

## Upper-Division Course Options for Genetics Majors

Major electives in general should be selected from upper-division lecture, laboratory, combination, or seminar courses offered in biochemistry, biology, cell biology, chemistry, computer science, ecology, entomology, genetics, marine science, math, microbiology, plant biology, statistics, and vet physiology. No greater than 4 hours of the 9 total required major elective hours may be earned in independent research or directed study courses. A minimum grade of C (2.00) is required in all major, including major elective, course work.

The following list categorizes and lists courses once, even though a course may fit in more than one category. The list is not exhaustive, so check out the online Bulletin or Schedule of Classes for additional options.

### BEHAVIORAL GENETICS

#### **GENE 4050. Behavior Genetics. 3 hours.**

Prerequisite: BIOL 1107-1107L or BIOL 1108-1108L or permission of department.  
Interdisciplinary field combining behavioral sciences and genetics to study roles of the genes and other factors involved in a variety of complex behaviors of humans and animals. Topics include principles and methodologies of quantitative behavior genetics; nature, nurture, behavior and evolution; neurogenetics; cognitive disabilities, personality disorders, psychopathology; and culture.

Offered: Spring

### BIOTECHNOLOGY

#### **BCMB(ENTO) 4200/6200. Biotechnology. 3 hours.**

Undergraduate prerequisite: BCMB(BIOL)(CHEM) 3100 and GENE 3200  
Undergraduate prerequisite or corequisite: MIBO 3500 or CBIO(BIOL) 3400  
Applied aspects of biochemistry and molecular biology in various fields, with emphasis on the use of recombinant DNA methods and protein engineering.

Offered: Spring

#### **MIBO 4300/6300. Environmental Microbiology and Biotechnology. 3 hours.**

Prerequisite: MIBO 3500

Microorganisms used in biotechnology, agriculture, bioremediation, and industry; distribution, taxonomy, and physiology of environmentally significant microorganisms.

Offered: Spring – even-numbered years

#### **PBIO(BIOL)(CRSS) 4500. Introduction to Gene Technology. 3 hours.**

Not open to students with credit in BTNY(CRSS)(BIOL) 4500

Prerequisite: GENE(BIOL) 3200

Methods and applications of gene technology (recombinant DNA) and related concepts in molecular biology. These will include structure and synthesis of macromolecules; cDNA and genomic cloning, polymerase chain reaction; molecular markers and mapping; gene isolation strategies; and various host-vector systems.

Offered: Every year

**PBIO 4540/6540. Plant Molecular Biology and Genetic Engineering. 3 hours.**

Undergraduate prerequisite: (BIOL 1103 and BIOL 1103L) or BIOL 1107-1107L or PBIO 1210 or POD

Undergraduate prerequisite or corequisite: GENE(BIOL) 3200 or GENE(BIOL) 3200H

The goals of this course are to convey a working knowledge of plant gene structure, expression and regulation, mutant isolation, genetic mapping and gene cloning, generation of transgenic plants, and the application of the knowledge of plant molecular biology and genetics in producing plants with novel traits.

Offered: Spring

**CHEMISTRY**

**CHEM(BCMB) 4190/6190. Introduction to NMR Spectroscopy. 3 hours. 2 hours lecture and 3 hours lab per week.**

Undergraduate prerequisite: CHEM 2211 and CHEM 2212

Instrumental aspects of NMR spectroscopy including pulsed Fourier transform techniques, proton and carbon-13 techniques used in the analysis of organic compounds, polypeptides and other small molecules. The focus is on the operation of NMR spectrometers presently available in the University of Georgia Chemistry Department.

Offered: Fall

**DEVELOPMENTAL / EVOLUTIONARY BIOLOGY**

**CBIO(PBIO) 4600/6600-4600L/6600L. Biology of Protists. 5 hours. 3 hours lecture and 4 hours lab per week.**

Undergraduate prerequisite: BIOL 1104 or BIOL 1108-1108L or PBIO 1220-1220L

Protists (algae, protozoa, and zoosporic fungi) with an emphasis on cell structure, evolution, and life histories. Laboratories will concentrate on examination of living and fixed materials and will include methods of isolation and culturing of protists.

