BIOLOGY

Students may complete a major or minor in Biology. Interdisciplinary minors with connections to the Biology Major include Data Science, Environmental Studies, Health Studies and Neuroscience.

The curriculum of the Department is designed to introduce students to unifying concepts and broad issues in biology, and to provide the opportunity for in-depth inquiry into topics of interest through coursework and independent research. Introductory and intermediate-level courses examine the structures and functions of living systems at all levels of organization, from molecules, cells and organisms to populations and ecosystems. Advanced courses encourage students to gain proficiency in the critical reading of research literature, leading to the development, presentation and defense of a senior paper as the capstone experience. Opportunities for supervised research with faculty are available and encouraged. Students considering majoring in Biology are encouraged to make an appointment to meet with the Department's major advisor, Jennifer Skirkanich (jskirkanic@brynmawr.edu), to determine the best sequence of courses based on their interests and goals.

Academic Opportunities

Minors in Data Science, Environmental Studies, Health Studies and Neuroscience
These minors are available for students interested in interdisciplinary exploration in these areas. Check relevant sections of the course catalog for complete descriptions of the minors.

Teacher Certification
The College offers a certification program in secondary teacher education. Consult catalog for further information.

4+1 Master of Engineering Program with the University of Pennsylvania
Students enrolled in this program may begin coursework towards their master's degree at University of Pennsylvania as a Bryn Mawr undergraduate. After graduation from Bryn Mawr, students will complete their master's coursework over the course of a year as a full-time student at UPenn. More information can be found here. Biology majors interested in the 4+1 Program with Penn Engineering should contact Jennifer Skirkanich (jskirkanic@brynmawr.edu).

Summer Science Research Program at Bryn Mawr College
Bryn Mawr and Haverford students are eligible to apply to the Summer Science Research (SSR) program. SSR is a 10-week program that supports students who are doing discovery-based research in the laboratory or field with Bryn Mawr faculty. The program provides support for students along with a speaker series and professional development programming. More information can be found here.

Animal Experimentation Policy

Students who object to participating directly in laboratory activities involving the use of animals in a course required for the major are required to notify the faculty member of their objections at the beginning of the course. If alternative activities are available and deemed consistent with the pedagogic objectives of the course by the faculty member, then the student will be allowed to pursue alternative laboratory activities without penalty.

Major Requirements

Two semesters of introductory biology (BIOL B110 Biological Exploration I and BIOL B111 Biological Exploration II)

- The introductory biology courses must be completed with merit grades before the beginning of junior year.
- A score of 5 on the Advanced Placement examination or of 7 on the International Baccalaureate examination can be used to satisfy one semester of introductory biology. Students placing out of one semester of introductory biology are still required to take one semester of BIOL B110 Biological Exploration I/BIOL B111 Biological Exploration II plus an additional Biology course at the 200 or 300 level. In general, the Department highly recommends both semesters for majors since some 200/300-level courses require specific introductory courses (e.g., BIOL 110) as prerequisites.

Six courses at the 200 and 300 level (excluding BIOL 390-398)

- At least two of these upper-level courses must be at the 300 level.
- At least three of these upper-level courses must be laboratory courses. For students enrolled in two semesters of BIOL B400 Senior Research or BIOL B403 Supervised Laboratory Research in Biology, only two upper-level laboratory courses are required. Please note: students must take a minimum of two writing attentive (WA) laboratory courses to complete the Writing in the Major requirement, as described below.
- The Writing in the Major requirement is fulfilled by completion of two WA-designated 200/300-level laboratory courses in Biology.
- No more than two upper-level courses may be taken outside the Bryn Mawr Biology Department.

Senior capstone experience (two options)

- All capstone experiences include a written paper, presentation of this work, and periodic self-reflections. This can be completed via one of the following options:
- **Option 1**: Two semesters of senior laboratory research (BIOL B400 Senior Research).
- **Option 2**: An additional 300-level, Senior Capstone-Eligible course, taken in the senior year.
- Two semester courses in general chemistry (CHEM B103 General Chemistry I and CHEM B104 General Chemistry II)
- These courses must be completed with merit grades before the beginning of junior year.
- Three semester courses in allied sciences to be selected from Anthropology, Chemistry, Computer Science, Geology, Mathematics, Physics, or Psychology. Selection of allied science courses must be made in consultation with the student's major adviser and be approved by the Department.

