EMORY UNIVERSITY BIOLOGY DEPARTMENT
UNDERGRADUATE COURSES
(6.5.17)

BIOLOGY 141, 141L, 142, AND 142L ARE PREREQUISITES
FOR MOST UPPER-LEVEL COURSES.

One cross-listed course that originates in another department may be taken for the Biology major.

120. Concepts in Biology, with Laboratory (4 credit hours) (SNTL). Fall, Spring, Summer. This course reviews the principles of genetics, physiology, ecology, taxonomy, and evolution with special reference to contemporary life situations. Intended for non-science majors. Prerequisites: None. This course does NOT fulfill the requirements for medical and dental schools or for a biology major, but will fulfill the GER for Natural Science and Math.

141. Foundations of Modern Biology I (Cell Biology and Genetics) LECTURE (3 credit hours) (SNT). Fall, Summer. The Biology 141 and 142 courses will provide a topic-driven overview of molecular, cellular, and developmental biology, along with genetics. The topics covered in class (cell structure and function, cell reproduction, and Mendelian genetics) will address major issues in research and medicine, emphasizing critical thinking involved in modern biological discovery. Prerequisites: None; Corequisite: Biology 141L. Biology 141, Biology 141L, Biology 142, and Biology 142L are required of all biology majors and should be taken during the freshman year, along with Chemistry 150 and 202. If scheduling or advising precludes taking both, it is recommended that you take Chemistry 150 and 202 before taking Biology 141/141L and Biology 142/142L.

141L. Foundations of Modern Biology I LAB (2 credit hours) (SNTL). Fall, Summer. This is the laboratory component of Biology 141. Students will design and perform experiments using several important model systems. Pre- or corequisite: Biology 141.

142. Foundations of Modern Biology II (Molecular Biology and Developmental Genetics) LECTURE (3 credit hours) (SNT). Spring, Summer. This course expands on the fundamentals learned in Biology 141, providing a continuation of the topic-driven overview of molecular, cellular, and developmental biology, along with genetics. The topics covered in class (molecular genetics, population genetics and evolution, cellular metabolism and photosynthesis, signal transduction and development) will address major issues in research and medicine, emphasizing critical thinking involved in modern biological discovery. Prerequisites: Biology 141 and Biology 141L; Corequisite: Biology 142L. Biology 141, Biology 141L, Biology 142, and Biology 142L are required of all biology majors and should be taken during freshman year, along with Chemistry 150 and 202. If scheduling precludes taking both, it is recommended that you take Chemistry 150 and 202 before taking Biology 141/141L and 142/142L.

142L. Foundations of Modern Biology II LAB (2 credit hours) (SNTL). Spring, Summer. This is the laboratory component of Biology 142. Students will design and perform experiments using several important model systems. Prerequisites: Biology 141 and Biology 141L; pre- or corequisite: Biology 142.

151. Introductory Experimental Biology I, with Lab. Currently not being taught. This course will cover biochemistry and cell biology, mitosis, meiosis, genetics, and evolution, as does Biology 141; however, additional readings, discussion format, and guided laboratory explorations will
challenge the honors student. The laboratory component will focus on scientific reasoning, experimental design, and exploration of biological phenomena.

**152. Introductory Experimental Biology II, with Lab. Currently not being taught.** Following from Biology 151, this course will cover complex systems of biology, such as evolution, ecological communities, development, and behavior. These systems will be addressed from genetic and biochemical perspectives, as well as from the standpoint of their relationship to society. The course is designed for honors students and, using labs, discussion, and intensive writing and reading assignments, will focus on the development of critical thinking and experimental design skills.

**160. Biology for The People (3 credit hours) (SNT). Currently not being taught.** This non-majors course is designed to provide undergraduate students that are not biology majors (as well as interested majors) with an understanding of those elements of the biological and biomedical sciences, ecology, evolutionary biology, and applied statistics that are of direct importance to their lives as individuals and citizens. For Freshmen and above. Prerequisites: None. The course will meet three times per week and will consist of lectures, discussion sections, and occasional workshops. This course will fulfill the GER for Natural Science and Math, but does **NOT count for the biology major.**

