

Course Offerings

Fall 2020

Undergraduate Courses

BIO 105 M001: Technology Inspired by Nature (3 Credits)

Lecture: MW 12:45-1:40PM

Discussion: F (1 Day/Week – Varied Times)

Instructor: Dave Althoff

The course will explore how the biological world may provide solutions for many of the technological problems faced by society. We will examine the ways that organisms function and interact, and apply this knowledge towards understanding and creating technological advances. The course will be loosely organized around topics such as flight, communication and networking, swarm intelligence, computing, agriculture, chemical engineering, energy production, and medicine. Students will develop an appreciation of biology, how it is studied, and its importance to human society. This is a lecture course with a weekly one hour discussion of topics in Biomimicry.

BIO 121 M001 and M002: General Biology I (4 Credits)

Lecture: MW 10:35-11:30AM (M001) and MW 12:45-1:40PM (M002)

Laboratory: T, W, TH, F (1 Day/Week – Varied Times)

Instructor: Jason Wiles

This is a required entry-level course for biology majors and the first of a two-course sequence comprising a survey of major biological concepts ranging from the molecular level to global ecology. Students will explore the nature of science and the diversity of organisms within a framework of major themes including the flow and regulation of energy and information within living systems, and the central and unifying concept of evolution.

BIO 216 M001: Anatomy & Physiology I (4 Credits)

Lecture: MW 12:45-2:05PM

Laboratory: T, W (1 Day/Week – Varied Times)

Recitation: M, TH, F (1 Day/Week – Varied Times)

Prerequisite: BIO 121, 123, and 124 or equivalent

Instructor: Vera McIlvain

This is a lecture and laboratory course studying the structure and function of human tissues, organs and systems. Topics include skeletal and muscle structure and function as well as neural and integumentary systems. Laboratories will include bench top and interactive computer experiments, anatomy, histology and non-invasive experiment on human subjects. This course cannot be used to fulfill the requirements of the Biology major. Credit cannot be given for BIO 216 after successfully completing BIO 316. Enrollment in the lab will automatically enroll you in the lecture.

BIO 221 M002 and M003: Peer Led Team Learning (PLTL) Leadership Training I (1-2 Credits)

TH: 9:30-10:25AM (M002) or W 10:35-11:30AM (M003)

Instructor: Julia Snyder

This course relates educational research literature and learning to classroom applications in problem solving activities. Students are prepared to be peer leaders of a small, problem-solving group of students by attending weekly one-hour meetings and participating in Blackboard and in-class discussion groups. Peer leaders are then responsible for holding a 1-hour problem solving session each week and keeping a record of attendance for their group sessions.

BIO 316 M001: Anatomy & Physiology I for Biology Majors (4 Credits)

Lecture: MW 12:45-2:05PM

Laboratory: F 8:25-11:25AM or 12:45-3:45PM

Prerequisite: BIO 121

Instructor: Vera McIlvain

This Anatomy & Physiology I course is a 300-level course for Biology/Biochemistry/Biotechnology majors. It is a 4-credit course, of which 3-credits can be applied as upper-division Biology laboratory credit towards the Biology major, unlike BIO 216. This class will have the same lecture room and time (Monday & Wednesdays 12:45-2:05 p.m.) as BIO 216. Students in the BIO 316 class will have weekly quizzes and midterm and final exams, as will those in BIO 216. However, the students registered for BIO 316 will have a joint laboratory and recitation section on Fridays from 8:25 am to 11:25 pm or 12:45 to 3:45 pm. These sections will not be the same as those laboratory and recitation sections in BIO 216. They will include microscopy, virtual physiology experiments and other activities appropriate for a 300-level course. Understanding of laboratory material will be evaluated with 2-3 laboratory practicals. Enrollment in the lab will automatically enroll you in the lecture. Credit cannot be given for BIO 316 after successful completion of BIO 216. Also, only one Anatomy & Physiology 300-level course (316 or 317) can be utilized to fulfill 3-credits of upper-division Biology laboratory experience. **This course satisfies the Cell & Molecular Biology (CM) distribution requirement.**

