

Department of Biology

Biology Course Descriptions

Courses are offered each semester unless otherwise designated.

BIOL 195, 295, 395, 495 – Special Topics (1-12)

BIOL 198, 298, 398, 498 – Tutorial (1-3)

BIOL 100 – Principles of Biology (4) Three hours lecture and one two-hour lab weekly. One semester course providing an understanding of biological systems from the cellular to ecosystem level. Emphasis is placed on how biology plays a role in students' lives. For non-majors. Gen Ed: SB & LB credit. Fall and Spring.

BIOL 101 – Evolution and Ecology (3) Most introductory biology courses focus on cellular processes or human anatomy and physiology. Topics of ecology, evolution, and biodiversity are not explored in detail or omitted altogether. Evolution and Ecology helps students understand major biological concepts through the lens of evolutionary principles. This course takes a different approach to understanding biology, emphasizing concepts over details and scientific reasoning over terminology. Topics include natural and sexual selection, genetics, evolution of sex and mating strategies, population ecology, community ecology, macroevolution. For non-majors. Gen Ed: SB credit. Fall or Spring.

BIOL 105 – Introduction of Human Genetics (3) Human genetics, including transmission of genes, genetic ratios, chromosomal defects, sex determination, population considerations, introduction to DNA and gene functions, and moral dilemmas facing society. For non-majors. Gen Ed: SB credit. Fall and Spring.

BIOL 106 – Environmental Biology (3) Concepts related to the physical and biological environments, populations and communities, current environmental problems. Laboratory and field experiences are an integral part of the course. For non-majors. Gen Ed: SB & LB credit. Fall and Spring.

BIOL 107 – Human Biology (3) Emphasis on cellular function, nutrition, reproduction and other aspects of the body under normal and abnormal conditions. For non-majors. Gen Ed: SB credit. Fall and Spring.

BIOL 108 – Vertebrate Life (3) Life history of animals with backbones: evolution, distribution, behavior, anatomic adaptations, growth and development, and population dynamics. Special emphasis on vertebrates of North America. For non-majors. Gen Ed: SB credit. Fall.

BIOL 111 – Adirondack Ecology (3) General ecological principles including energy flow, biogeochemical cycling, population dynamics and community ecology using the Adirondack region as a backdrop. Natural history and identification of Adirondack plants and animals will be incorporated. Laboratory and field experiences are integral components of this course. For non-majors. Gen Ed: SB credit. Fall.

BIOL 112 – Connections in Biology (3) Connections in Biology is a learning experience that connects the major concepts in biology to the life of the student. The connections will vary but will likely include issues related to human health, populations, genetics, and ecology. For non-majors Gen Ed: SB credit.

BIOL 116 – Behavioral Ecology (3) Animal Behavior from the internal mechanisms to the evolutionary causes which led to them. No prerequisites. For non-majors. Gen Ed: SB credit. Spring.

BIOL 120 – Microbes and Human Welfare (4) Three hours lecture and one two-hour lab weekly. Morphology and physiology of microorganisms, their important in the cause of disease and their role in important industrial processes. For non-majors. Gen Ed: SB & LB credit. Fall and Spring.

BIOL 125 – Biological Concepts (3) Two hours lecture and one two-hour lab weekly. Biological Concepts is designed for students who are not science majors and plan to enter the teaching profession. There is an accompanying laboratory, which is required. The course is designed to provide students an in depth understanding of the major themes and concepts of biology including cell structure and function, genetics, evolution, biodiversity and ecology. Gen Ed: SB & LB credit. Fall and Spring.

BIOL 145 – Biotechnology and Society (3) An exploration of the science and history of biotechnology, with applications ranging from identifying genes to modifying the genetic material of whole organisms. For non-majors. Gen Ed: SB credit. Spring.

BIOL 148 – Biodiversity Conservation (3) Conservation biology is a multidisciplinary science with a focus on preserving the diversity of species and ecosystems. The Biodiversity Conservation course uses the Adirondacks as a case study to explore contemporary issues of climate damage, habitat loss, invasive species, pollution, population, and over-population. Conservation efforts in the Adirondacks provide a local and in depth understanding of the global issues and strategies to protect biological diversity on Earth. For non-majors. Gen Ed: SB. Spring.

BIOL 151 – General Biology I (4) The focus of this course is on cellular processes. Topics include cell structure, photosynthesis and respiration, cell division and genetics, and evolution. Lab required. Gen Ed: SB & LB credit. Fall.