**185/185W. Special Topics in Biology (1 to 4 credit hours) (SNT/SNTW). Fall, Spring.** A lecture series or special course designed for **first year students** on topics of special biological concern. May be repeated for a total of 8 credit hours when topic varies. Prerequisites: None. See current course atlas. This course does **NOT count toward the biology major.**

**190 Series. Freshman Seminar (3 credit hours) (FSEM). Fall and Spring.** Variable topics. For Freshmen only. Prerequisites: None. See current course atlas. This course does **NOT count toward the biology major.**

**200. Introduction to Biological Research (2 credit hours). Fall.** This course will prepare biology majors for a future laboratory or field research experience as a participant in SURE (Summer Undergraduate Research Experience), SIRE (Scholarly Inquiry and Research Experience), Biology 499R (Undergraduate Research), or other research options. This course will also be useful for other students desiring an overview of the scientific research processes as well as for other students planning to enter a graduate program at some future date. For first and second year students. Prerequisites: None. This course may be taken as elective credit for the biology major.

**205. Comparative Vertebrate Anatomy, with Laboratory (5 credit hours). Fall, Spring.** This course provides comparative studies of phylogeny and anatomy of vertebrates from both an evolutionary and functional perspective. Cat and shark are dissected in laboratory. Prerequisites: Biology 142 and Biology 142L. This course fulfills the Column B and upper-level laboratory requirements for the biology major.

**206. Biology of Parasites, with Laboratory (4 credit hours). Currently not being taught.** This course will introduce students to modern and classical parasitology (protozoan, helminthic, and arthropod parasites of medical significance) using microscopic evaluation, digital images, and preserved specimen dissections. Topics addressed include basic principles of parasitology, evolutionary trends, host-parasite ecological considerations, therapeutic measures, and control programs. Prerequisites: Biology 142 and Biology 142L. This course may be taken as elective
credit for the biology major and fulfills the upper-level laboratory requirement for the biology major.

210. Plant Biology, with Lab (4 credit hours). Currently not being taught. Topics in this class will include plant structure, function, growth, development, physiology, and systematics. Evolutionary relationships within the plant kingdom will be emphasized. This course is intended for biology/science majors. Prerequisites: Biology 142 and Biology 142L. This course may be taken as elective credit for the biology major and meets the upper-level laboratory requirements for the biology major.

212. Computational Modeling for Scientists and Engineers (3 credit hours). Spring. Computation is one of the pillars of modern science, in addition to experiment and theory. In this course, various computational modeling methods will be introduced to study specific examples derived from physical, biological, chemical, and social systems. Prerequisites: Biology 142 and Biology 142L (for Biology 212); Physics 141 or 151 and Math 112 or 116. This course is shared by the Physics and Biology Departments (same as Physics 212) and may be taken as elective credit for the Biology major.

223. Developmental Biology (3 credit hours). Fall and Spring. This course studies the fundamental principles that govern vertebrate and invertebrate development at the cellular, molecular, and organismal levels. Prerequisites: Biology 142 and Biology 142L. This course fulfills the Column A requirement for the biology major.

224. Advanced Developmental Biology and Embryology, with Laboratory (3 credit hours). (MayMester). This course will be a more in-depth continuation of Biology 223, with a laboratory component. Prerequisite: Biology 223. This course may be taken for elective credit and fulfills the upper-level laboratory requirement for the biology major.

240. Organismal Form and Function (3 credit hours). Fall and Spring. For Sophomores. Major topics include the biology of animals and plants, physiology, evolution, and ecology. Prerequisites: Biology 141 and Biology 141L. This course fulfills the Column B requirement for the biology major.

241. Evolutionary Biology (4 credit hours). Fall and Spring. This course is a study of factors that cause genetic change and of the evolutionary consequences of such changes. Topics include population genetics, adaptation and natural selection, evolution of genes, proteins, and genomes, sexual selection, kin selection, speciation, and diversification of taxa. Emphasis will be on molecular, genetic, ecological, and evolutionary factors related to variation and adaptation to environment, and constraints on adaptation. Attendance at a mandatory discussion section is required. Prerequisites: Biology 142 and Biology 142L. This course fulfills the Column C requirement for the biology major.

247. Ecology (3 credit hours). (Same as ENVS 247.) Fall. This course provides an overview of the principles of ecology and the study of relationships between organisms and their environments, ecosystems, communities, and populations. Prerequisites: Biology 142 and Biology 142L. This course originates in the Biology Department and fulfills the Column C requirement for the biology major.

