SUBJECT: Biology

BIOL 101 Foundations of Biology (4)

An introduction to the fundamental principles underlying the biological world and the means by which biologists investigate it. Students will explore the scope of biology within the context of a specific biological system, with the goal of being able to think like a biologist about the natural world. Lab will take students outdoors to engage in scientific inquiry around the SJU campus. Fall.

BIOL 106 Plants and Humans (4)

An introduction to plant science featuring horticultural techniques and plants that have impacted society. Intended for non-majors. Lecture and laboratory.

BIOL 107 Field Biology (4)

An introduction to the natural history of plants and animals with an emphasis on the ecosystems of Central Minnesota. The laboratory is field-oriented, concentrating on developing an understanding of basic ecological interactions. Intended for non-majors. Lecture and laboratory.

BIOL 108 Microbes and Human Affairs (4)

An examination of the role microorganisms play in various aspects of human affairs. Consideration will be given to both the beneficial activities and the harmful effects of microbes. The laboratory emphasizes the morphological diversity and physiological activities of microorganisms. Intended for non-majors. Lecture and laboratory.

BIOL 109 Environmental Science (4)

A survey of the scientific basis of human interactions with nature. Topics include global environmental problems, analysis of local and regional issues, population biology and conservation of ecological systems. Intended for non-majors. Lecture and laboratory.

BIOL 110 Life Science (4)

Exploration of fundamental principles and processes of biology through their application to biological topics of interest to the liberal arts student. The concepts and topics examined will help students to interpret and understand important scientific events affecting society. Intended for non-majors. Lecture and laboratory.

BIOL 112 Human Biology (4)

Human biology has as its goal an understanding of the biology of the human organism. Emphasis is on genetics, embryology, endocrinology, physiology, anatomy and environmental factors that influence and affect humans. Intended for non-majors. Lecture and laboratory. Fall and/or spring.

BIOL 180 Summer Courses (2)

Biology courses offered specifically during the summer term. Courses are offered for S/U grading only.

BIOL 201 Intermediate Cell Biology and Genetics (4)

This course builds on the material covered in BIOL 101, and includes biological molecules, cell structure, cell signaling, metabolism, and classical and molecular genetics. Laboratories provide the students with opportunities to investigate these topics at a cellular and molecular level. Intended for science majors. Prerequisite BIOL 101 and Corequisite or prerequisite CHEM 125 or HONR 210E.

BIOL 202 Evolution in Action (4)

This course builds on the material covered in BIOL 101 and 201 by examining evolutionary processes, and some of the tools used to understand these processes, in the context of important biological themes. Laboratories provide opportunities to investigate these topics while building on the skills acquired in BIOL 101 and 201. Prerequisite BIOL 101 and 201.

BIOL 212 Microbiology (4)

Survey of microorganisms emphasizing those that cause disease. Topics include morphology and physiology of microorganisms, sterilization, disinfection, and specific diseases and their causative agents. Laboratory work emphasizes aseptic technique. Intended for pre-nursing students. Prerequisite: BIOL 101. Spring. Course offered for A-F grading only.

BIOL 216 Human Physiology (4)

This course is specifically designed to introduce nutrition and dietetics students to basic principles of human physiology from cellular processes, to the workings of organ systems, to homeostasis. The course will use a case study, problem-based learning approach to teach basic physiology from applied examples that students will likely be exposed to in their future clinical practice. A-F grading only. Prerequisites: BIOL 101.

BIOL 221 Introduction to Organismal Biology (4)

An introduction to the major challenges faced by multicellular organisms such as gas exchange, transport, movement, response to the environment, resource acquisition, homeostasis, and reproduction. Laboratories provide opportunities to study form and function of both plants and animals. Intended for science majors. Prerequisites: BIOL 121 or consent of department chair. A-F grading only. Spring.

BIOL 271 Individual Learning Project (1-4)

Supervised reading or research at the lower-division level. Permission of department chair required. Does not count toward major requirements. Not available to first-year students.

BIOL 277A Plants and Society (4)

An introduction to plant sciences and their role in human society, with a focus on food security, conservation, climate change, and Ojibwe and Dakota plant sciences. Labs will explore using the scientific method to answer justice-related questions regarding plant cultivation and conservation. Intended for nonmajors. Prerequisites: Learning Foundations, CSD:I, and Theological Explorations

BIOL 300 Protist Diversity (2)

Protists are eukaryotic organisms that are not plants, animals, or fungi. They include algae, protozoans, slime molds, and countless diverse microbes. Protists play many important ecological roles, such as human parasites, primary producers, beneficial mutualists, plant pathogens. As the ancestors of all other eukaryotes, they experimented with cell structure, sex, multicellularity, and complex life cycles. Special attention given to their morphology, evolution, ecology, and importance to humans. Prerequisite: BIOL 202. Spring.