BIO 327 M001: Cell Biology (3 Credits)

TTH: 11:00AM-12:20PM

Prerequisite: BIO 121 or equivalent and CHE 106 or 109 or 150

Instructors: Scott Erdman and Robert Silver

This course discusses cell structure, molecular biology of eukaryotic cells, cytoskeletal organization and function, cell division cycle, membrane structure and function, cell-cell interactions, cell differentiation and regulation. Cell Biology is part of the required core curriculum of the Biology/Biochemistry/Biotechnology major.

BIO 345 M001: Ecology and Evolution (3 Credits)

TTH: 9:30-10:50AM

Prerequisite: BIO 121 or equivalent

Instructors: Yasir Ahmed and Katie Becklin

This course introduces students to ecological and evolutionary processes that affect populations, communities, and ecosystems with an emphasis on the maintenance and origins of biological diversity and responses to a changing biosphere. Students will evaluate current theory and practices in ecology and evolution through case studies, data analysis, and small group discussions. Ecology and Evolution is part of the required core curriculum of the Biology Major

BIO 355 M001: The Physiology of Human Systems (3 Credits)

TTH: 12:30-1:50PM

Prerequisite: BIO 121 or equivalent and CHE 106 or 109 or 150

Instructor: TBA

This is a lecture course on the physiology of human organ systems. The nervous system, digestion, kidney function, muscle and cardiac physiology will be covered. **It satisfies the Cell & Molecular Biology (CM) distribution requirement.**

BIO 360 M001: Biology Lab Assistant (1 Credit)

M: 3:45-5:05PM

Prerequisite: One upper division 3-credit Biology lab such as BIO 425 and 435

Instructor: Jason Wiles

Students who have completed an upper-division 3-credit hour lab may receive one credit hour for assisting in the teaching of laboratories. This opportunity is especially appropriate for students considering teaching careers. It may be repeated once for credit.

BIO 400 M004 and M005: Ecosystem Ecology Lab (3 Credits)

Lecture: M 12:45-1:40PM

Laboratory: W 12:45-4:45PM

Prerequisite: BIO 345

Instructors: Jason Fridley

This course addresses the fluxes of energy and materials through plants and ecosystems and how they are related to global warming. Lab activities focus on monitoring plant and soil properties in nearby forests, including measurements of photosynthesis and leaf behavior, tree water relations, root growth, and associated animal and microbial relations. Students will also examine soil processes at a field site in Pompey, NY. Students will develop an understanding of the scientific method by conducting an independent project that involves data analysis and class presentations. Juniors and seniors only; others by permission. Enrollment in the lecture will automatically enroll you in the lab. **This course satisfies the communication skills requirement, the Ecology and Evolutionary Biology (EE) distribution requirement, and 3-credits of upper-division lab experience.**

BIO 400 M006: Microbiomes in Biotechnology and Medicine (3 Credits)

MW: 3:45-5:05PM

Meets with: BIO 600 M006

Prerequisites: BIO 326 and 327

Instructor: Ruth Phillips

What microbes are growing in and on you, and how does your own personal microbiome affect you? Microbes can cause disease, treat disease, modify food and drugs you ingest, change your DNA, clean up your pollution, alter your metabolism, impact your mood and much more. In this course, we survey basic structure and function of human microbiota - viruses, bacteria, archaea as well as selected microscopic protists and fungi, from a genetic, biochemical, molecular perspective, and explore ways we can use microbes to solve real-world problems. Most readings will come from scientific journal articles, in order to study current applications of microbiome research in biotechnology and medicine. The course is student-centered and project-based, in order to encourage students to develop and pursue areas that interest them most. Emphasis is placed on creatively and critically applying course material, rather than simply remembering it. Additional work is required of graduate students. **This course satisfies the communication skills requirement and the Cell and Molecular Biology (CM) distribution requirement.**