Honors

Departmental honors are awarded to students who have distinguished themselves academically or via their participation in departmental activities. In order to be considered for honors, Biology majors are required to attend at least six STEM-focused seminars at Bryn Mawr College or Haverford College over the course of their junior and senior years. In addition, students are required to submit a one-paragraph summary of each seminar they attend within 48 hours of attendance. The form to submit summaries can be found here. As part of the process for awarding honors in Biology, interested seniors are also required to write a short (one-page maximum) essay identifying ways in which they

have distinguished themselves within the Biology Department, including activities and scholarship beyond the classroom that exemplify their engagement and growth as a Biology major. The form to submit an essay can be found here.

Final selection for honors is made by the Biology faculty.

Minor Requirements

- Six semester courses in Biology (including up to two introductory biology courses)
- No more than two of these courses may be taken outside the Bryn Mawr Biology Department

BIOL B103 Basic Concepts in Human Biology (1 Unit)
An introduction to modern topics in biology with an emphasis on human biology. Topics include biomolecules, cells, genes, development, organ systems, and disease. The scientific process and interpretation of scientific information as it pertains to understanding human biology and disease will also be explored. This course is intended for students who are not majoring in Biology or Biochemistry & Molecular Biology. Lecture three hours a week.

BIOL B110 Biological Exploration I (1 Unit)
BIOL B110 is an introductory-level course designed to encourage students to explore the field of biology at multiple levels of organization: molecular, cellular, organismal and population. Lecture three hours, laboratory three hours a week. BIOL B110 explores the ways the central dogma of molecular biology relates to the biochemical basis of human traits through the lens of biochemistry, cell biology, genetics, and molecular biology. The laboratory portion of the course will explore the fundamentals of molecular and cellular biology through scientific research, with an emphasis on scientific process and experimental design. Topics include genetically modified organisms, stem cell biology, and molecular biological techniques.

BIOL B111 Biological Exploration II (1 Unit)
BIOL B111 is an introductory-level course designed to encourage students to explore the field of biology at multiple levels of organization: molecular, cellular, organismal and ecological. Lecture three hours, laboratory three hours a week. Spring 2023: BIOL B111 will explore how organisms interact with and adapt to their environments, both abiotic and biotic. Topics to be investigated include development, physiology, photosynthesis, ecology (population, community and ecosystem), and evolution. The laboratory portion of the course will explore the fundamentals of organismal biology through scientific research, with an emphasis on the scientific process and experimental design.

BIOL B150 Anatomy & Physiology I (1 Unit)
BIOL 150 is the first semester of a two-semester series exploring the structure and function of the human body. Topics include fundamental principles of physiology, overall body organization, cytology, histology, and the integumentary, skeletal, muscular, and nervous systems. In lecture and lab we will use comparative approaches and human models to investigate the relationships between humans' anatomy and physiology. Lecture three hours, laboratory three hours a week. Course does not count toward the Biology Major and is not a substitute for BIOL 110 or 111. Completion of BIOL 150 with a grade of 2.0 or better is required for subsequent enrollment in BIOL 151 in Spring. Course not open to first year students.

BIOL B151 Anatomy and Physiology II (1 Unit)
BIOL B151 is the second semester of a two-semester series exploring the structure and function of the human body. Topics include endocrine, circulatory, cardiovascular, respiratory, digestive, urinary, and reproductive systems. In lecture and lab, we will use comparative approaches and human models to investigate the relationships between humans' anatomy and physiology. Lecture three hours, laboratory three hours a week. Course does not count toward the Biology Major. Prerequisite: Must have taken BIOL B150.

BIOL B181 Introduction to Biology I: Genetics & the Central Dogma (1 Unit)
For post-baccalaureate premedical students only. A comprehensive examination of topics in genetics, molecular biology and cancer biology. Lecture three hours, laboratory three hours a week

BIOL B182 Introduction to Biology II: Biochemistry & Human Physiology (1 Unit)
For post-baccalaureate premedical students only. A comprehensive examination of topics in biochemistry, cell biology and human physiology. Lecture three hours, laboratory three hours a week. BIOL B101 is strongly recommended.

