

Course Offerings

Fall 2021

Undergraduate Courses

BIO 106 M001: Ocean Life (3 Credits)

Lecture: MW 12:45-1:40PM

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

Instructor: Susan Parks

This is an introduction to the biology of the diverse organisms that live in the ocean, applications of cutting-edge technology to their study, recent scientific discoveries, and the science behind current global conservation issues.

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, M002 and M003: Anatomy & Physiology I for Biology Majors (4 Credits)

Lecture: MW 12:45-2:05PM (M001)

Laboratory: F 8:25-11:25AM (M003) or F 12:45-3:45PM (M002)

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: General Physiology (3 Credits)

MW: 3:45-5:05PM

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

Instructor: TBA

This is a lecture course on the physiology of systems of higher animals and plants, including circulation, regulation of body fluids, nervous system, muscle, sensory systems and photosynthesis. **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 435 or 471

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 M001 and M002: Neuroanatomy Lab (3 Credits)**Lecture: T 12:30-3:30PM (M001)****Lab: TH 12:30-2:30PM (M002)**

Prerequisite: NEU 211

Instructor: Robin Jones

Exploration of the basic structures of the central and peripheral nervous systems through lectures and hands-on laboratory experiences. Students will perform animal brain and spinal cord dissections, study gross anatomical structures using models and plastinated human brain slices and explore tissue and cellular structures at the microscopic level. Students will also discuss how neurological disorders develop from pathological changes in key brain and spinal cord regions. Enrollment in the lab will automatically enroll you in the lecture. **It satisfies the Cell & Molecular Biology (CM) distribution requirement and 3-credits of upper-division lab experience.**

BIO 400 M003: Advances in Biotechnology Research & Ideas (3 Credits)**MW: 2:15-3:35PM**

Meets with: BIO 600 M003

Prerequisite: BIO 326 and 327

Instructor: Ruth Phillips

What is going on in biotechnology, in the real world, right now? This topical course explores a variety of cutting-edge biotechnology research areas. The subject matter varies from semester to semester, based on the most recent advances in biotechnology. Topics include gene therapy/gene editing, personalized medicine, stem cells/regenerative medicine, bioremediation, environmental and sustainability biotechnology, optogenetics, nanotechnology, immunotherapy, and many others. Readings are drawn primarily from current scientific journal articles. The course is student-centered and project-based, to encourage students to develop a broad understanding of what biotechnology can be used for, while pursuing aspects of the field that interest them most. Emphasis is placed on creatively and critically applying basic principles of biotechnology to solve problems that matter. Additional work is required of graduate students. **This course satisfies the communication skills requirement and the Cell & Molecular Biology (CM) distribution requirement.**

BIO 400 M004 and M005: Ecosystem Ecology Lab (3 Credits)**Lecture: M 12:45-1:40PM (M004)****Laboratory: W 12:45-4:45PM (M005)**

Prerequisite: BIO 345

Instructor: 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, to study current applications of microbiome research in biotechnology and medicine. The course is student-centered and project-based, 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 M008, M009 and M010: Biochemistry Laboratory (3 Credits)

Lecture: M 12:45-1:40PM (M008)

Laboratory: W 12:45-4:45PM (M009) or TH 12:30-4:30PM (M010)

Prerequisite: BIO 326 and 327

Corequisite: BCM 475

Instructor: TBA

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

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: NEU 211, BIO 217, BIO 317, 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 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 Kate Lewis

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 421 M001: Capstone Seminar in Biotechnology (3 Credits)**TTH: 11:00AM-12:20PM**

Corequisite: BIO 463

Instructor: Heather Coleman

This is a seminar course for senior Biotechnology majors. Students will evaluate scientific papers, current news stories, and biotechnology related issues. Evaluation will occur through readings, oral presentations, written assignments, and class discussion. **This course satisfies the communication skills requirement.**

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

Meets with BIO 600 M013 and M014

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. Additional work is required of graduate students. **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 452 M001: Neurodegenerative Disease (3 Credits)**W: 12:45-3:30PM**

Meets with: BIO 652 M001

Prerequisite: BIO 326 and 327

Instructor: Donna Korol

This seminar course is intended to review and to stimulate discussion about the current status of our knowledge regarding neurodegenerative disease. While the main focus is on the etiology, neurobiology, and emergent symptoms of the diseases, broader biological, sociological, and historical perspectives are woven into the material. This course will include student presentations and a variety of written assignments. Juniors and seniors only. Although not required, prior neuroscience coursework-related or research is encouraged. Additional work is required of graduate students. **It satisfies the communication skills requirement and the Cell & Molecular Biology (CM) distribution requirement.**