Offered: Spring - odd-numbered year

**GENE 4000/6000. Advanced Evolutionary Biology. 3 hours.**

Prerequisite: GENE(BIOL) 3000, GENE(BIOL) 3200, MATH 2200 or 2300H, or POI

Evolutionary processes and their genetic basis. Theoretical and experimental approaches to the study of population genetics, quantitative genetics, evolutionary ecology, and molecular evolution.

Offered: Fall

**PBIO(BIOL) 3600. Plant Cell and Developmental Biology. 4 hours.**

Prerequisite: BCMB(BIOL)(CHEM) 3100 or BCMB 4010 or BCMB 4020

Prerequisite/corequisite: GENE(BIOL) 3200 or PGEN 3580

Structure and function of plant cells, their membranes, cell walls, organelles and tissues; energy transduction and signaling mechanisms; regulation of gene expression in response to the environment, tissue interactions, hormones and during development; developmental programs and their controls during flowering, gametogenesis, fertilization, embryogenesis, seed germination, and morphogenesis.

Offered: Fall

**PBIO 4530/6530. Evolutionary Developmental Biology. 3 hours.**

Undergraduate prerequisite: GENE(BIOL) 3200

A survey of the wealth of information arising from comparative developmental research conducted on multicellular organisms. Students will explore the evolutionary diversification of developmental pathways in phylogenetically remote organisms and refine critical thinking and technical writing skills through analysis of publications drawn from the recent literature.

**ECOLOGY**

**ECOL 3000-3000L. Introduction to Field Methods. 4 hours.** Repeatable for maximum 8 hours credit. 4 hours lecture and 4 hours lab per week.

Prerequisite: BIOL 1108-1108L and permission of department

Survey of quantitative field methods in ecology. Lectures and field applications focus on research design and hypothesis testing, with an emphasis on sampling design, measurement, and statistical comparison of environmental variables, plant and animal abundance, diversity, spatial pattern, and species composition. Students will build skills in statistical analysis, scientific rigor, and critical thinking, and in the practical application of quantitative field methods in ecology.

Non-traditional format: This course is taught in Costa Rica.

Offered: Fall, Summer

**ECOL 3100-3100L. Tropical Field Ecology. 4 hours.** 4 hours lecture and 4 hours lab per week.

Prerequisite: BIOL 1108-1108L and permission of department

An interdisciplinary field program in tropical habitats, exploring and comparing tropical environments, their natural history, their biological wealth, and the ecological patterns, processes, and interactions that characterize tropical systems. Students will develop competence in recognition and observation of tropical organisms in the wild. Analysis of the interplay of tropical nature and human society, the threats to tropical biodiversity, and current conservation approaches in the tropics.

Non-traditional format: This course is taught in Costa Rica.

Offered: Fall

**ECOL 3220. Biology and Conservation of Marine Mammals. 4 hours.**

Marine mammal biology and conservation with a primary focus on marine mammals common to the southeastern United States. Topics will include anatomy/physiology, population dynamics, captive management and rehabilitation, law and public policy, and careers in marine mammal science.

Non-traditional format: This course includes field trips to the Georgia Aquarium (behind the scenes) and the Skidaway Institute of Oceanography (on water activities, dolphin watch boat).

Offered: Summer

**ECOL(BIOL) 3500-3500L. Ecology. 4 hours.**

Not open to students with credit in GEOG 3210

Prerequisite: BIOL 1104-1104L or BIOL 1108-1108L or BTNY 1220-1220L and CHEM 1211-1211L or CHEM 1311H-1311L

Population structure and dynamics, organization and classification of communities, and nutrient and energy flows in ecosystems. Non-traditional format: This course is also offered through University System of Georgia Independent Study (USGIS).

Offered: Fall, Spring, Summer

**ECOL(BIOL) 3510. Ecology Laboratory. 3-4 hours.** Repeatable for maximum 10 hours credit.

Prerequisite: ECOL(BIOL) 3500-3500L

Techniques and methodologies to assess organismal, population, community, or ecosystem interactions. Non-traditional format: A field course taught for blocks of time off-campus (semester breaks or summer). Additional on-campus lecture hours may be added depending upon the field schedule.