BIOL 152 – General Biology II (4) Evolutionary processes and resulting biodiversity, animal and plant morphology and physiology, and ecological relationships. Lab required. Gen Ed: SB & LB credit. Spring.

BIOL 209 – Winter Ecology (3) Interdisciplinary course which looks at all aspects of winter. At first the physics of seasons, snow crystals, glaciers, and temperature will be examined. Then plant and animal adaptations to the cold will be considered. Laboratory experiments will include: how plants and insects survive freezing and animal tracking. The last part of the course will cover human adaptations to winter including local customs and Eskimo cultures. Trips to Ottawa and the Adirondacks are planned. Prerequisite: FW credit. For non-majors. Gen Ed: WI credit. Spring.

BIOL 210 – Intro to Anatomy & Physiology (4) Basic principles of human anatomy and physiology with special emphasis on the mechanisms of homeostasis and the inter-relationships of structure and function. For non-majors. Gen Ed: SB & LB credit. Fall.

BIOL 300 – Ecology (3-4) Physical environment of terrestrial and fresh-water ecosystems, interspecific and intraspecific relationships, speciation, demography, growth and regulation of populations, energy flow, community organization and development. Prerequisites: BIOL 151 or 125, and 152. Gen Ed: WI credit with lab. Fall.

BIOL 303 – Plant Physiology (4) Biological processes of plants and the role various structures (cells, tissues, and organs) play in them. Relationship between functions and reactions of plants and those of other organisms. Significant research discussed. Lab required. Prerequisites: BIOL 151 or 125, and 152. Lab required. Fall.

BIOL 304 – Sustainable Agriculture (3) Lecture and active learning activities are designed to investigate topics vital to understanding agricultural sustainability, including issues of: land use, biological diversity, pest control, labor and human rights economic viability. Field trips to local farms will serve as examples of the various local agroecosystems. The class will document the differences between these farms and analyze them for their relative sustainability. Class members will also grow crops themselves, to investigate tools for sustainability assessment. Prerequisites: BIOL 100, 125 151 or 152. Fall.

BIOL 305 – Comparative Anatomy of the Vertebrates (4) Similarities and differences in structural organization of vertebrate animals. Laboratory work includes detailed dissections of various systems of lamprey, spiny dogfish shark and cat. Lab required. Prerequisites: BIOL 151 or 125, and 152. Spring.

BIOL 309 – Marine Mammals and Seabirds (3) This is an 18 day field course starting at the beginning of August at the Huntsman Marie Science Centre, St. Andrews, New Brunswick. Marine mammals and seabirds will be observed under natural conditions through frequent field trips at sea and shore. Passamaquoddy Bay and the Bay of Fundy are excellent locations for sighting harbor and grey seals, harbor porpoises, minke, fin, and humpback whales, and numerous avian species including Atlantic puffins, razorbills, black guillemots, and northern gannets. Further, a three day trip to Grand Manan Island will allow us to observe the incredibly rare northern right whale (there are only 300 in the world). There is a strong emphasis on field research and each student will complete an independent research project. Lectures and labs will introduce the evolution, zoogeography, morphology, ecology, physiology, and behavior of diving air-breathing vertebrates. Estimated cost is approximately \$1,000 which includes travel to and from New Brunswick (from Potsdam), food, lodging, access to an on-site aquarium, and more than four whale and bird watching boat trips. For more info contact Dr. Jason Schreer (SUNY Potsdam), schreejf@potsdam.edu, 315-276-2290. Summer.

BIOL 310 – Marine Biology (3) Explores the diversity and ecology of organisms that reside in our oceans, bays, and estuaries. Examines physiological and morphological adaptations of marine life, including the specific adaptations and ecological

interactions among organisms that inhabit the plankton, nekton, and benthos. We will also explore marine resources and the impact of humans on the oceans. BIOL 151 or 125, and 152. Fall.

BIOL 311 – Genetics (4) Principles of genetics, including classic Mendelian studies, chromosomal considerations and biochemical approaches to understanding the genetic material and how it functions. Prerequisites: BIOL 151 or 125, and 152. Spring.

BIOL 312 – Insect Ecology (4) Study of insects: anatomy, physiology, development, behavior; social insects; and insect control. Systematic coverage of major insect groups. Prerequisites: BIOL 151 or 125, and 152. Lab required. Spring, alternate years.