BIO 400 M007: Neurobiology of Pain and Analgesia (3 Credits)

MW: 5:15-6:35PM

Instructor: Jen Cook

In this course, the etiology of chronic pain, and the mechanisms of its treatment will be explored. You will learn about how we have pain, beginning with how the somatosensory system functions under normal conditions. From there you will learn about the maladaptive changes that can occur following injury that contribute to the transition from acute to chronic pain. Finally, you will learn how we treat pain, including the mechanisms of action and the intersection of treatment and addiction. Throughout the semester you will also learn how to critically read and analyze primary articles related to the topics we are covering in class. We will explore cutting edge research in addition to foundational papers and reviews. Additionally, you will apply what we cover in lectures and discussions to the development of a detailed case study, integrating information from throughout the course. This course is intended for neuroscience majors and any other students who have an interest in the biological foundations of chronic pain and its treatment. This elective course is meant for juniors and seniors. It is taught assuming that students have taken lower level biology and/or neuroscience coursework, having a strong foundation prior to taking the course. **This course satisfies the communication skills requirement and the Cell & Molecular Biology (CM) distribution requirement**

BIO 400 M011: Personalized Medicine (3 Credits)

TTH: 9:33-10:50AM

Meets with: BIO 600 M011

Prerequisites: BIO 326 and 327

Instructor: Surabhi Raina

This course will address topics related to providing effective, personalized therapeutic treatment of diseases based on the genomic and proteomic profile of an individual. The diagnosis of a disease can be more effective by better understanding a person's specific molecular and genetic makeup. This information has the potential to tailor effective and safe treatment with minimal side effects. Additional work is required of graduate students. **This course satisfies the communication skills requirement and the Cell and Molecular Biology (CM) distribution requirement.**

BIO 414 M001: Brain & Behavioral Plasticity (3 Credits)

MW: 2:15-3:35PM

Meets with: BIO 614 M001

Prerequisite (2 of the 5): BIO 211, BIO 217, BIO 317, BIO 327, or PSY 223

Instructor: Paul Gold

Behavioral adaptations based on individual experiences give animals the ability to use their pasts to solve new problems, an ability that can be obviously important to an animal's survival. This course will examine behavioral plasticity and the brain mechanisms responsible for the changes in behavior. Interestingly, there appears to be considerable conservation across much of the animal kingdom of basic biological mechanisms that mediate behavioral and brain plasticity. The class will include information that crosses several levels of analysis, from the organism, to brain systems, to neurons, to synapses, to biochemical mechanisms. The class will also consider information about memory dysfunctions as seen in aging, dementia, and retardation in humans and in laboratory model animals such as rats and mice. The format will be lecture/discussion sessions with evaluations of student performance based on participation, writing assignments, and exams. Additional work is required of graduate students. **It satisfies the communication skills requirement and the Cell & Molecular Biology (CM) distribution requirement.**

BIO 416 M001: Biology of Aging (3 Credits)**TTH: 2:00-3:20PM**

Meets with: BIO 616 M001

Prerequisite: BIO 327 or BIO 355

Instructor: Donna Korol

Aging is an intrinsic property of all living organisms. However, the way in which aging manifests itself varies quite broadly within and between species. To understand the complex nature of aging and its place in the life cycle, this course will review topics related to the biology of aging across many levels of analysis from molecule to cell to system to organism. Classic and contemporary aging research will be evaluated from a variety of experimental models. In the process, we will dispel some of the myths of aging even as they relate to basic scientific findings and evaluate how the conventional wisdom on aging issues obtained through the media and other public sources reflects and influences basic research findings. Organization of the course includes lectures, discussions, quizzes, and a variety of written assignments. Additional work is required of graduate students. **This class fulfills the Cell and Molecular Biology (CM) distribution requirement.**

