinated with the visiting lecturer series of the Program in Molecular and Cellular Biophysics.

Grading status: Letter grade

Same as: BIOC 704.

BIOL 705. Best Practices for Rigor and Reproducibility in Research. 1 Credit.

A workshop to introduce best practices for increasing rigor and reproducibility in research. Permission of course directors required.

Grading status: Letter grade

Same as: BBSP 705.

BIOL 758. Molecular Population Biology. 4 Credits.

Hands-on training, experience, and discussion of the application of molecular genetic tools to questions of ecology, evolution, systematics, and conservation.

Requisites: Prerequisite, BIOL 471; Permission of the instructor for students lacking the prerequisites.

Grading status: Letter grade

Same as: MASC 742.

BIOL 801. Seminar in Biological Sciences. 1-2 Credits.

Permission of the instructor. Advanced seminar in interdisciplinary biological sciences.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics.

Grading status: Letter grade.

BIOL 810. Seminar in College Science Teaching. 2 Credits.

This interactive course will help graduate students develop the knowledge and skills needed to implement student-centered science instruction at the university level. Participants will support one another in creating a teachable unit, a personal teaching philosophy statement, and a course syllabus.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics.

Grading status: Letter grade.

BIOL 829. Seminar in Quantitative Biology. 1-3 Credits.

Permission of the instructor. Advanced seminar in quantitative biology.

Repeat rules: May be repeated for credit.

Grading status: Letter grade.

BIOL 831. Seminar in Insect Physiology, Biochemistry, and Endocrinology. 1-2 Credits.

Permission of the instructor. Advanced seminar in insect physiology, biochemistry, and endocrinology.

Repeat rules: May be repeated for credit.

Grading status: Letter grade.

BIOL 832. Seminar in Molecular Biology. 1-2 Credits.

Advanced seminar in molecular biology.

Requisites: Prerequisite, BIOL 202; permission of the instructor for students lacking the prerequisite.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics.

Grading status: Letter grade.

BIOL 841. Seminar in Embryology. 1-2 Credits.

Advanced seminar in embryology.

Requisites: Prerequisite, BIOL 205; permission of the instructor for students lacking the prerequisite.

Grading status: Letter grade.

BIOL 842. Seminar in Cell Biology and Biochemistry. 1-2 Credits.

Permission of the instructor. Advanced seminar in cell biology and biochemistry.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics.

Grading status: Letter grade.

BIOL 845. Advanced Seminar in Neurobiology. 2 Credits.

Advanced seminar in Neurobiology. Students should have previous experience in Neurobiology courses or research.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics; 6 total credits. 3 total completions.

Grading status: Letter grade.

BIOL 852. Seminar in Plant Systematics. 1-2 Credits.

Permission of the instructor. Advanced seminar in plant systematics.

Grading status: Letter grade.

BIOL 853. Seminar in Plant Morphology and Anatomy. 1-2 Credits.

Permission of the instructor. Advanced seminar in plant morphology and anatomy.

Grading status: Letter grade.

BIOL 854. Seminar in Neurophysiology. 1-2 Credits.

Permission of the instructor. Advanced seminar in neurophysiology. May be repeated for credit.

Repeat rules: May be repeated for credit.

Grading status: Letter grade.

BIOL 855. Seminar in Invertebrate Zoology. 1-2 Credits.

Advanced seminar in invertebrate zoology. May be repeated for credit.

Requisites: Prerequisite, BIOL 475; permission of the instructor for students lacking the prerequisite.

Repeat rules: May be repeated for credit.

Grading status: Letter grade.

BIOL 856. Seminar in Vertebrate Evolutionary Biology. 1-2 Credits.

Permission of the instructor. Advanced seminar in vertebrate evolutionary biology. May be repeated for credit.

Repeat rules: May be repeated for credit.

Grading status: Letter grade.

BIOL 857. Seminar in Comparative Animal Behavior. 1-2 Credits.

Permission of the instructor. Advanced seminar in comparative animal behavior. May be repeated for credit.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics.

Grading status: Letter grade

Same as: NBIO 857.

BIOL 858. Seminar in Comparative Physiology. 1-2 Credits.

Advanced seminar in comparative physiology.

Requisites: Prerequisite, BIOL 451; permission of the instructor for students lacking the prerequisite.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics.

Grading status: Letter grade

Same as: NBIO 858.

BIOL 859. Seminar in Marine Biology. 1-2 Credits.

Permission of the instructor. Advanced seminar in marine biology. May be repeated for credit.

Repeat rules: May be repeated for credit.

Grading status: Letter grade.

BIOL 861. Statistical Analysis in Ecology and Evolution using R. 1 Credit.

Graduate standing in biology, ecology or genetics required. Introduction to statistical analysis and modeling of ecological and evolutionary data using the R programming environment.