Offered: Fall, Spring

**ECOL 3520. Ecological Applications. 3 hours.**

Prerequisite: ECOL(BIOL) 3500-3500L

Current ecological approaches used to quantify impacts of natural and human disturbances on ecosystem structure and function. Case studies illustrate impacts and management strategies in fields such as environmental toxicology, conservation ecology, agroecosystem ecology, and restoration ecology.

Offered: Spring

**ECOL 3530-3530D. Conservation Biology. 3 hours.**

Prerequisite: BIOL 1108-1108L

The scientific study of the phenomena that affect the maintenance, loss, and restoration of biological diversity.

Offered: Fall

**(ECOL)FORS 3580-3580L. Vertebrate Natural History. 5 hours.** 3 hours lecture and 4 hours lab per week.

Prerequisite: BIOL 1108-1108L

Life history strategies of vertebrates with emphasis on ecology, behavior, taxonomy, and systematics.

Offered: Spring

**ECOL 4000/6000. Population and Community Ecology. 3 hours.**

Undergraduate prerequisite: ECOL(BIOL) 3500-3500L and MATH 2210

The birth, death, and movement of organisms, with particular reference to population dynamics; the forces that structure communities of plants and animals.

Offered: Fall

**ECOL 4010/6010. Ecosystem Ecology. 3 hours.**

Undergraduate prerequisite: ECOL(BIOL) 3500-3500L and MATH 2210

Ecosystem structure and function with emphasis on energetic and biogeochemical processes in natural and managed ecosystems, from local to global scales.

Offered: Spring

**ECOL 4020/6020-4020L/6020L. Field Systems Ecology. 4 hours.** 2 hours lecture and 6 hours lab per week.

Prerequisite: ECOL(BIOL) 3500-3500L and MATH 2210 and MATH 2210L

Ecology, field biology, and dynamic processes of terrestrial and aquatic ecosystems integrated by empirical monitoring and systems modeling within a campus watershed. Field trips to the Smoky Mountains and Georgia coast will extend the principles to a regional geographic scale.

Non-traditional format: The projects will be conducted on an unscheduled basis, requiring open access to laboratory and computer facilities.

Offered: Fall - odd-numbered years

**ECOL(BIOL) 4150/6150-4150D/6150D. Population Biology of Infectious Diseases. 4 hours.**

Undergraduate prerequisite: (BIOL 1104 or BIOL 1108-1108L or P BIO 1220) and (STAT 2000 or MATH 2200 or MATH 2250)

Ecology and evolution of infectious diseases that affect free-living animals, plants and human populations. Topics include pathogen life history and transmission modes, epidemiology and impacts on hosts, evolution of resistance and virulence, emerging infectious diseases, and the role of parasites in wildlife conservation.

Offered: Fall - even-numbered years

**ECOL 4160. Ecology of North America. 4 hours.**

Prerequisite: Permission of department

Ecological survey of North American ecosystems taught in the field from coastal Georgia to southwest deserts and the Pacific Northwest. Application of ecological principles such as biodiversity and ecosystem function, climate change, disturbance, pollution, and trophic food web interactions. Consideration of human interaction with the environment, past, present, and future.

Non-traditional format: May be taught during summer session in the field as part of the Interdisciplinary Field Program.

Offered: Summer

**ECOL 4240-4240L. Physiological Ecology. 3 hours.** 2 hours lecture and 3 hours lab per week.

Prerequisite: BIOL 1108-1108L

Physiological responses of organisms to environmental factors.

Not offered on a regular basis.

## ENTOMOLOGY

**ENTO 3140-3140L. Insect Natural History. 4 hours.** 2 hours lecture and 6 hours lab per week.

Prerequisite: BIOL 1104 or BIOL 1108-1108L

Insect biology, with emphasis on factors that have made insects one of the most abundant and successful animal groups. Topics include the behavior, ecology, and evolution of the major insect groups. Most laboratory periods will be spent in the field.