BIO 417 M001 and M002: Animal Behavior and Evolution Lab (3 Credits)**Lecture: T 11:00-12:20PM****Laboratory: T 12:30-4:30PM**

Corequisite: BIO 345

Instructor: Scott Pitnick

This lecture and laboratory course focuses on understanding the process of evolution by natural and sexual selection of fruit flies with a special emphasis on the evolution of adaptive animal behavior. Laboratory exercises provide direct experience in how to ask scientific questions, develop hypotheses, design and run experiments, analyze data, and communicate results both orally and in the form of manuscripts for peer-reviewed journals. In addition, students are required to develop and conduct an independent research project outside of class time, the results of which will be the subject of a term paper. Throughout the course, you will consider how the study of evolution and animal behavior can help us understand human behavior. This course is an upper-level biology lab course appropriate for junior and senior biology majors. Enrollment in the lab will automatically enroll you in the lecture. **This course satisfies the communication skills requirement, the Ecology and Evolutionary Biology (EE) distribution requirement, and 3-credits of upper-division lab experience.**

BIO 419 M001: Junior and Senior Thesis Seminar (1 Credit)**T: 5:00-6:00PM**

Prerequisite: Acceptance into a Biology thesis program (Honors or Distinction)

Instructors: Scott Erdman and Scott Pitnick

A discussion-student presentation format course designed to introduce highly qualified students to biological research. Students present progress reports on their thesis research. The course is designed for open communication among people with interests in biological research. It must be taken for four semesters.

BIO 435 M001 and M002: Genetics Laboratory (3 Credits)**Lecture: T 2:00-3:20PM****Laboratory: TH 2:00-5:00PM**

Prerequisite: BIO 326 and BIO 327

Instructor: Ruth Phillips

Students will gain experience in various methods, techniques and analyses while designing, conducting and presenting experiments of their own creative design. Topics covered include the flow of genetic information in cells, (DNA → RNA → Protein); gene structure and function; genetic modification of model organisms; regulation of gene expression; phenotypic analysis; and the uses of gene reporter assays. Enrollment in the lab

will automatically enroll you in the lecture. **This course satisfies the communication skills requirement, the Cell and Molecular Biology (CM) distribution requirement, and 3-credits of upper-division lab experience.**

BIO 446 M001: Epigenetics of Health and Disease (3 Credits)

MW: 3:45-5:05PM

Meets with: BIO 646 M001

Prerequisites: BIO 326 and BIO 327; BIO 443 or 462 recommended

Instructor: Jessica MacDonald

The epigenome encodes information above and beyond the sequence of DNA, acting at the interface between genes and the environment. This seminar course will explore how epigenetic modifications influence our health and modify our risk of disease, including neurodevelopmental and neurodegenerative disorders, heart disease, and obesity. This course will include student presentations and a variety of written assignments. Juniors and seniors only; others by permission. Additional work is required of graduate students. **It satisfies the communication skills requirement and the Cell & Molecular Biology (CM) distribution requirement.**

BIO 447 M001: Basic Immunology (3 Credits)

MWF: 11:40-12:35PM

Prerequisites: BIO 326 and 327

Instructor: Tom Fondy

This course will cover the following: (a) humoral and cell-mediated immunity; (b) antigens and T-cell receptor structure, function, and diversity; (c) cells and tissues of the immune system; (d) cytokines, cytokine receptors, and immune regulation; (e) major histocompatibility loci, tolerance, and cell-mediated cytotoxicity; and (f) vaccines. **This course satisfies the Cell and Molecular Biology (CM) distribution requirement.**

BIO 457 M001: Principles of Human Toxicology (3 Credits)