Requisites: Prerequisite, STOR 155.

Grading status: Letter grade.

BIOL 890. Special Topics in Biology. 1-2 Credits.

Permission of the instructor. Consideration of special topics in biology. May be repeated once for credit.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics.

Grading status: Letter grade.

BIOL 891. Graduate Seminar in Biology. 2 Credits.

Graduate standing or permission of the instructor. This course will increase students' intellectual depth across the fields of ecology, evolution, and organismal biology (EEOB). Students will read and discuss papers, attend seminars, and present research ideas. Required of all candidates for the degree in biology in the EEOB graduate program.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics.

Grading status: Letter grade.

BIOL 892. Special Topics in Biology for Graduate Students. 1-4 Credits.

This course is designed to allow graduate students to explore areas of biology outside their direct area of specialization. Three credits lecture only. Four credits lecture and lab.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics.

Grading status: Letter grade.

BIOL 901. Introduction to Graduate Research. 1-15 Credits.

Graduate research for six weeks in two laboratories. Designed primarily to acquaint first-year students with research techniques and to assess their propensity for research. Arranged by mutual agreement of students and faculty members during fall orientation. May be repeated once for credit. Six to nine hours per week.

Grading status: Letter grade.

BIOL 921. Research in Genetics. 1-15 Credits.

May be repeated for credit.

Grading status: Letter grade

Same as: GNET 905.

BIOL 931. Research in Molecular Biology. 1-15 Credits.

Acquaints early career graduate students with research techniques and assesses their propensity for research. Arranged by mutual agreement of student and faculty member.

Grading status: Letter grade.

BIOL 932. Research in Plant Molecular Biology. 1-15 Credits.

Acquaints early career graduate students with research techniques and assesses their propensity for research. Arranged by mutual agreement of student and faculty member.

Grading status: Letter grade.

BIOL 941. Research in Cytology and Cell Biology. 1-15 Credits.

Acquaints early career graduate students with research techniques and assesses their propensity for research. Arranged by mutual agreement of student and faculty member.

Grading status: Letter grade.

BIOL 942. Research in Embryology. 1-15 Credits.

Acquaints early career graduate students with research techniques and assesses their propensity for research. Arranged by mutual agreement of student and faculty member.

Grading status: Letter grade.

BIOL 943. Research in Physiology: Cellular, Comparative, Neurophysiology. 1-15 Credits.

Acquaints early career graduate students with research techniques and assesses their propensity for research. Arranged by mutual agreement of student and faculty member.

Grading status: Letter grade.

BIOL 951. Research in Neurobiology. 3-12 Credits.

Permission of the department. Research in various aspects of neurobiology. Six to 24 hours a week.

Grading status: Letter grade

Same as: NBIO 951, PHCO 951.

BIOL 952. Research in Ethology and Animal Behavior. 1-15 Credits.

Acquaints early career graduate students with research techniques and assesses their propensity for research. Arranged by mutual agreement of student and faculty member.

Grading status: Letter grade.

BIOL 953. Research in Marine Sciences. 2-21 Credits.**BIOL 954. Research in Marine Sciences on Mollusca, Crustacea, Ichthyology, or Oceanography. 1-15 Credits.**

Permission of the department. At the Institute for Marine Sciences, Morehead City, NC.

Grading status: Letter grade.

BIOL 955. Research in Vertebrate or Invertebrate Zoology. 1-15 Credits.

Acquaints early career graduate students with research techniques and assesses their propensity for research. Arranged by mutual agreement of student and faculty member.

Grading status: Letter grade.

BIOL 957. Research in Plant Systematics. 1-15 Credits.

Acquaints early career graduate students with research techniques and assesses their propensity for research. Arranged by mutual agreement of student and faculty member.

Grading status: Letter grade.

BIOL 958. Research in Plant Morphology and Anatomy. 1-15 Credits.

Acquaints early career graduate students with research techniques and assesses their propensity for research. Arranged by mutual agreement for student and faculty member.

Grading status: Letter grade.

BIOL 959. Research in Paleobotany. 1-15 Credits.

Acquaints early career graduate students with research techniques and assesses their propensity for research. Arranged by mutual agreement of student and faculty member.

Grading status: Letter grade.

BIOL 961. Research in Ecology. 1-15 Credits.

Acquaints early career graduate students with research techniques and assesses their propensity for research. Arranged by mutual agreement of the student and faculty member.

Repeat rules: May be repeated for credit; may be repeated in the same term for different topics.

Grading status: Letter grade.

BIOL 992. Master's (Non-Thesis). 3 Credits.

Course for graduate students expecting to receive the degree of Master of Arts in Biology.

Repeat rules: May be repeated for credit.

BIOL 993. Master's Research and Thesis. 3 Credits.**BIOL 994. Doctoral Research and Dissertation. 3 Credits.**