247LW. Ecology Laboratory (3 credit hours) (WRITING REQUIREMENT (WRT)). (Same as ENVS 247LW.) Fall. This is the optional laboratory portion of the Ecology class (Biology 247/ENVS 247). Field studies will be conducted in various natural areas in Georgia, including a
week-end trip to the mountains. Prerequisites: Biology 142 and Biology 142L; Prerequisite or corequisite: Biology 247 or ENVS 247. This course originates in the Biology Department, may be taken for elective credit, meets the upper-level laboratory requirement for the biology major, and fulfills a writing requirement for the GERs.

250. Cell Biology (3 credit hours). Fall, Spring. This course covers advanced topics on the structure and function of cells at the molecular level. Topics include the relationship between structure and function, integration of cellular functions, compartmentalization of cellular functions, nuclear and cytoplasmic interactions, and intracellular and intercellular communications. Prerequisites: Biology 142 and Biology 142L. This course fulfills the Column A requirement for the biology major.

260. Insect Biology (3 credit hours). MayMester. This course offers students hands-on experience to develop an understanding of insect biology. Through lectures, labs, and fieldwork, students will develop the skills to distinguish the major groups of insects and to analyze the importance of insects for ecology, human food production, and health. Prerequisites: Biology 142 and Biology 142L or Biology 240. This course may be taken as elective credit and fulfills the upper-level laboratory requirement for the biology major. For Biology 261-SAF, contact the Emory College Study Abroad office for more information.

261-SAF. Biology of Insects (4 credit hours). Summer Study Abroad (Australia). This course offers students hands-on experience to develop an understanding of insect biology. Through lectures, labs, and fieldwork, students will develop the skills to distinguish the major groups of insects and to analyze the importance of insects for ecology, human food production, and health. Prerequisites: Biology 142 and Biology 142L or Biology 240. This course may be taken as elective credit and fulfills the upper-level laboratory requirement for the biology major. Contact the Emory College Study Abroad office for more information.

264. Human Genetics (4 credit hours). Fall, Spring. Topics include population genetics, genetics of behavior, human origins, the genetics of immunity and of cancer, stem cell research, and human genomics. Attendance at a mandatory discussion section is required. Prerequisites: Biology 142 and Biology 142L. This course fulfills the Column A requirement for the biology major.

285/285W. Special Topics in Biology. (1 to 4 credit hours). Fall, Spring, and Summer. A lecture series or special course designed for second year students on topics of special biological concern. May be repeated for a total of 8 credit hours when topic varies. Prerequisites: Biology 142 and Biology 142L. See current course atlas. This course may be taken as elective credit for the biology major.

301. Introductory Biochemistry (3 credit hours) (SNT). Fall, Spring, and Summer. This course gives an integrated approach to the synthesis, structure, and function of macromolecular biomolecules, including proteins, carbohydrates, DNA, and RNA. The evolution of structural and catalytic diversity at a molecular level will provide a theme that underpins specific examples that will include: the energetics of catalysis, protein structure and folding, enzyme kinetics and mechanisms, protein engineering, DNA structure and synthesis, RNA structure and synthesis, and genomic organization and regulation. Prerequisites: Biology 142, Biology 142L, and Chemistry 203 (previously Chemistry 221). This course may be taken as elective credit for the biology major.
302. Introductory Biochemistry II. This course is no longer offered by the Biology Department effective Fall 2010. The Chemistry Department offers Chemistry 302 for interested students.

320. Animal Behavior (3 credit hours) (SNT) (Same as PSYC 320.) Fall. This course provides an overview of major research areas in the field of animal behavior. The behavior of animals will be analyzed from an evolutionary and comparative perspective. Some of the topics included are orientation and migration, genetic and environmental influences on behavior, population regulation, courtship and mating strategies, and parental behavior. Prerequisites: Biology 142 and Biology 142L (for Biol 320). This course originates in the Psychology Department and may be taken as elective credit for the biology major.