MWF: 9:30-10:25AM

Meets with: BIO 657 M001

Crosslisted with: FSC 457

Prerequisite: BIO 327, CHE 275, and MAT 285

Instructor: James Hewett

This course will examine the interactions between chemical, physical or biological substances and mammalian systems that result in adverse changes in physiological function. Concepts in chemistry, biochemistry, cell biology, and anatomy and physiology will be applied to the study of absorption, distribution, biometabolism and elimination of toxic agents, or poisons. In addition, general molecular mechanisms by which poisons act will be examined, including the processes of genotoxicity and carcinogenesis. Several general classes of poisonous agents, including pesticides, herbicides, and heavy metals, will be discussed in some detail. Finally, students will learn about important concepts in exposure risk assessment and the government agencies that regulate use of and exposure to chemicals in our food and environment. Additional work will be required of graduate students. **This course satisfies the Cell & Molecular Biology (CM) distribution requirement.**

BIO 459 M001: Plants and People

TTH: 12:30-1:50PM

Meets with: BIO 659 M001

Prerequisite: BIO 121

Instructor: Heather Coleman

Plants are critical for sustaining life on Earth. They sequester carbon dioxide and convert solar energy to forms that can be used, acting as key agents against climate change. In addition they are a key source of food, clothing and fuel. This course will focus on how plants function individually, how they interact with their environment, and how we have manipulated plants both by breeding and genetic modification to fulfill our needs. The course goals are to gain an understanding of basic plant biology at the molecular level, to understand the differences between plant breeding and genetic modification of plants, and to understand the use of these plants in the environment and in society. Finally, we will use this information to make informed opinions and decisions about current environmental issues including air pollution, land conservation, climate change and genetic modification. As plants are a model system for molecular genetics, cell biology and biochemistry research, this class is an excellent elective for students interested in these areas. Additional work will be required of graduate students. **This course satisfies the Cell & Molecular Biology (CM) distribution requirement.**

BIO 460/BCM 460: Research in Biology & Biotechnology/Biochemistry (1-4 Credits)

Varied Times

Instructor: Varied

BIO 460 is intended for Biology and Biotechnology majors and BCM 460 is intended for Biochemistry majors who wish to participate in either an experimental laboratory or field research project. BIO 460/BCM 460 replaces the use of independent study or experience credit courses for research purposes. Student research projects will incorporate use of the scientific method, experimentation, data analysis, data presentation and interpretation, and the responsibilities of scientific integrity. To enroll in BIO 460/BCM 460, the student must seek a sponsor who is willing to direct an appropriate project. Typically, the sponsor will assign the student to some aspect of an existing, larger research project. In consultation with the sponsor, the student will submit a form with the Academic Coordinator of the Biology Department which states the nature of the project, the expectations regarding time commitment (3 hrs. per week per credit hr.), and the means for evaluation. The student will then receive a permission number to enroll in the course. The grading procedure is based on 1) the faculty member's evaluation of overall student performance, and 2) examination of required laboratory records or notebooks. Students can enroll in BIO 460/BCM 460 more than once, but only a total of 4-credits can be applied to the Biology/Biotechnology major requirements and 3-credits can be applied to the Biochemistry major requirements. The 4-credits of BIO 460 can be used as an upper-division lab experience or an upper division elective. The 3-credits of BCM 460 can only be used as an upper division elective.

BIO 461: Experience in Biology (0 Credits)

Varied Times

Instructor: Varied

This is an internship or work experience supervised by a faculty mentor. Projects may include experimentation, data analysis, presentation, and responsibilities of scientific integrity. Development and analysis of business plans or intellectual property in **biotechnology-focused** companies, agencies or law firms is also possible.