BIOL B201 Genetics (1 Unit)
This course focuses on the principles of genetics, including classical genetics, population genetics and molecular genetics. Topics to be covered include the genetic and molecular nature of mutations and phenotypes, genetic mapping and gene identification, chromosome abnormalities, developmental genetics, genome editing and epigenetics. Examples of genetic analyses are drawn from a variety of organisms including Drosophila, C. elegans, mice and humans. Lecture three hours a week. Prerequisite: BIOL B110 and CHEM B104.

BIOL B202 Neurobiology (1 Unit)
This course provides a cellular and molecular lens on foundational topics in neuroscience, such as electrophysiology, synaptic transmission, plasticity, and neural circuit development and function. Students will develop skills necessary to read primary literature in neuroscience. Lecture and activities three hours per week. Prerequisite: One semester of BIOL 110-111, Neuroscience 100, or permission of instructor.

BIOL B212 Nutritional Physiology (1 Unit)
Nutritional physiology covers the biochemical basis of energy metabolism, physiological processes in digestion and uptake, structure and function of the digestive tract, and the biochemical transformation of carbohydrates, fats, and proteins in the body. The course also addresses vitamins, mechanisms of organ- to organism-wide control, the gut microbiome, and major events in nutritional research, as well as topics on politics and sociocultural influences of agricultural practices, food production, its distribution, and factors in its consumption. The emphasis is on expanding the students' understanding of physiology, primarily through a human-focused approach. Prerequisite: completion of Biol 110 or 111.

BIOL B215 Biostatistics with R (1 Unit)
An introductory course in statistical analysis focusing on biological data. This course is structured to develop students' understanding of statistics and probability and when to apply different quantitative methods. The lab component focuses on how to implement those methods using the R statistics environment. Topics include summary statistics, distributions, randomization, replication, and probability. The course is geared around problem sets, lab reports, and interactive learning. No prior experience with programming is required. Suggested Preparation: BIOL B110 or B111 is highly recommended. Students who have taken PSYC B205/H200 or SOCL B265 are not eligible to take this course.

BIOL B216 Genomics (1 Unit)
An introduction to the study of genomes and genomic data. This course will examine the history of this exciting field, the types of biological questions that can be answered using large biological data sets and complete genome sequences as well as the techniques and technologies that make such studies possible. Topics include genome organization and evolution, comparative genomics, and analysis of transcriptomes, with a focus on animal genomics and humans in particular. Prerequisite: One semester of BIOL 110. BIOL 201 highly recommended.

BIOL B217 Biomechanics (1 Unit)
This course integrates anatomy, physiology, neuromechanics, and physics to understand the principles that govern animal and human movement. Concepts will highlight the interdisciplinary nature of biomechanics that must be used to study the mechanics of movement, from running, walking, flying, to swimming. Students will develop fundamental quantitative skills for biological problem-solving and be exposed to the field of comparative biomechanics. Prerequisite: One semester of BIOL 110-111, or permission of instructor.

BIOL B220 Ecology (1 Unit)
A study of the interactions between organisms and their environments. The scientific underpinnings of current environmental issues, with regard to human impacts, are also discussed. Students will also become familiar with ecological principles and with the methods ecologists use. Students will apply these principles through the design and implementation of experiments both in the laboratory and the field. Lecture three hours a week, laboratory/field investigation three hours a week. There will be optional field trips throughout the semester. Prerequisite: One semester of BIOL B110 or B111 or permission of instructor.

BIOL B221 Invasion Biology (1 Unit)
The negative impact of biological invasions is recognized as one of the key drivers of biodiversity loss. We will study how biological invasions come to be, what makes invasive species so successful, and how the ecology and evolution of invasive populations redefine the ecosystems in which they become established. The course will explore the interaction between invasive species and other global change factors such as urbanization, globalization of trade, and climate change. For each topic, we will examine the theoretical background, consider case studies, and develop a deeper understanding through class discussions, readings, and assignments. Prerequisite: BIOL B111 or instructor permission.