325. Primate Social Psychology (3 credit hours) (SNT). (Same as PSYC 325/ANTH 304.) Spring. Following a general introduction to primatology, the course will cover recent progress in the growing field of primate social behavior. Topics range from aggression and dominance to affiliation, sex, and peaceful coexistence. Prerequisites: Biology 142 and Biology 142L (for Biology 325). PSYC/BIOL 320 is recommended. This course originates in the Psychology Department and may be taken as elective credit for the biology major.

329. Coastal Biology, with Laboratory (4 credit hours). Spring. This is a lecture course emphasizing the basic principles of coastal ecology, the human impact on coastal ecosystems, and the diversity of invertebrates living in these ecosystems. Students will also attend a mandatory laboratory/field trip to St. Simon’s Island during Spring Break. A laboratory fee will be required for the laboratory/field portion of this course. See the Course Atlas for additional information. Prerequisites: Biology 142 and Biology 142L and permission of instructor. This course will fulfill the Column C and upper-level laboratory requirements for the biology major.

330. Chemistry, Biology, and Molecular Modeling (3 credit hours) (SNT). Spring. (Same as Chemistry 330.) This course is designed to put to use what you already know about chemistry and biology and to extend it in two directions. On the one hand, we will examine the world around us as reflected by the media, the web, and encounters in your own lives. Thus, we will examine issues around ‘natural and unnatural molecules’, the environment, disease, and society in the context of topics such as drugs, molecules from mars, aging, AIDS, bioterrorism, and crime in the courtroom. On the other hand, we will examine these ideas by means of computer graphics, the molecular structure of small molecules and proteins, and energy. Prerequisites: Biology 142, Biology 142L, and Chemistry 203 (previously Chemistry 221). This course originates in the Chemistry Department and may be taken as elective credit for the biology major.

336. Human Physiology (3 credit hours). Fall, Spring, and Summer. This course is a study of human physiology emphasizing integrated body functions. Topics include respiration, circulation, contractility, osmoregulation, endocrinology, and neurophysiology. Prerequisites: Biology 142 and Biology 142L. This course may be taken as elective credit for the biology major.

345. Conservation Biology (3 credit hours). (Same as ENVS 345.) Fall. This course focuses on the conservation of biodiversity and introduces students to ways that ecological and evolutionary principles can be used to conserve and protect species and ecosystems at risk. Specific topics include the causes and consequences of biodiversity, systematics, and endangered species, the demography and genetics of small populations, invasive species, habitat loss and fragmentation, design of reserves, and restoration ecology. Prerequisites:
Biology 142 and Biology 142L or ENVS 131. This course originates in the Environmental Science Department and may be taken as elective credit for the biology major.

346L. Biomolecular Chemistry Lab (2 credit hours). (Same as Chemistry 346L: Bioanalytical Chemistry Lab.) Currently not being taught. Experiments in this course involve analysis and characterization of the major classes of biological compounds. There will be one three-hour laboratory and one lecture per week. An additional laboratory training option is available for two additional credits. Prerequisites: Biology 142, Biology 142L, and Biology/Chemistry 301. This course originates in the Chemistry Department and may be taken as elective and upper-level laboratory credit for the biology major.

348. Mechanisms of Animal Behavior (3 credit hours). Currently not being taught. This course is a survey of current topics in neural development and neural basis of behavior. Emphasis is on research work that uses a combination of physiological, genetic, cellular, and molecular techniques to understand neural systems and their evolution and development. Prerequisites: Biology 142 and Biology 142L. This course may be taken as elective credit for the biology major.

349. Ecology of Invasions (4 credit hours). (Same as ENVS 349.) Spring. This course will familiarize students with principles of ecological invasions and methods for assessing the spread and impacts of invasive species on a global scale. Students will also become familiar with major sources of exotic species and methods available for prevention and control. Prerequisites: Biology 141 and Biology 141L. This course originates in the Environmental Science Department and may be taken as elective credit for the Biology major.

349-SAF. Ecology of Invasions (4 credit hours). Summer Study Abroad. (Same as ENVS 349.) The Departments of Biology and Environmental Studies offer a five week summer study abroad program of classroom and field study in ecology and evolutionary biology. The course will use a combination of in-class meetings and out of class field experience. There will be a one-week field excursion to sites near Cairns, including the Great Barrier Reef, Magnetic Island, Kurana Rainforest, and other sites. Prerequisites: Biology 142 and Biology 142L or ENVS 131. Contact the Emory College Study Abroad Office for more information. This course is shared by the Biology and Environmental Studies Departments and may be taken as elective credit for the biology major.