Offered: Fall

**ENTO 4000/6000-4000L/6000L. General Entomology. 3 hours. 3 hours lecture and 3 hours lab per week.**

Undergraduate prerequisite: BIOL 1107-1107L and BIOL 1108-1108L

Functional anatomy and physiology, behavior, ecology, insects as vectors of pathogens, chemical and biological control of pests. Laboratory sessions are devoted primarily to collecting and the identification of major families of insects.

Offered: Fall

**GENOMICS & BIOINFORMATICS**

**BCMB 3600 or 3600H. Genomics and Bioinformatics. 3 hours.**

Prerequisite: BCMB(BIOL)(CHEM) 3100 or BCMB 4010/6010 [and POH for 3600H]

A focus on the remarkable impact that genome sequencing projects is having on virtually all aspects of biochemistry, as well as on medicine and biotechnology. An introduction to a broad range of 'omic' topics, including functional genomics, microarrays, proteomics, physiological genomics, and bioinformatics.

Offered: Spring

**PBIO(BIOL) 3020. Genomic Biology. 3 hours.**

Prerequisite: BIOL 1107-1107L

An introduction to genomic biology and the bioinformatic underpinning required for its comprehension. Scientific, ethical, economic, legal, and societal impacts arising from these advances will be explored in integrated fashion.

Offered: Fall

**PBIO(GENE)(PATH) 4510/6510. Genome Evolution Across the Tree of Life. 3 hours.**

Prerequisite: GENE(BIOL) 3200

Survey of the wealth of information arising from genomic research conducted on diverse species across the tree of life. Students will explore the evolutionary diversification of genomes in phylogenetically remote organisms and refine critical thinking and technical writing skills through analysis of publications drawn from the recent literature.

**PBIO(BIOL) 4550/6550. Bioinformatics Applications. 3 hours. 2 hours lecture and 2 hours lab per week.**

Undergraduate prerequisite: PBIO(BIOL) 3020 or BCMB 3600 or BCMB 3600H or GENE(BIOL) 3200

The applications and concepts of computational technologies for solving problems in molecular genetics. Current programs and the principles that underlie them will be discussed. Topics include: sequence and structure databases; sequencing; mapping; sequence alignments (dynamic programming); motifs and profiles; phylogeny reconstruction; probabilistic approaches (Markov models).

Offered: Spring

**(MIBO)(IDIS)POPH 4450/6450-4450L/6450L. Microbial Genetics and Genomics. 4 hours. 3 hours lecture and 2 hours lab per week.**

Not open to students with credit in MIBO 4800L/6800L or MIMB 4450/6450.

Undergraduate prerequisite: MIBO 3500

Graduate prerequisite: MIBO 3500 or permission of department  
Molecular basis of gene regulation in microorganisms with emphasis on systems pertaining to pathogenesis, evolution, and ecology. computer lab includes examination of evolutionary relatedness, sequence comparisons, database searches and reconstruction of metabolic pathways.

Offered: Fall

**(MIBO)POPH 4651. RNA Virus Genomic Diversity. 3 hours.**

Prerequisite: BCMB(BIOL)(CHEM) 3100 or BCMB 4010/6010 or POD

Use of recent publications on molecular characterization and analysis of RNA viruses to give students insight on virus genome diversity and evolution.

Offered: Spring - even-numbered years

**STAT 4630/6630. Statistical Methods in Bioinformatics I. 3 hours.**

Graduate prerequisite: STAT 4210 or STAT 6220

Methods for analysis of DNA sequence data, with an emphasis on the probabilistic basis of the methods. Topics include analysis of single DNA sequences, sequences alignment, BLAST searches, and related topics, as well as relevant topics from probability theory.

Offered: Fall

**STAT 4640/6640. Statistical Methods in Bioinformatics II. 3 hours.**

Graduate prerequisite: STAT 4630/6630

Further development of methods for analysis of DNA sequence data. Topics include sequence comparisons, DNA database searches, evolutionary models, phylogenetic tree construction and related topics, as well as relevant topics from probability theory.

Offered: Spring

**LABORATORY COURSES (excludes major required GENE lab options)**

**(BCMB)BTEC(PBIO) 4000L. Methods in Biotechnology. 4 hours. 8 hours lab per week.**

Prerequisite: PGEN 3580 or GENE(BIOL) 3200

Laboratory instruction in the methods for manipulation of plants, microbes, and animals for biotechnological purposes.