BIOL B225 Biology and Ecology of Plants (1 Unit)
Plants are critical to numerous contemporary issues, such as ecological sustainability, economic stability, and human health. Students will examine the fundamentals of how plants are structured, how they function, how they interact with other organisms, and how they respond to environmental stimuli. In addition, students will be taught to identify important local species, and will explore the role of plants in human society and ecological systems. One semester of BIOL 110/111.

BIOL B228 Drosophila as a model for neurogenetics (1 Unit)
This course will allow students to gain firsthand experience in how to use the Drosophila melanogaster model to perform original research in neurogenetics. Students will be provided with a novel gene to study and assess the role of these genes in a diversity of behavioral assays. The course will be a mixture of lecture, laboratory activity, paper discussion, and student presentation. One semester of BIOL B110-111 or permission of instructor.

BIOL B230 Ecological Exiles and Sustainability (1 Unit)
The fossil record writes a natural history of forced past migrations of organisms due to physiological intolerances of shifting climatic conditions. These paleo stories of ecological exiles provide an informative backdrop for our own species as we grapple with the potential of becoming ecological exiles ourselves within our own lifetimes based on projections by the Intergovernmental Panel on Climate Change. For instance, the 2018 World Bank Report projects that climate change could force over 140 million people to migrate by 2050. Actions in support of sustainability initiatives are imperative to the health and well being of our species as we grapple with the status quo and the challenge of environmental injustices. This workshop-based course will begin with the concept of ecological exiles then consider how local initiatives on campus and beyond can help us to work towards global goals for sustainable development. For students enrolled in the Russophone Diaspora 360 cluster, the concept of ecological exiles will be enriched by considering the literature and lived experiences of Russophone émigrés.

BIOL B236 Evolution (1 Unit)
A lecture/discussion course on evolutionary biology. This course will cover the history of evolutionary theory, population genetics, molecular and developmental evolution, paleontology, and phylogenetic analysis. Lecture three hours a week.

BIOL B238 Ethics in Biology (1 Unit)
Students will read and discuss various text to understand the intersection of ethics with biology in the modern world in light of the history of questionable morality and ethics in science. We will specifically focus on the medical sciences, environmentalism, and how settler colonialism is an intrinsic part of most scientific research practices. Prerequisites: A college-level intro science class like BIOL 110 or 111, ENVS 101 or GEOL 101

BIOL B250 Computational Methods in the Sciences (1 Unit)
A study of how and why modern computation methods are used in scientific inquiry. Students will learn basic principles of analyzing, modeling, and visualizing scientific data through hands-on programming exercises. Content will draw on examples from across the life sciences. This course will use the Python programming language. No prior programming experience is required. Six hours of combined lecture/lab per week.

BIOL B255 Microbiology (1 Unit)
Invisible to the naked eye, microbes occupy every niche on the planet. This course will examine how microbes have become successful colonizers; review aspects of interactions between microbes, humans and the environment; and explore practical uses of microbes in industry, medicine and environmental management. The course will combine lecture, discussion of primary literature and student presentations. Three hours of lecture and three hours of laboratory per week. Prerequisites: BIOL 110 and CHEM B104.

BIOL B262 Urban Ecosystems (1 Unit)
Cities can be considered ecosystems whose functions are highly influenced by human activity. This course will address many of the living and non-living components of urban ecosystems, as well as their unique processes. Using an approach focused on case studies, the course will explore the ecological and environmental problems that arise from urbanization, and also examine solutions that have been attempted. Prerequisite: BIOL B110 or B111 or ENVS B101.

BIOL B271 Developmental Biology (1 Unit)
An introduction to embryology and the concepts of developmental biology. Concepts are illustrated by analyzing the experimental observations that support them. Topics include gametogenesis and fertilization, morphogenesis, cell fate specification and differentiation, pattern formation, regulation of gene expression, neural development, and developmental plasticity. The laboratory focuses on observations and experiments on living embryos. Lecture three hours, laboratory three scheduled hours a week; some weeks require additional hours outside of the regularly scheduled lab. Prerequisite: one semester of BIOL 110-111 or permission of instructor.