352. Epigenetics and Human Disease (3 credit hours). Fall. Epigenetics is the area of research that studies heritable characteristics that are not caused by changes in the DNA sequence of an organism. It is the study of non-genetic factors that cause the organism’s genes to behave (or “express themselves”) differently in different cells and different tissues. Epigenetics can also explain why identical twins that have exactly the same DNA sequence may display differences in behavior or in susceptibility to disease. New evidence suggests that the first steps in the development of many cancers may be epigenetic rather than genetic (i.e., caused by mutations). This course will discuss the nature of epigenetic inheritance and its relation to stem cell differentiation, normal development, and disease. Prerequisites: Biology 142 and Biology 142L. This course may be taken as elective credit for the biology major.

353. Genetics of Complex Traits (3 credit hours). Currently not being taught. Many traits of biological importance are often “complex” in that they are controlled by more than one single gene and genetic analyses of these complex traits are often sophisticated. This course will study the fundamental principles and methodology of quantitative genetics and expose students to current primary literature on current genetic analyses of complex traits such as human diseases.
**Prerequisites:** Biology 241. Math 111 and 116 are recommended. **This course may be taken as elective credit for the biology major.**

354. **The Origin and Evolution of the Immune System (3 credit hours).**  *Currently not being taught.* This course will study the origins and evolution of the immune system from different fields such as immunology, molecular biology, and evolution. **Prerequisites:** Biology 142 and Biology 142L. **This course may be taken as elective credit for the biology major.**

355. **Introduction to Time Series Analysis (3 credit hours).**  *(Same as QTM 355.) Spring.* This course covers the fundamentals of time series analysis in both the natural and social sciences, utilizing analytical, statistical, and numerical approaches. We will focus on the application of these methods to complex, real world data from medicine, economics, geology, and other fields. **Prerequisites:** Biology 142 and Biology 142L. **This class is shared by the Biology and QTM Departments and may be taken as elective credit for the Biology major.**

360. **Introduction to Neurobiology (3 credit hours).**  *(Same as NBB 301.) Spring, Fall.* This course provides an introduction to cellular and integrative neurobiology. Topics include the electrochemical mechanisms for neuronal signaling, synaptic transmission, and the neural basis of behavior in invertebrates and vertebrates. **Prerequisites:** Biology 142, Biology 142L, and Chemistry 142 with Lab. Math 116 and Introductory Physics are strongly recommended. **This course is shared by the Biology and NBB Departments and fulfills the Column B requirement for the biology major.** There is also an optional 2-credit hour lab associated with this course (Biology 360L/NBB 301L).

360L. **Introduction to Neurobiology Lab (2 credit hours).**  *(Same as NBB 301L.) Fall.* This is the optional lab associated with Biology 360/NBB 301 and will explore topics in cellular and small network neuroscience by performing virtual electrophysiology experiments on the computer. The content of the course matches material covered in Biology 360/NBB 301 and will help students understand neurons and neuronal networks in greater depth. **Prerequisites:** Biology 142 and Biology 142L; pre- or corequisite: Biology 360/NBB 301. **This course originates in the Biology Department and may be taken as elective and upper-level laboratory credit for the biology major.**

361. **Ecosystems Through Time (3 credit hours).**  *(Same as ENVS 361.) Occasionally taught.* This course provides an overview of paleoecology and paleoecological methods, which will be accomplished by examining the geological and paleontological evidence for ecosystems (marine, estuarine, freshwater, terrestrial) from the last 600 million years of earth history. Common themes will be a better understanding of the evolution of ecosystems, as well as how ancient ecosystems compare to modern analogues. **Prerequisites:** Biology 142 and Biology 142L, or ENVS 131, or BIOL_OX 111/113. **This course originates in the Environmental Science Department and may be taken as elective credit for the biology major.**