Offered: Spring

**BCMB 4030L/6030L. Laboratory Techniques in Biochemistry and Molecular Biology. 4 hours. 1 hour lecture and 6 hours lab per week.**

Undergraduate prerequisite: BCMB(BIOL)(CHEM) 3100 or BCMB 4010/6010

Basic techniques in biochemistry and molecular biology, including enzyme assays and purification, nucleic acid purification and characterization, chromatography, spectroscopy, and other modern methods.

Non-traditional format: This course includes an additional 2-3 hours per week that is required for calculating data and presenting the results.

Offered: Fall

**BIOL(CBIO) 3410L. Laboratory in Cellular and Developmental Biology. 4 hours.**

Prerequisite: BCMB(BIOL)(CHEM) 3100 or BCMB 4010 or BCMB 4020

Cell biology research techniques in cell cycle and cell differentiation, cell adhesion, motility, molecular transport, and cell metabolism. Cell culture, cell fractionation, fluorescence and laser-confocal microscopy, electron microscopy, immunocytochemistry, DNA isolation, polymerase chain reaction, and DNA sequencing.

Offered: Fall, Spring

**(BIOL)PBIO 3240L. Transposable Elements of Style: Science and Sentences. 3 hours. 2 hours lecture and 2 hours lab per week.**

Prerequisite: BIOL 1107-1107L or BIOL 2107H-2107L or permission of department  
Cutting-edge research techniques and creative writing for science majors. Students will study the fascinating world of transposable elements, utilizing computer databases and wet-bench science techniques. They will also study how writing unites what they do with the greater world and their own area of study.

Offered: Fall

**(BIOL)PBIO 3250L. The Dynamic Genome: Introduction to Bioinformatic and Experimental Research. 4 hours. 8 hours lab per week.**

Prerequisite: BIOL 1107-1107L or BIOL 2107H-2107L

Cutting-edge research techniques for science majors where students use computational and experimental approaches to determine, often for the first time, what genomes are made of and how they evolve. The focus will be on transposable elements, which comprise over fifty percent of plant and animal genomes.

Offered: Spring

**GENE(PBIO)(PATH) 4800L/6800L. Ecological Genetics of Invasive Species. 4 hours. 2 hours lecture and 4 hours lab per week.**

Undergraduate prerequisite: POD and BIOL 1108-1108L

Graduate prerequisite: POD

Evolutionary and ecological concepts as applied to invasive species, including the evolutionary changes that occur when species colonize new geographical areas and on the evolutionary responses of native species to invasion. The laboratory focuses on genetic and ecological methods applicable to field studies of invasive species.

Offered: Spring

**MIBO 3510L. Introductory Microbiology Laboratory. 3 hours.**

Prerequisite or corequisite: MIBO 3500 and BCMB(BIOL)(CHEM) 3100 or BCMB 4020

General laboratory techniques in experimental microbiology with emphasis on microscopic, morphological, and biochemical analysis.

Offered: Fall, Spring, Summer

**MARINE SCIENCE**

**MARS 3450-3450L. Marine Biology. 4 hours. 3 hours lecture and 2 hours lab per week.**

Prerequisite: BIOL 1108-1108L and CHEM 1212 and CHEM 1212L

Study of marine organisms and the environments they inhabit; diversity of marine organisms, primary and secondary production in marine habitats, ecological interactions in marine environments, and management concerns.

Offered: Spring

**MARS 4200/6200. Chemical and Biological Oceanography. 3 hours.**

Not open to students with credit in MARS 4110/6110.

Undergraduate prerequisite: BIOL 1108-1108L and CHEM 1211 and CHEM 2211

Chemical composition, dynamics, and processes of life in the oceans and the role the life of the oceans plays in global processes.

Offered: Fall

**MARS(MIBO) 4620/6620-4620L/6620L. Microbial Ecology. 3 hours.** 2 hours lecture and 2 hours lab per week.

Undergraduate prerequisite: MIBO 3500 or POD

Emphasizes the roles of microorganisms in ecosystems. Nutrient cycles, methods of microbial analysis, and the functional roles of microorganisms.