BIOL B303 Human Physiology (1 Unit)
A comprehensive study of the physical and chemical processes in tissues, organs and organ systems that form the basis of animal and human function. Homeostasis, control systems and the structural basis of function are emphasized. Laboratories are designed to introduce basic physiological techniques and the practice of scientific inquiry. Lecture three hours, laboratory three hours a week. Prerequisites: One semester of BIOL 110-111, CHEM 103, 104 and one 200-level biology course, or permission of instructor.

BIOL B305 Sleep and Biological Rhythms (1 Unit)
This seminar course will survey our current understanding of chronobiology and sleep at the molecular, cellular, and organismal level. Classes will be a mixture of lecture, discussion, and student presentations based on both historical and current primary literature. Prerequisite: PSYC H217, PSYC B218, or BIOL B202 or permission of instructor.

BIOL B312 Biodiversity Conservation in a Changing World (1 Unit)
How is biodiversity responding to human-induced global change, and how can ecological knowledge be applied to conservation? This course explores pressing ecological challenges such as endangered species management, invasive species spread, and climate-driven range shifts. Through case studies and primary literature, we will examine how conservation biologists, invasion ecologists, and population biologists use data-driven approaches to understand ecological dynamics, inform decision-making, and propose real-world solutions. Students will explore quantitative methods by analyzing and discussing scientific papers, gaining insight into the role of data and models in conservation science. By the end of the course, students will design a research proposal detailing how to collect and analyze data for forecasting ecological change or modeling biodiversity threats. Prerequisites: Any 200-level BIOL course OR ENVS 201 OR permission of instructor. Students should have completed at least one QM course.

BIOL B317 Evolution and Medicine (1 Unit)
An opportunity to apply evolutionary thinking to the prevention and treatment of human disease. Course themes include: pathogen evolution; evolution of defense mechanisms; reproductive medicine; cancer as an evolutionary process; disease-associated allele frequencies in populations; individual health versus population health. A problem-based seminar course with a focus on the primary research literature. Three hours of course meetings per week. Prerequisite: Required: BIOL 110 or 111 and any 200-level course in Biology. At least one of the following courses is recommended but not required: BIOL 201 (Genetics), BIOL 206 (Genomics), BIOL 215 (Biostatistics with R) or BIOL 236 (Evolution).

BIOL B318 Sex in Modern Healthcare (1 Unit)
A primary goal of this course is to explore the spectrum of biological sex, a concept that is usually described as entirely binary, but is highly variable with as many as 1% of individuals born with differences in sex development. We will also study topics specific to people with uteruses including menstruation, pregnancy, and menopause to gain a more comprehensive understanding of these physiological processes. In addition, this course will engage with societal issues affecting patients who identify as women including access to reproductive and gender affirming healthcare, and the of historical understudying of female physiology. Prerequisite: BIOL 110 and any 200-level biology course

BIOL B323 Coastal and Marine Ecology (1 Unit)
An interdisciplinary course exploring the ecological, biogeochemical, and physical aspects of coastal and marine ecosystems. We will compare intertidal habitats in both temperate and tropical environments, with a specific emphasis on global change impacts on coastal systems (e.g. sea level rise, warming, and species shifts). Lecture three hours, laboratory three hours per week. In 2020 the course will have a mandatory field trip to a tropical marine field station and an overnight field trip to a temperate field station in the mid-Atlantic. Prerequisite: BIOL B220 or BIOL B225.

BIOL B326 From Channels to Behavior (1 Unit)
Introduces the principles, research approaches, and methodologies of cellular and behavioral neuroscience. Prerequisites: one semester of BIOL 110-111 and one of the following: BIOL 202 or PSYC B218 or PSYC H217.

BIOL B327 Evolutionary Genetics and Genomics (1 Unit)
This seminar course will discuss evolution primarily at the level of genes and genomes. Topics will include the roles of selection and drift in molecular evolution, evolution of gene expression, genomic approaches to the study of quantitative variation, evolutionary history of humans, and evolutionary perspectives on the study of human disease. Students will read papers from the primary literature, lead and participate in class discussions and debates, and write reviews of research articles. Quantitative proficiency required. Pre-requisites: One semester of BIOL 110-111 and BIOL 201, or BIOL 236, or permission of instructor.