NBB 361W. **Neurophysiology Laboratory (4 credit hours) (SNTLW).**  *Spring.* Record intracellular and extracellular from invertebrates to examine sensory and motor circuits, synaptic plasticity, and ionic bases of potentials. Part of the semester is devoted to student-designed projects. Special attention is given to scientific writing and presentation of data. **Prerequisites:** Biology 360/NBB 301. **This course originates in the NBB Department and may be taken as elective and upper-level laboratory credit for the biology major.**
365. **Controversial Science (3 credit hours).** Occasionally taught. This course addresses aspects of science and technology that stir controversy in society. **Prerequisites:** Biology 142 and Biology 142L. **This course may be taken as elective credit for the biology major.**

370. **Introduction to Microbiology (4 credit hours).** Fall and Spring. This course provides an introduction to the concepts of microbial physiology, biochemistry, genetics, and evolution. **Attendance at a mandatory discussion section is required.** **Prerequisites:** Biology 142 and Biology 142L. **This class may be taken as elective credit for the biology major.** There is also an optional 2-credit hour lab (Biology 370L) associated with this class.

370L. **Introduction to Microbiology Laboratory (2 credit hours).** Fall, Spring. This course is the optional lab associated with Biology 370. This lab will provide students with an introduction to basic laboratory techniques in microbiology. Experiments dealing with the physiology, biochemistry, genetics, and molecular biology of microbes will be included. **Prerequisites:** Biology 142 and Biology 142L; pre- or corequisite: Biology 370. **This course may be taken as elective and upper-level laboratory credit for the biology major.**

371. **Ecology of the Tropics (2 credit hours).** Spring. (Same as ENVS 371.) This lecture course will explore the diverse biomes of the tropics. The focus will be on tropical forests and grasslands, with an emphasis on ecological processes, biodiversity, human impact on the tropics, indigenous peoples, and ethnobotany. **Prerequisites:** Biology 142 and Biology 142L (for Biology 371). **This course is taught by Dr. Larry Wilson (adjunct faculty), is shared by the Biology and Environmental Science Departments, and may be taken as elective credit for the biology major.**

372. **Ecology of the Tropics - Field Course (2 credit hours).** Spring. (Same as ENVS 372.) This field trip course will be taught during Spring Break week in the Amazon River lowland rainforests of southern Peru (Tambopata Research Station), famous for its huge flocks of colorful Macaws. This field course will give the student a real hands-on rainforest experience complete with bromeliads, toucans, sloths, and the sounds of the night. Cost for the trip is approximately $3000 (depending on air fare prices). **Prerequisites:** Biology 142 and Biology 142L; pre- or corequisite: Biology 371 or ENVS 371. **Permission of instructor is also required. This course is taught by Dr. Larry Wilson (adjunct faculty), is shared by the Biology and Environmental Science Departments, and may be taken as elective and upper-level laboratory credit for the biology major.** See the Biology Department Spring Course Atlas for further information.

385/385W. **Special Topics in Biology (1 to 4 credit hours).** Fall, Spring. A lecture series or special course designed for advanced students on topics of special biological concern. May be repeated for a total of 8 credit hours when topic varies. **Prerequisites:** Biology 142 and Biology 142L. See current course atlas. **This course may be taken for elective credit for the biology major.**

386/386W. **Special Topics in Biology, with Lab (1 to 5 credit hours).** Fall, Spring. A lecture and/or lab series or special course designed for advanced students on topics of special biological concern. May be repeated for a total of 8 credit hours when topic varies. **Prerequisites:** Biology 142 and Biology 142L. See current course atlas. **This course may be taken for elective credit for the biology major.**
402. Neuroscience Live (4 credit hours). Occasionally taught. This advanced seminar covers current topics of neuroscience research and the intellectual and experimental challenges involved. In this hands-on, writing intensive seminar, students will learn how to read and critique research papers and how to write and prepare a research grant proposal. Students will also interact in a ‘live’ format with authors of the research papers. Prerequisites: Biology 142 and Biology 142L; pre- or corequisite: Biology 360 or NBB 301. This course may be taken as elective credit for the biology major.

415. Cancer Biology and Oncogenes (3 credit hours). Spring. This course will examine the biological mechanisms regulating cell growth, differentiation, and migration through a focus on the mechanisms by which cancers grow and spread. Prerequisites: Biology 141 and Biology 142L. Math 111 is highly recommended. This course may be taken as elective credit for the biology major.