Offered: Fall – odd-numbered years

**MICROBIOLOGY**

**MIBO 4090/6090. Prokaryotic Biology. 3 hours.**

Prerequisite: MIBO 3500

Prerequisite/corequisite: GENE(BIOL) 3200

Ultrastructure, physiology, genetics, ecology, and phylogeny of bacteria and archaea.

Offered: Spring

**MIBO 4500/6500. Bacterial Symbioses. 3 hours.**

Prerequisite: MIBO 3500 or MIBO 3000-3000L

Prerequisite/corequisite: GENE(BIOL) 3200

Bacterial interactions with plants and animals, particularly mutualistic associations. Emphasis on insights yielded by modern molecular, genetic, and genomic experimental approaches.

Offered: Spring

**PLANT BIOLOGY**

**(P BIO)(ANTH)PATH 3010. Fungi: Friends and Foes. 3 hours.**

Prerequisite: (BIOL 1103 and BIOL 1103L) or (BIOL 1104 and BIOL 1104L) or BIOL 1107-1107L or BIOL 1108-1108L or (P BIO 1220 and P BIO 1220L)

Impact of fungi on human affairs. Historical and current uses of fungi by humans as well as the roles of fungi in various ecosystems.

Offered: Spring

**P BIO 4250/6250. Biology of Natural Plant Products. 3 hours.**

Not open to students with credit in BTNY 4250/6250

Undergraduate prerequisite: (BIOL 1104 and BIOL 1104L) or BIOL 1108-1108L or (P BIO 1220 and P BIO 1220L) or POD

The biological/ecological role of natural plant products or metabolites such as alkaloids, terpenes, and pigments in relationships and interactions among plants and between plants and animals.

Offered: Fall - even-numbered years

**PBIO 4270/6270. Flowers. 3 hours.**

Prerequisite: (BIOL 1103 and BIOL 1103L) or (BIOL 1104 and BIOL 1104L) or BIOL 1107-1107L or BIOL 1108-1108L

An examination of the basic biology of flowers as well as current research in floral biology. It will include lectures, class discussions on scientific papers, hands-on sessions, and literature or research projects using local spring flowers to help students learn topics in reproductive biology of flowering plants.

Offered: Spring - odd-numbered years

**PBIO(BCMB)(FORS) 4670. Plant Molecular Responses to the Environment. 4 hours.**

Prerequisite: BCMB(BIOL)(CHEM) 3100 or BCMB 4010 or BCMB 4020 or POD

Molecular and biochemical regulation of plant metabolic pathways activated in response to environmental cues, environmental stress, and interaction with pathogenic and symbiotic organisms. Cell wall formation (primary wall, wood), secondary metabolism (lignin, flavonoids, phenolics), wounding, plant defense (phytoalexins, oxidative burst, hypersensitivity), responses to drought, flooding, salinity, pollutants (heavy metals, ozone).

Offered: Fall – even years

**PREMEDICAL/PREVETERINARY/PREDENTAL**

**BCMB(GENE) 3433. Biology for Medicine. 4 hours.**

Prerequisite: BIOL 1107-1107L or BIOL 2107H-2107L

Selected topics in biochemistry, molecular biology, genetics, and biotechnology involved in modern medicine. Includes cloning, stem cells, endocrinology, human genetics, gene testing, and human population genetics. Bioethical issues will also be discussed. Both formal lectures and discussion sessions will be utilized and students will write short essays on selected topics.

Non-traditional format: Will include lectures, discussion groups, and seminars. There will be ten hours in discussions/seminars per week for three weeks, accompanying ten lectures per week. This course, designed for the Maymester, will be taught at the UGA facility in Cortona, Italy.

Offered: Summer

**BCMB 4020. Biochemistry and Molecular Biology II. 3 hours.**

Prerequisite: BCMB(BIOL)(CHEM) 3100 or BCMB 4010

A comprehensive treatment of biochemistry and molecular biology stressing aspects of metabolism, metabolic regulation, bioenergetics, and recombinant DNA methodologies.