BIOL 315 – Ornithology (3) Study of birds with emphasis on field identification. Prerequisites: BIOL 151 or 125, and 152. Field trips required. Spring.

BIOL 319 – Evolutionary Biology (3) Evolutionary Biology examines the mechanisms that have resulted in the rich diversity of life. Students will explore connections between natural selection and genetics, population biology, form and function, sexual selection, development, the fossil record and human evolution. Prerequisites: BIOL 151 or 125, and 152. Spring.

BIOL 320 – Microbiology (4) Morphological, physiological genetic, and biotechnological concepts of Bacteria, Archae, Fungi and viruses. Laboratory emphasizes sterile culture techniques and current technology. Prerequisites: BIOL 151 or 125, 152, and CHEM 105 & 106. Lab required. Fall.

BIOL 321 – Cell Structure (3) Consideration of cells from standpoint of morphology at level of light and electron microscopes, cytodifferentiation, histochemistry and recent advances in cytological techniques. Prerequisites: BIOL 151 or 125, and 152. Spring or Fall.

BIOL 322 – Introduction to Genomics (4) This course focuses on the theory and methods of analyzing large genetic data sets and their application to biological problems, including sequence alignment and search methods, gene prediction, phylogenetic trees, and microarray analysis. Lab required. Prerequisite: BIOL 311. Spring.

BIOL 325 – Morphology of Lower Plants and Algae (4) Evolutionary trends, life cycles and economic importance of nonflowering plants. Recent changes in classification and systematics are presented. Prerequisites: BIOL 151 or 125, and 152. Lab required. Fall.

BIOL 326 – Morphology of Higher Land Plants (3) Interrelationships, life cycles, and economic significance of seed plants. Role of plant cells, tissues and organs in relation to biological processes of plants. Modern techniques in plant systematics are presented. Prerequisites: BIOL 151 or 125, and 152. Lab required. Spring.

BIOL 330 – Natural History of Lower Vertebrates (4) Life histories, systematics, behavior, ecological relationships, distribution, reproduction, and evolution of protochordates, fish, amphibians, and reptiles. Emphasis on species of the north-eastern United States and Canada. BIOL 151 or 125, and 152. Lab required. Fall.

BIOL 331 – Natural History of Higher Vertebrates (4) Life histories, systematics, behavior, distribution, reproduction and evolution of birds and mammals. Emphasis on species of the northeastern United States and Canada. Prerequisites: BIOL 151 or 125, and 152. Lab required. Spring.

BIOL 333 – Biogeography (3) Biomes of the world past and present. Emphasis on evolutionary, ecological and geographic factors and principles which determine distribution of plants and animals. Prerequisites: BIOL 151 or 125, and 152. Gen Ed: SI credit. Fall.

BIOL 334 – Biology of Woody Plants (3) Identification and ecological and silvicultural characteristics, natural history, distribution and economic uses of native and introduced woody plants (trees, shrubs and vines). Laboratory exercises and field trips will include visits to diverse natural habitat types in the area, as well as the Botanical Gardens in Montreal and some private lands. BIOL 151 or 125, and 152. Fall.

BIOL 336 – Biology of the St. Lawrence River (4) A basic course in river biology. Topics will include aquatic and semi-aquatic plant and animal life, habitat composition and variation and various physical aspects of the aquatic environments. Emphasis will be placed on field projects. Summer.

BIOL 350 – Biotic Communities of South Florida (3) Two week field trip to south Florida over Winterim to visit unique biotic communities including subtropical hardwood forests, pine-palmetto scrub, mangroves, coral reefs, and several freshwater wetland

communities such as cypress domes, wet sawgrass prairie and deepwater sloughs. Participants will see first-hand the ecological problems that beset this part of the country, including water diversion for agriculture, intense urbanization, and the introduction of numerous exotic plants and animals, and will meet with scientists and agency officials charged with management responsibilities for this unique region. Limit to 14 students. Prerequisites: BIOL 300 or permission of instructor. Fall.

BIOL 351 – Biology of Northern Ecosystems (3) Intensive primer on the structure and function of ecological communities, focusing on ecosystems occurring in the northern forest and coastal regions of North America. The course will include an extended field trip to visit terrestrial, wetland, and aquatic biotic communities from northern New York through northern New England and the Canadian Maritime Provinces. Methods of sampling plants, invertebrates and vertebrates will be demonstrated. Individual plant collections will be required. Prerequisites: BIOL 151 or 125, and 152. Summer.