BIOL B330 Ecological Modeling (1 Unit)
Unraveling the complexity of ecological systems calls for increasingly sophisticated quantitative approaches. Statistical models and simulations built on empirical data offer the means of exploring complex ecological questions to better understand ecological processes and inform environmental decisions. This class will introduce students to a variety of ecological models while instilling an appreciation for the strengths and limitations of each modeling technique, vital to characterizing inferences made from them. The course will be taught as a hands-on integrated lab/lecture, and students will be expected to program regularly, primarily in R. Prerequisite: BIOL B215 or BIOL B250.

BIOL B337 Stem Cell Biology and Regenerative Medicine (1 Unit)
In this course we will explore the molecular and cellular biology of stem cells and regeneration, and examine experimental evidence demonstrating the underlying mechanisms and clinical applications of stem cell biology. Topics will include stem cell physiology, niches, embryonic stem cells, adult stem cells, limb/tissue regeneration, therapeutics, and regenerative bioengineering. Content information in this class will be supplemented by a student-driven journal club that will discuss experimental techniques and findings from recent primary research articles. Prerequisite: Any 200 level BIOL class.

BIOL B338 Advanced Topics in Neurobiology: Learning and Memory (1 Unit)
This course will focus on the cellular and molecular mechanisms underlying neuronal synaptic plasticity, learning, and memory. Through a combination of lectures, discussions, and presentations, we will build up to reading primary scientific literature covering multiple model organisms, learning paradigms, and experimental techniques. PSYC H217, PSYC B218, or BIOL B202 or permission of instructor.

BIOL B344 Sensory Physiology (1 Unit)
How do animals sense the world around them? How does an animal's physiology shape its experience of the world? In this class, we will cover the processes underlying animal sensing, including the senses familiar to us – vision (seeing), audition (hearing), somatosensation (touch), olfaction (smell), and gustation (taste) – as well as those we lack, such as electroreception and magnetoreception. The course will focus on the structures and transduction mechanisms that convert sensory signals in the outside world to neural signals. We will highlight commonalities across sensory systems in divergent organisms, as well as examine how animals have evolved unique sensory systems suited to their particular environments.

BIOL B347 Neural Coding (1 Unit)
How do patterns of electrical activity in the brain represent information about the outside world, our movements, and our thoughts? In this course, we will discuss scientists' attempts to decipher this "neural code," examining current knowledge and theories of how information is represented and processed in the brain. We will consider the roles of individual neurons, small neural circuits, and larger brain areas. Topics include: tuning curves, rate and temporal codes, noise and variability, population codes, oscillations and synchrony, and neural adaptation. We will also discuss existing and emerging technologies that are enabled by our understanding of the neural code, as well as the ethical questions raised by these technologies. (This course does not involve programming.) Prerequisite: BIOL B202 or permission of instructor

BIOL B352 Immunology (1 Unit)
An introduction to immunology with a focus on the dynamic network of molecules and cells underlying the vertebrate immune response. This problem-based workshop course uses primary research articles and a curiosity-driven, open-ended laboratory research project to make sense of complicated biology and empower each student to build a big-picture view of this fast-moving, interdisciplinary field. Key themes include: immune cell specification and development; molecular recognition and immune cell signaling; generation of immunological memory; and cancer immunotherapies. Learning strategies include problem solving, small group discussion, and critical analysis of the primary literature. Three hours of class meetings and three hours of lab per week. Prerequisites: BIOL B110 and any 200-level course in Biology.

BIOL B354 Basic Concepts and Special Topics in Biochemistry (1 Unit)
For post-baccalaureate premedical students and non-majors with instructor permission. Course does not count toward the Biology, Chemistry or BCMB Majors; students majoring in Biology, Chemistry or BCMB should take BIOL B375 or CHEM B242. Prerequisites: BIOL B110 and CHEM 211, or permission of the instructor.

BIOL B375 Biochemistry (1 Unit)
This course will focus on the structure and function of proteins, carbohydrates and lipids, enzyme kinetics, and central metabolic pathways. Students will explore these topics via lecture, critical reading and discussion of primary literature and laboratory experimentation. Three hours of lecture, three hours of lab per week. Prerequisites: BIOL B110 and two semesters of Organic Chemistry (CHEM B211/B212).