Offered: Spring

**BCMB 4120. Human Biochemistry and Disease. 3 hours.**

Prerequisite: BCMB(BIOL)(CHEM) 3100 or BCMB 4010

Integrated treatment of human biochemistry and selected topics on the biochemical basis of human disease. Examples will be given of inheritable and acquired disorders.

Offered: Fall

**CBIO 3000-3000L. Comparative Vertebrate Anatomy. 4 hours.**

Not open to students with credit in ECOL 3260-3260L

Prerequisite: BIOL 1103+L or BIOL 1104+L or BIOL 1107+L or BIOL 1108+L

Comparative systemic vertebrate anatomy emphasizing structure and function.  
Offered: Fall

**(CBIO)IDIS 3100 [or 3100H]. People, Parasites, and Plagues. 3 hours.**

Not open to students with credit in PARA 3100/3100H

Prerequisite: (BIOL 1103 and BIOL 1103L) or BIOL 1107-1107L [and POH]

A multi-disciplinary approach to examining the impact of infectious diseases on human populations. Current persistent, epidemic, and emerging diseases and how they are identified, studied, and combated will be discussed. Topics will also include the sociological, psychological, historical, legal, environmental, and economic implications of disease. Non-traditional format: Honors students will be required to meet for a two hour biweekly discussion group in addition to meeting for the three hours of normal weekly lecture.

Offered: Spring

**CBIO(BIOL) 3300. Developmental Biology. 4 hours.**

Prerequisite: BCMB(BIOL)(CHEM) 3100 or BCMB 4010 or BCMB 4020

Prerequisite/corequisite: GENE(BIOL) 3200 or PGEN 3580

Cell differentiation and morphogenesis, primarily in animal development. Gene regulation at the molecular level, gametogenesis, fertilization, normal embryonic development, cell and tissue interactions, hormonal regulation, and developmental aspects of cancer and the immune response.

Offered: Spring, Summer

**CBIO 3710. Principles of Physiology. 3 hours.**

Prerequisite: BIOL 1108-1108L

Principles of integrative systems physiology, emphasizing humans and current mammalian animal research models. Organismal homeostasis, including cardiovascular, respiratory, renal, digestive, and reproductive systems. Emphasis on the integrative actions of the nervous and endocrine systems.

**CBIO(BIOL) 3800. Neurobiology. 3 hours.**

Prerequisite/corequisite: BIOL 1104 or BIOL 1108-1108L

Structural organization, cell biology, physiology, development, and integration of the nervous system. This course integrates individual nervous system cells into neural systems for motivation, locomotion, perception, and learning.

Offered: Spring

**CBIO(MIBO) 4100/6100. Immunology. 3 hours.**

Prerequisite: BCMB(BIOL)(CHEM) 3100 and GENE(BIOL) 3200

Immunology from an experimental perspective. Anatomy, development, and function of the immune system. Immune system in infectious diseases. Mechanisms and pathogenesis of immunological disorders. Evolution of immunological concepts.

Offered: Fall

**CBIO 4200 [or 4200H]. Biomedical Research in Health and Disease. 3 hours.**

Prerequisite: BCMB(CHEM)(BIOL) 3100 [and POH]

Examination of the impact of biomedical research in human health and disease. Students will be expected to master the concept of how scientific research is done, and the various

mechanisms by which biomedical research has impacted individuals and the societies in which they live.

**CBIO 4340/6340. Biology of Aging. 3 hours.**

Undergraduate prerequisite: BIOL 1107-1107L and BIOL 1108-1108L

Biological processes accompanying aging in human and other organisms. Emphasis on physiological decline; theoretical explanations; attempts to prolong life; and the utility and limitations of model systems used to analyze human aging.

Offered: Spring

**CBIO 4500/6500. Medical Parasitology. 3 hours.**

Prerequisite: BIOL 1108-1108L

Parasites are responsible for classical tropical diseases and emerging opportunistic infections in the United States. We will discuss the biology of parasites, their vectors and hosts, and the diseases they cause, emphasizing modern molecular concepts. The class will also cover epidemiology, control, prevention, and treatment of important parasitic diseases.