BIOL 352 – Tropical Ecology and Conservation (3) Two week field trip to a tropical region of the world over Winterim to visit and experience biological communities and ecosystems present in these regions, including, but not limited to, rain forest, dry deciduous forest, savannah, freshwater wetlands, mangrove forest and coral reefs. Participants will see and explore in detail the conservation issues that occur in tropical environments and experience how different cultures propose solutions to environmental problems. Four 2-3 hour lecture periods will precede the field trip. Prerequisites: BIOL 300 or BIOL 402 and/or permission of instructor. Limit to 16 students. Fall.

BIOL 355 – Invertebrate Biology (4) A survey of the invertebrate animals: their form, function, ecology, behavior and evolution. Lab required. Prerequisites: BIOL 151 or 125, and 152. Spring, alternate years.

BIOL 360 – Neurobiology (3) Morphology of neurons, synapses, spinal cord and brain stem; physiological factors: neurotransmitters, reex pathways, neuroendocrinology and biological rhythms. Prerequisites: BIOL 151 or 125, and 152. Fall or Spring.

BIOL 375 – Behavioral Evolution (4) Upper level animal behavior course with a laboratory. Primary literature and independent laboratory projects will help students understand the scientific process. Prerequisites: BIOL 151 or 125, and 152. Fall, alternate years.

BIOL 400 – Field Ecology (4) A field-oriented course utilizing local terrestrial, wetland and aquatic ecosystems to illustrate and apply concepts presented in BIOL 300. This course emphasizes making observations of the natural world, recording them systematically and generating hypotheses to be tested experimentally. Methods of collecting data will be presented and will include identification of local plants and animals. Prerequisites: BIOL 300. Gen Ed: WI credit. Fall.

BIOL 401 – Advanced Exercise Physiology (4) This course will provide an understanding of how the body responds physiologically to exercise and the anatomy that allows for these physiological responses. The course will also explore how the body responds to various forms of training under various conditions. In the lab portion of the course students will get hands-on experience with many of the key principles in exercise physiology. Lab required. Prerequisites: BIOL 151 and 152. Fall or Spring

BIOL 402 – Conservation Biology (3) The application of scientific principles to understanding and solving the conservation problems facing most of the Earth's ecosystems and species. This discipline is both derived from and nested within such areas of biological science as ecology, wildlife and fisheries management, zoology and botany and draws heavily on expertise from physiologists, microbiologists, molecular biologists and population geneticists. This course will be a mix of lecture, discussions, field trips, lab and classroom exercises and one large project. Prerequisite: BIOL 300 or permission of instructor. Spring, alternate years.

BIOL 403 – Human Anatomy and Physiology 1 (4) Detailed structure and function of human cells, tissues, organs, and organ systems. The lab will focus on the anatomy of each system and on physiological experiments relating to several systems. BIOL 403 will focus on an introduction to human anatomy and physiology, cells, tissues, integument, and the skeletal, muscular, and nervous systems. Lab required. Prerequisites: BIOL 151 and 152. Fall.

BIOL 404 – Human Anatomy and Physiology 2 (4) Detailed structure and function of human cells, tissues, organs, and organ systems. The lab will focus on the anatomy of each system and on physiological experiments relating to several systems. BIOL 404 will focus on the endocrine, cardiovascular, lymphatic, respiratory, digestive,

urinary, reproductive systems. Lab required. Prerequisite: BIOL 403. Spring

BIOL 405 – The Origin of Species (3) This seminar course focuses on Charles Darwin's seminal book, *The Origin of Species*. This book will be explored within the context of modern biology, including the topics of natural selection, phylogenetics, biogeography, and sexual selection. In addition, the book's historical and sociological impacts and underpinnings will be examined. Prerequisites: BIOL 300 and 311. Spring, alternate years.

BIOL 407 – Cell Physiology (4) Metabolic reactions and physiology of plant and animal cells together with studies of molecular, biochemical, and histological aspects of these cells. Lab required. Prerequisites: BIOL 151 or 125, and 152, and CHEM 341. Fall.

BIOL 409 – Fresh Water Ecology (4) Adaptations and ecological relationships of freshwater organisms. Physical and chemical properties of water will also be examined; Emphasis will be placed on local ecosystems such as Adirondack lakes, streams, and the St. Lawrence River. Pre-requisite BIOL 151 or 125, and 152. Lab required. Fall, alternate years.