BIO 457 M001: Principles of Human Toxicology (3 Credits)**TTH: 2:00-3:20PM**

Meets with: BIO 657 M001

Crosslisted with: FSC 457/657

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 is required of graduate students. **This course satisfies the Cell & Molecular Biology (CM) distribution requirement.**

BIO 458 M001: Seminar in Animal Communication (3 Credits)

MW: 2:15-3:35PM

Meets with BIO 658 M001

Prerequisite: BIO 345

Instructor: Susan Parks

This course covers the general principles of animal communication systems across modalities (visual, auditory, chemical and tactile) and taxa (invertebrates to mammals). Topics include the mechanisms of signal production and reception, behavioral functions of communication signals, and the role of economics and evolution in shaping communication systems. Organization of the course includes lectures, discussions, student presentations, and a variety of written assignments. Juniors and seniors only; others by permission. Additional work is required of graduate students. **This course satisfies the communication skills requirement and the Ecology & Evolutionary Biology (EE) 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.

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 is 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: MW: 12:45-2:05PM (M001)****Laboratory: TH 12:30-3:45PM (M002) or T 12:30-3:45PM (M003)**

Meets with: BIO 663 M001, M002 and 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 is 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.**

BIO 471 M001 and M002: Cell & Developmental Biology Laboratory (3 Credits)**Lecture: M 2:15-3:10PM (M001)****Laboratory: W 12:45-4:45PM (M002)**

Meets with: BIO 671 M001 and M002

Prerequisite: BIO 326 and BIO 327

Instructor: Melissa Pepling

This course reviews current methods employed in cell and developmental biology studies, including microscopy and imaging techniques, spatial analyses of gene expression, protein expression and localization, cell fractionation, and immunocytochemistry. In addition, it reviews general laboratory methods, data analysis and reporting. Additional work is required of graduate students. 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.**

BCM 475 M001: Biochemistry I (3 Credits)

MWF 9:30-10:25AM

Prerequisite: CHE 325

Instructor: Carlos Castaneda and Rebecca Oot

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 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.

Course Offerings

Fall 2021

Graduate Courses

BIO 600 M003: Advances in Biotechnology Research & Ideas (3 Credits)

MW: 2:15-3:35PM

Meets with: BIO 400 M003

Instructor: Ruth Phillips

What is going on in biotechnology, in the real world, right now? This topical course explores a variety of cutting-edge biotechnology research areas. The subject matter varies from semester to semester, based on the most recent advances in biotechnology. Topics include gene therapy/gene editing, personalized medicine, stem cells/regenerative medicine, bioremediation, environmental and sustainability biotechnology, optogenetics, nanotechnology, immunotherapy, and many others. Readings are drawn primarily from current scientific journal articles. The course is student-centered and project-based, to encourage students to develop a broad understanding of what biotechnology can be used for, while pursuing aspects of the field that interest them most. Emphasis is placed on creatively and critically applying basic principles of biotechnology to solve problems that matter.

BIO 600 M006: Microbiomes in Biotech BioMed (3 Credits)

MW: 3:45-5:05PM

Meets with: BIO 400 M006

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.

BIO 600 M011: Personalized Medicine (3 Credits)

TTH: 9:30-10:50AM

Meets with: BIO 400 M011

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.

BIO 600 M013 and M014: Genetics Laboratory (3 Credits)

Lecture: T 2:00-3:20PM (M013)

Laboratory: TH 2:00-5:00PM (M014)

Meets with BIO 435 M001 and M002

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.

BIO 610: Graduate Research Laboratory (1-3 Credits)

Varied Times

Instructor: Varied

This is work in research laboratories to acquire skills and techniques. It may be repeated for a maximum of 6-credits.

BIO 614 M001: Brain & Behavioral Plasticity (3 Credits)

TTH: 12:30-1:50PM

Meets with: BIO 414 M001

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.