Offered: Spring – even-numbered years

**CBIO 4730/6730. Endocrinology. 3 hours.**

Prerequisite: BIOL 1103-1103L and BIOL 1104-1104L or BIOL 1107-1107L and BIOL 1108-1108L

Vertebrate endocrinology and the principles of chemical integration, emphasizing the physiology of regulatory mechanisms and the cellular and molecular bases of hormone action.

Offered: Fall – odd-numbered years

**ENTO 3650-3650L. Medical Entomology. 3 hours.**

Prerequisite: BIOL 1104-1104L or BIOL 1108-1108L

Arthropods of medical and veterinary importance, and the diseases they transmit.

Offered: Spring

**GENE 4070. Evolutionary Medicine. 2 hours.**

Prerequisite: GENE(BIOL) 3000 and GENE(BIOL) 3200

Evolutionary theory explains not only why the body functions, but also why it fails.

Examination of how natural selection has shaped a range of human traits and diseases, touching on such topics as reproduction, mating behavior, infection, obesity, cancer, mental illness, and aging.

Non-traditional format: Each week one class will be devoted to a lecture presentation on that week's topic. The second class will consist of a discussion of primary literature.

Offered: Fall

**MIBO 3500\*. Introductory Microbiology. 3 hours.**

Prerequisite: BCMB(BIOL)(CHEM) 3100 or BCMB 4020

Microorganisms, with special emphasis on bacteria, their structure, function, diversity, and importance to man.

Offered: Fall, Spring, Summer

---

\* Highly recommended for premedical students

**MIBO 4220/6220. Pathogenic Bacteriology. 3 hours.**

Prerequisite: MIBO 3500

Molecular basis of bacterial virulence: identification of virulence factors, genetic regulation of virulence, and the complex interactions between bacterial pathogens and their hosts.

Offered: Fall

**(MIBO)POPH 4650/6650. Viral Zoonoses. 3 hours.**

Undergraduate prerequisite: [MIBO 3500 and (GENE(BIOL) 3200 or POPH(MIBO)(IDIS) 4450/6450-4450L/6450L)] or POD

Graduate prerequisite: Permission of department.

Classification, replication, diagnosis, quantification, pathogenesis, and epidemiology of zoonotic viruses. Introduction to basic principles and concepts of virology and animal viruses that are pathogenic for humans.

Offered: Fall

**MIBO 4700/6700. Medical Mycology. 3 hours.**

Undergraduate prerequisite/corequisite: MIBO 3500

Graduate prerequisite or corequisite: POD

The yeasts, molds, and actinomycetes most likely to be encountered by a medical mycologist in a diagnostic laboratory, with special emphasis on the organisms which are pathogenic for man and other animals.

Offered: Spring

**(PBIO)(ANTH)HORT 3440. Herbs, Spices, and Medicinal Plants. 3 hours.**

Historical and contemporary significance of herbs, spices, and medicinal plants in human culture and commerce; chemical and biological characteristics; commercial production techniques; application in modern and traditional medical systems.

Offered: Fall

**VPHY 3100. Elements of Physiology. 3 hours.**

The mammalian body as a single functional unit; studies include nervous, muscular, respiratory, circulatory, digestive, renal, endocrine, and reproductive systems.

Offered: Fall, Spring

**STATISTICS**

**STAT 4110H. Honors Applied Statistics. 3 hours.**

Not open to students with credit in STAT 4110 or STAT 4210.

Prerequisite: STAT 2100H and permission of Honors

Analysis of variance including completely randomized design, randomized block design, factorial designs, and interaction; regression analysis including linear regression and multiple regression, model checking and analysis of residuals, and model building; nonparametric statistics; power of a test. Computer application by use of a statistical package with programming capabilities. Major project required.

Offered: Spring

**STAT 4210. Statistical Methods. 3 hours.** [may count as a major elective *if* not used in core area IV]

Not open to students with credit in STAT 4110H or STAT 4110.

Prerequisite: STAT 2000 or STAT 3000 or MSIT 3000

Statistical distributions; one- and two-population tests about means, including t-tests and paired-difference tests; one- and two-population tests about the variance; contingency tables and goodness-of-fit tests; non-parametric tests; analysis of variance and simple experimental designs; linear regression and residual diagnostics.

Offered: Fall, Spring, Summer