BIOL 410 – Human Physiology (4) Basic principles of human physiology, locomotion, digestion, respiration, circulation, endocrine and neural control mechanisms, reproduction, and biological rhythms. Lab required. Pre-requisite BIOL 151 or 125, and 152. Spring.

BIOL 413 – Neurophysiology (4) Structure and function of nervous system including neural transmission, neurotransmitters, sensory and motor systems, the brain, behavior, and memory. Lab required. Pre-requisite BIOL 151 or 125, and 152. Fall.

BIOL 415 – Virology (3) Basic physical, chemical and biological properties of plant, animal and bacterial viruses. Prerequisite: BIOL 151 or 125, and 152. Junior standing. Fall or Spring.

BIOL 418 – Microbial Diseases & Anthropod Vectors (3) This course aims to highlight the pathogens and pests that plague humans, and is designed for students who are interested in medicine, microbiology, entomology, and evolution. The course will cover pathogen/host and pathogen/host/anthropod interactions, recognition and identification of vectors and disease, and an understanding of epidemiology. Prerequisite: BIOL 320. Spring, alternate years.

BIOL 420 – Medical Microbiology (3) Principles of immunology, pathogenesis, prevention and control of bacterial, fungal, viral and protozoan diseases. Prerequisite: BIOL 320. Spring.

BIOL 425 – Techniques in Molecular Biology (3) Experimental approach to structure and function of biologically active molecules in living systems and their integration. Prerequisites: BIOL 151 or 125, 152, CHEM 341, 342, and permission. Spring.

BIOL 426 – Immunobiology (3) Higher vertebrates immune response. Structure of immune system, cellular phagocytosis, antigen-antibody interaction, regulation of the immune response and immunological techniques. Prerequisites: BIOL 151 or 125, and 152, and one semester of Organic Chemistry or permission. Spring.

BIOL 431 – Developmental Biology (3) Fundamentals of embryogenesis using molecular, biochemical and organismal methods of study. Development of animals and plants will be considered, with emphasis on cellular and tissue levels of organization. Prerequisites: BIOL 151 or 125, and 152. Gen Ed: WI credit. Spring.

BIOL 440 – Comparative Animal Physiology (4) Functions of organs, organ systems and entire organisms of selected vertebrate examples. Major topics: respiration and metabolism, osmoregulation, circulation, digestion and nutrition, sensory phenomena, reproduction and endocrinology, temperature regulation and adaptation to various environments. Lab required. Prerequisites: BIOL 311 & CHEM 341. Fall or Spring.

BIOL 442 – Population Ecology (3) Population Ecology serves as a second course in ecology. A population is a group of plants, animals, or other organisms, all of the same species, that live together and reproduce. While much of biology is centered on how individuals grow and reproduce - population ecology focuses on the population as the lowest common unit of life. This course will address the fundamental ideas of population and community ecology as they relate to size, composition, and distribution of populations and the processes that determine these attributes of populations. While this course focuses on the theories and

mathematical formulations of population ecology, we must remember the goal is to better understand natural populations. Prerequisites: BIOL 300 & MATH 151. Fall, alternate years.

BIOL 445 – Human Genetic Diseases (3) An examination of the inheritance and the molecular and phenotypic basis of human genetic diseases. Diagnoses, treatments, and societal implications of genetic-based diseases are also explained. Minimum requirement of Junior standing. Prerequisites: BIOL 105 or BIOL 311. Gen Ed: WI credit. Fall, alternate years.

BIOL 455 – Molecular Genetics (3) An in depth examination of the molecular aspects of gene control, including control of replication, transcription, and translation. Prerequisite: BIOL 311. Gen Ed: WI credit. Fall, alternate years.

BIOL 475 – Biology Laboratory Techniques (1) Experience in laboratory instruction under supervision and guidance of staff member. Prerequisite: 15 semester hours of biology and permission. Fall and Spring.

BIOL 480 – Advanced Topics in Biology (1-3) Individual and group study of problems in biology. Prerequisite: 15 semester hours of biology. Fall and Spring.

BIOL 483 – Current Topics in Biology (2-3) Investigations of topics of current interest with class discussions and oral presentations. Topics vary from instructor to instructor. Prerequisite: Junior standing. Gen Ed: SI credit. Fall and Spring.

BIOL 485 – Research in Biology (1-3) Designing, performing, interpreting and summarizing research project under supervision and guidance of staff member. Prerequisite: determined by nature of project, and permission. Fall and Spring.