430. Human Genome Project and Disease (3 credit hours). Spring. This course covers human genome projects and is geared toward developing independent thinking through solving human genetic problems and critically reviewing literature on human diseases. Prerequisites: Biology 142 and Biology 142L. This course may be taken as elective credit for the biology major.

434. Physical Biology (3 credit hours). (Same as PHYS 434.) Fall. This course explores the physical and statistical constraints on strategies used by biological systems, from bacteria to large organisms and to entire populations, to sense external environmental signals, process them, and shape a response. Prerequisites: Biology 142 and Biology 142L (for Biology 434). This course is shared by the Physics and Biology Departments and may be taken as elective credit for the biology major.

440/440W. Animal Communication (3 or 4 credit hours) (WRITING REQUIREMENT (WR)). (Same as PSYC 440.) Spring. This course will study the functions, evolution, and significance of animal communication systems in a wide taxonomic range from insects to primates. Prerequisites: Biology 142 and Biology 142L (for Biology 440/440W). This course originates in the Psychology Department, may be taken as elective credit for the biology major, and fulfills a writing requirement for the GERs.

441. Molecular Biology and Evolutionary Genetics (4 credit hours). Fall. This course covers population genetics, molecular evolution, and genomics and is geared toward developing independent thinking by solving molecular biology and evolutionary genetics problems in natural populations. Attendance at a mandatory discussion section is required. Prerequisites: Biology 142 and Biology 142L. This class may be taken as elective credit for the biology major.

450. Computational Neuroscience (3 credit hours). (Also offered as IBS 534). Spring. This course will look at the exploration of single neurons and biological neural networks with computer simulations. Each class consists of an introductory lecture followed by computer tutorials using the GENESIS software under UNIX. Specific topics include passive cable theory, compartmental modeling, voltage-gated and synaptic conductances, motor pattern generation, and cortical networks. Prerequisites: Biology 360 or NBB 301 (or IBS 514 or equivalent). Permission of instructor is required. This course may be taken as elective credit for the biology major.
455. Immunology and Disease (4 credit hours). Spring. This course will explore the fundamental concepts of immunology and disease. The course will cover the basic principles of immunology and will use this knowledge to better understand the causes of pathogenesis during the course of infection with microparasites. We will consider the limitations of our current understanding of infectious diseases caused by viruses, bacteria, and unicellular eukaryotes by discussing recent articles from the literature on infections such as HIV/AIDS, tuberculosis, and malaria. Attendance at a mandatory discussion section is required. Prerequisites: Biology 142 and Biology 142L. This course may be taken as elective credit for the biology major.

460. Building Brains (3 credit hours). (Same as NBB 460.) Currently not being taught. This course will examine the experimental foundations underlying our understanding of the mechanisms regulating development of the nervous system. Topics will include neurogenesis, migration of neuronal precursors, axon guidance, programmed cell death, and the formation of synaptic connections. Through study of primary literature and texts, students will develop skills in identifying hypotheses and analyzing the logic of the experiments used to test these hypotheses. Prerequisites: Biology 142 and Biology 142L. This course originates in the Biology Department and may be taken as elective credit for the biology major.

463. Population Biology and Evolution of Disease (4 credit hours). (Also offered as IBS 591.) Fall. This course will look at the immune response, infectious diseases, and cancers that will be treated as population dynamical and evolutionary phenomena. Primary consideration will be given to four topics: (1) the within-host population dynamics of micro parasites (viruses, bacteria, and protozoa) and the immune defenses, (2) the population biology of infectious disease transmission and its control by vaccination and chemotherapy, (3) theories of the evolution of parasite virulence, and (4) the somatic cell population biology and evolution of neoplasms and their metastasis. Attendance at a mandatory discussion section is required. Prerequisites: Biology 142, Biology 142L, and an intense interest in this subject. College level mathematics and calculus are highly recommended. This course may be taken as elective credit for the biology major.

475. Biology of the Eye (3 credit hours). (Also offered as IBS 548.) Spring. This course is for juniors, seniors, and graduate students who may be interested in a basic understanding of the eye. This course will review basic principles and state-of-the-art information on ocular anatomy, embryology, biochemistry, physiology, genetics, immunology, microbiology, pharmacology, and pathology. Prerequisites: Biology 142 and Biology 142L. This course originates in Department of Ophthalmology (taught by Dr. P.M. Iuvone and Dr. John Nickerson) and may be taken as elective credit for the biology major.