BIO 462 M001: Molecular Genetics (3 Credits)**MWF: 10:35-11:30AM**

Meets with: BIO 662 M001

Prerequisites: BIO 326 and 327

Instructor: Steve Dorus

This course will provide a broad introduction to the study of gene and genome function, including transcription, translation, DNA replication, recombination and prokaryotic and eukaryotic mechanisms of inheritance. Gene and genome architecture, mechanisms of gene regulation, epigenetics and the molecular basis of human disease will be discussed. An emphasis will be placed on the application of high-throughput genomic, transcriptomic and epigenomic approaches to systems level analyses of genome biology. Additional work required of graduate students. **This course satisfies the Cell & Molecular Biology (CM) distribution requirement.**

BIO 463 M001, M002 and M003: Molecular Biotechnology (4 Credits)**Lecture: MWF: 11:40AM-12:35PM****Laboratory: TH 12:30-3:45PM (M002) or T 12:30-3:45PM (M003)**

Meets with: BIO 663 M001 and M002 or M003

Prerequisite: BIO 326 and 327

Instructor: Surabhi Raina

Molecular Biotechnology is the first course of a two-course Biotechnology series. The second course, Applied Biotechnology, will be offered in the spring. These courses complement each other, but one is not required for the other. These courses will introduce students to the molecular and genetic principles and processes involved in biotechnology. Lectures will include topics such as the genetic modification of microbial, plant, & animal cells, forensic biotechnology, and important medical, industrial, agricultural and environmental applications of biotechnology. Labs will cover many of the methods routinely used in biotechnology labs. This course will address questions such as: What is biotechnology, how is it done, and how is it being used today? How can biotechnology impact the lives of humans and other animals, plants, and the environment? What are the issues that biotechnology raises about the role of science and technology in society and ethical issues related to Biotechnology? Additional work required of graduate students. Enrollment in the lecture will automatically enroll you in the lab. **This course satisfies the communication skills requirement, the Cell & Molecular Biology (CM) distribution requirement, and is 3-credits of upper-division lab experience.**

BCM 475 M001: Biochemistry I (3 Credits)**MWF 9:30-10:25AM**

Prerequisite: CHE 325

Instructor: Roy Welch

This course covers the following: (a) the chemistry of water and the amino acids; (b) weak inter-atomic interactions; (c) amino acids and peptides; (d) primary, secondary, tertiary and quaternary structures of proteins; (e) protein function: enzyme mechanisms, kinetics and regulation; (f) the flow of genetic information; (g) DNA structure, replication, repair, and recombination; (h) RNA synthesis and processing; (i) protein synthesis and the genetic code; (j) recombinant DNA technology; (k) metabolic pathways of glycolysis and respiration and the application of thermodynamic principles to them. **This course satisfies the Cell and Molecular Biology (CM) distribution requirement.**

BIO 475 M001: Biochemistry Laboratory (4 Credits)

MW 1:00-5:00PM

Prerequisite: BIO 326 and 327

Corequisite: BCM 475

Instructor: Heidi Hehnly

Experiments on proteins, enzymes, membranes, and nucleic acids will be performed that illustrate modern biochemical techniques applied to the chemistry of living cells. Among the techniques employed are: electrophoresis; amino acid sequence determination; gel filtration; enzyme isolation; enzyme kinetics; spectrophotometric assays; preparative ultracentrifugation; preparation and analysis of cell fractions; sucrose gradient centrifugation; base composition of nucleic acids; and microscopic analysis of cells. Careful recording of data is emphasized. Data are analyzed and discussed in class. **This course satisfies the Cell and Molecular Biology (CM) distribution requirement and 4-credits of upper-division lab experience.**

BIO 490: Independent Study (1-6 Credits)

Varied Times

Instructor: Varied

This is an exploration of a problem, or problems, in depth based on a plan submitted by the student. Admission to the course is by consent of the supervising instructor(s) and the department. A proposal is required.

BIO 495: Distinction Thesis in Biology (1-3 Credits)

Varied Times

Instructor: Varied

This course is for students preparing a thesis in partial fulfillment of the requirements for the Distinction in Biology Program. Distinction students will enroll in the semester prior to graduation. **Departmental consent required.**

BIO 499/BCM 499: Biology & Biotechnology/Biochemistry Honors Capstone Project (1-3 Credits)

Varied Times

Instructor: Varied

This is the completion of an Honors Capstone Project under the supervision of a faculty member.