BIOL B376 Molecular Biology (1 Unit)
This course focuses on the analysis of nucleic acids and gene regulation through lecture, critical reading and discussion of primary literature and laboratory experimentation. Three hours of lecture, three hours of lab per week. Prerequisite: BIOL 201 or BIOL B375 or permission of instructor.

BIOL B398 Senior Seminar (1 Unit)
A senior seminar course in which students investigate a broad topic in biology. Students will also write and present an independent research paper and facilitate class discussions about their topic. Potential topics for independent research are based on your own interests. Three hours of discussion per week, supplemented by frequent individual meetings with instructor. Open to senior Biology majors only.

BIOL B400 Senior Research (1 Unit)
Independent laboratory research in the senior year, which includes written and oral presentation of a senior paper based on this research. Typically taken both in the fall and the spring, in the spring this course will require meeting for one hour every week as a group.

BIOL B403 Supervised Laboratory Research in Biology (0.5-1 Unit)
Laboratory research under the supervision of a member of the department. Prerequisite: permission of instructor.

BIOL IB BIology - IB (0.5-1 Unit)

BIOL 125B The Cellular Basis of Embryonic Development and Cancer (B) (1 Unit)
Through discussion of the primary literature and independent experimental studies, students will investigate how precisely coordinated cellular processes promote the formation of embryos. We will also explore how disruptions in these processes promote cancerous cell behaviors. Potential topics include - cell migration and metastasis, the role of matrix adhesion in regulating embryonic and stem cell proliferation and the ability of cells to interpret their environment using dynamic internal structures.

ANTH B208 Human Biology (1 Unit)
This course will be a survey of modern human biological variation. We will examine the patterns of morphological and genetic variation in modern human populations and discuss the evolutionary explanations for the observed patterns. A major component of the class will be the discussion of the social implications of these patterns of biological variation, particularly in the construction and application of the concept of race. Prerequisite: ANTH 101 or permission of instructor.

ANTH B317 Disease and Human Evolution (1 Unit)
Pathogens and humans have been having an "evolutionary arms race" since the beginning of our species. In this course, we will examine how natural selection and other evolutionary forces shape our susceptibility to disease, and how we have adapted to resist disease. We will also address how concepts of Darwinian medicine impact our understanding of how people might be treated most effectively. We will focus on infectious and chronic diseases, and the anthropogenic effects contributing to the observed distribution of various diseases and illnesses, such as climate change and racism, and their interactions.

CHEM B103 General Chemistry I (1 Unit)
This is an introductory course in chemistry, open to students with no previous chemistry experience. Topics include aqueous solutions and solubility; the electronic structure of atoms and molecules; chemical reactions and energy; intermolecular forces. Examples discussed in lecture and laboratory include applications of the material to environmental sciences, material science and biological chemistry. Lecture three hours, recitation one hour and laboratory three hours a week. Prerequisite: Quantitative Readiness Required.

CHEM B104 General Chemistry II (1 Unit)
For students who have completed General Chemistry I or have some previous work in chemistry. Topics include chemical kinetics; aqueous solutions and solubility; chemical equilibrium; electrochemistry; thermochemistry. Examples discussed in lecture and laboratory workshop include nuclear chemistry, geochemistry, environmental sciences, material sciences and biological chemistry. One section of the course is designed for students considering a major in the sciences and takes an interdisciplinary approach to the course topics. Lecture three hours, recitation one hour and laboratory three hours a week. Prerequisite: CHEM B103 with a grade of at least 2.0 or permission of the instructor.

CHEM B377 Biochemistry II: Biochemical Pathways and Metabolism (1 Unit)
This course is a continuation of CHEM B242 or BIOL B375. Biochemical pathways involved in cellular metabolism will be explored in molecular detail. Energy producing, degradation, and biosynthetic pathways involving sugars, fats, amino acids, and nucleotides will be discussed with an emphasis on structures and mechanisms, experimental methods, regulation, and integration. Additional topics, drawn from the primary research literature, may be covered. Readings will be drawn from textbooks and from the primary literature and assessments may include oral presentations, problem sets, written examinations, and writing assignments. This is a second course in Biochemistry and assumes a strong foundation in the fundamentals of Biochemistry. Prerequisite: BIO 375 or CHEM 242, or permission of instructor.