480. Modeling Biological Systems (3 credit hours). Currently not being taught. This course will cover the construction and analysis of mathematical models of cellular and population processes in biology. Prerequisites: Biology 142 and Biology 142L. There is also an optional lab associated with this course – Biology 480L. This course may be taken as elective credit for the biology major.

480L. Modeling Biological Systems Laboratory (1 credit hour). Currently not being taught. This is the optional laboratory course to accompany Biology 480 and, if taken, must be taken concurrently with the lecture course -- Biology 480. Prerequisites: Biology 142 and Biology 142L; co-requisite: Biology 480. This course, taken together with Biology 480, fulfills the upper-level laboratory requirement for the biology major.
485/485W. Special Topics in Biology (1 to 4 credit hours). Fall, Spring. A lecture series or special course designed for advanced students on topics of special biological concern. May be repeated for a total of 8 credit hours when topic varies. Prerequisites: Biology 142 and Biology 142L. See current course atlas. This course may be taken for elective credit for the biology major.

495A. Honors Research - 1st semester (4 credit hours). Fall. This is the first semester of a two-semester, independent research course for students invited to participate in the Biology Department Honors Program. Senior Biology majors (with a 3.5 g.p.a. in both the biology major and overall) should take Biology 495A in the Fall semester and 495B in the Spring semester. Those graduating in a Fall semester should take 495B in the Fall of their junior year. For more information, go to the webpage for the Honors Program in Biology. Prerequisites: Biology 142, Biology 142L, and permission of instructor. Contact Tonya Woolcock at tdavis6@emory.edu or at 404-727-6292 to obtain a permission number. A maximum of 4 credit hours of Honors Research may be counted as elective credit and as an upper-level lab only after successful completion of the second semester of Honors.

495BW. Honors Research - 2nd semester (Variable credit--1 to 8 hours) (WRITING REQUIREMENT (WR)). Spring. This is the second semester of the two-semester, independent research course for students invited to participate in the Biology Department Honors Program. Biology 495B fulfills a college writing requirement upon submission and acceptance of a completed honors thesis based on the student’s research. Please visit the Biology Department website for further information. Prerequisites: Biology 142, Biology 142L, Biology 495A, and permission of instructor. Contact Tonya Woolcock at tdavis6@emory.edu or at 404-727-6292 to obtain a permission number. A maximum of 4 credit hours of Honors Research may be counted as elective credit and as an upper-level lab only after successful completion of the second semester of Honors. This course also fulfills a writing requirement for the GERs.

497R. Supervised Reading (1 to 4 hours). Fall, Spring, Summer. For this course, readings are done in conjunction with a faculty member. Interested students should communicate with appropriate faculty and obtain their permission in advance of registration. Prerequisites: Biology 142, Biology 142L, and permission of instructor. Contact Tonya Woolcock at tdavis6@emory.edu or at 404-727-6292 to obtain a permission number. This course does NOT count for the biology major and does NOT fulfill a writing requirement, but may be taken for college hours.

499R. Undergraduate Research (4 hours each semester). Fall and Spring. This is a two-semester research participation course open to sophomores, juniors, and seniors, by permission only. The student must find a faculty member to supervise the research and SUBMIT AN APPLICATION FORM to Dr. Nicole Gerardo (Director of Undergraduate Research) at a mandatory information/registration meeting at the beginning of the semester, where the student will receive approval for their research project. The student will then receive a permission number from Dr. Gerardo and will need to register on OPUS through normal procedures before the end of add/drop/swap. Students will also be required to participate in the annual Undergraduate Research Symposium at the end of the spring semester, where they will present a poster describing their research. The application form and other detailed information regarding Biology 499R requirements can be obtained from the Undergraduate Education page of the Biology Department website. Prerequisites: Biology 142, Biology 142L, second-semester Freshman standing, and a declared major in Biology. A maximum of 4 credit
hours of Undergraduate Research may be counted as elective credit and as an upper-level lab only after successful completion of the second semester of 499R.

**Notes:**

Biology 185/185W, 285/285W, 385/385W, 386/386W, and 485/485W courses will be assigned a permanent course number for later semesters. The name of the course will normally remain the same.