BIO 624 M001: Readings in Neuroscience (3 Credits)

TTH: 3:30-4:50PM

Cross listed with: BEN 613, NEU 613, CSD 753, and PSY 778

Instructor: Jennifer Cook

Literature-based team-taught course focusing on in depth discussions of either classical or recent neuroscience papers of exceptional import. The purpose of this course is to provide neuroscience faculty with a readily available format to convey to graduate students important and/or cutting-edge topics in molecular, cellular, systems, behavioral, and cognitive neuroscientific approaches to investigate basic, pre-clinical, translational, and clinical questions to unravel the relationship between brain and behavior. Students will complete readings assigned by each faculty member and participate in in-depth discussion, including constructive critiquing of a primary piece of literature to foster critical-thinking and science-process skills.

BIO 646 M001: Epigenetics of Health & Disease (3 Credits)

MW: 3:45-5:05PM

Meets with: BIO 446 M001

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.

BIO 652 M001: Neurodegenerative Disease (3 Credits)

W: 12:45-3:30PM

Meets with: BIO 452 M001

Instructor: Donna Korol

This seminar course is intended to review and to stimulate discussion about the status of our knowledge regarding neurodegenerative disease. While the focus is on the etiology, neurobiology, and emergent symptoms of the diseases, broader biological, sociological, and historical perspectives are woven into the material. This course will include student presentations and a variety of written assignments. Although not required, prior neuroscience coursework-related or research is encouraged.

BIO 657 M001: Principles of Human Toxicology (3 Credits)

TTH: 2:00-3:20PM

Meets with: BIO 457 M001

Cross listed with: FSC 657/457

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.

BIO 658 M001: Seminar in Animal Communication (3 Credits)

MW: 2:15-3:35PM

Meets with BIO 458 M001

Instructor: Susan Parks

This course covers the general principles of animal communication systems across modalities (visual, auditory, chemical, and tactile) and taxa (invertebrates to mammals). Topics include the mechanisms of signal production and reception, behavioral functions of communication signals, and the role of economics and evolution in shaping communication systems. Organization of the course includes lectures, discussions, student presentations, and a variety of written assignments.

BIO 662 M001: Molecular Genetics**MWF: 10:35-11:30AM**

Meets with: BIO 462 M001

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.

BIO 663 M001, M002 and M003: Molecular Biotechnology (4 Credits)**Lecture: MW 12:45-2:05PM (M001)****Laboratory: TH 12:30-3:45PM (M002) or T 12:30-3:45PM (M003)**

Meets with: BIO 463 M001, M002 and M003

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? Enrollment in the lecture will automatically enroll you in the lab.

BIO 671 M001 and M002: Cell & Developmental Biology Laboratory (3 Credits)**Lecture: M 2:15-3:10PM (M001)****Laboratory: W 12:45-4:45PM (M002)**

Meets with: BIO 471 M001 and M002

Instructor: Melissa Pepling

This course reviews current methods employed in cell and developmental biology studies, including microscopy and imaging techniques, spatial analyses of gene expression, protein expression and localization, cell fractionation, and immunocytochemistry. In addition, it reviews general laboratory methods, data analysis and reporting. Enrollment in the lab will automatically enroll you in the lecture.

BIO 688: Biological Literature (1-3 Credits)**Varied Times**

Instructor: Varied

A student reviews a specific area in conjunction with a faculty member in this tutorial. Prior to the beginning of the semester, a proposal for Independent Study must be completed (in which the area and procedures for evaluation are described), signed by the supervising professor and given to the Academic Coordinator in the Biology Department for processing.

BIO 690: Independent Study (1-6 Credits)

Varied Times

Instructor: Varied

This course is a special project in which a graduate student conducts laboratory or field research unrelated to his/her thesis or dissertation research and supervised by a faculty member other than his/her supervisor. Prior to the beginning of the semester, a proposal for Independent Study must be completed (in which the project and procedures for evaluation are described), signed by the supervising professor and given to the Academic Coordinator in the Biology Department for processing.

BIO 700 M002: Scientific Writing (3 Credits)

TTH: 8:00-9:20AM

Instructor: Eleanor Maine

The overarching goal of this 3-credit course is to improve students' scientific writing skills. The intended audience is first- and second-year graduate students. Major emphasis will be placed on preparing a short grant proposal; other types of writing will also be addressed.

BIO 705 M001: Graduate Research Seminars (0-1 Credit)

Varied Times

Instructor: TBA

Students present their thesis or dissertation research and critically evaluate the research presentations of other students.

BIO 997 M001: Master's Thesis (0-6 Credits)

BIO 999 M001: Dissertation (0-15 Credits)

Varied Times

Instructor: Varied