BIOL 302 Fungal Diversity (2)

A survey of the various groups of organisms belonging to the kingdom Fungi. These organisms are important decomposers, plant pathogens, human parasites, and as mutualist with plants and algae. Special attention is given to their morphology, phylogeny, ecology, and importance to humans. Laboratories include examination of living and prepared specimens as well as experimental work with fungi. Prerequisite: BIOL 202. Spring.

BIOL 304 The Evolution of Terrestrial Plants (2)

An overview of the evolution of the major groups of terrestrial plants from their green algal ancestors. We will follow the changes that took place as these organisms have become better adapted to living on dry land, from mosses to ferns, conifers, and flowering plants. Special attention is given to their morphology, phylogeny, ecology and importance to humans. Laboratories entail the examination of living and prepared specimens. Prerequisite: BIOL 202. Spring.

BIOL 305 Invertebrate Zoology (4)

Classification, evolution, structure, life cycles and ecology of representative invertebrate animals. Laboratories include a study of representative species from major taxa. Prerequisite: BIOL 201. Spring.

BIOL 307 Biology of Microorganisms (4)

This course begins with introduction and comparison using structural, molecular, and physiological characteristics of the representative microbial groups. Special topics that students will research include host-parasite relationships, microbial genomics and synthetic microbiology, and the environmental impact of microorganisms. Laboratory will stress research design and student-based projects. Students will design experiments using microbiology techniques including different culturing methods, microscopy, and identification techniques. Prerequisites: BIOL 201 and CHEM 125 (or HONR 210E) and 250 or instructor's consent. Fall.

BIOL 308 Plant Systematics (4)

A study of the principles of identifying and classifying flowering plants, with a focus on plant species that are found on campus, exemplify conservation concerns, or are of special interest to human health and society. Labs will involve identifying plants on campus in order to answer conservation questions, analyzing data, and preparing herbarium specimens. Prerequisite: BIOL 101, or instructor permission.

BIOL 309 Biology of Insects (4)

Examination of the morphology, systematics, behavior, ecology, evolution and economic importance of major groups. Laboratory and field studies of local insects. Prerequisite: BIOL 222 or 202. Fall.

BIOL 311 Cell Biology (4)

A study of the organization and function of plant and animal cells, emphasizing the experimental basis of current concepts in cell biology. Laboratory work includes light and electron microscopy, cell culture, cytochemistry and other techniques of cellular investigation. Prerequisites: BIOL 201 and CHEM 125 (or HONR 210), 250, 201 and 202. Fall.

BIOL 315 Virology (4)

Structure and chemical composition of viruses. Host-virus interactions with emphasis on bacterial and animal viruses, subviral particles and viral evolution. Laboratory focuses on techniques for culturing and characterizing bacterial viruses. Prerequisite: BIOL 201. Fall.

BIOL 316 General Genetics (4)

The principles and applications of gene transmission are a primary focus of this course. Gene and genome structure and function are also discussed in detail. The laboratory serves to introduce students to techniques and analytical approaches that are routinely used by practicing geneticists. Prerequisite: BIOL 201. Fall and spring.

BIOL 317 Biochemistry (4)

Lecture and laboratory study of the chemical characteristics of biological molecules with emphasis on bioenergetics, enzymes, metabolic pathways and integration, biological signals and membrane receptors. Prerequisites: BIOL 201, and CHEM 125 (or HONR 210E), 250, 255, 201, 202, and 205 or instructor's consent. Fall and spring.

BIOL 318 Molecular Genetics (4)

Lecture and laboratory study of the structure of DNA and RNA, the regulation of gene expression, and the organization and function of genomes in eukaryotes and prokaryotes. Laboratory techniques and applications include DNA and RNA manipulations, recombinant DNA technology, and analysis of nucleic acid and protein sequence. Prerequisites: BIOL 201, and CHEM 125 (or HONR 210E), 250, 201, and 202 or instructor's consent. Spring.

BIOL 319 Immunology (4)

A study of the initiation and the biological/chemical aspects of the immune response. Emphasis is placed on the innate response, B and T cell development, T cell receptor and antibody protein and gene structure, and the adaptive response to an infection. Attention will be given to hypersensitivities (allergies), autoimmunity and tumor and transplant immunology. Prerequisites: BIOL 221 or 201 and CHEM 125 (or HONR 210E) and 250 or instructor's consent. Spring.

BIOL 320 Neurobiology (4)

A reading, writing, and discussion-based investigation of neurobiological principles such as neuronal and circuit structure and function, cellular excitability, synaptic transmission, and the neurobiological basis of disease. Students will produce a critical analysis of a current neurobiological issue of their choice. Current experimental techniques are used to generate, analyze, and interpret data in laboratory and in class discussions. Prerequisite: BIOL 101 and 201, with a grade of C or better in all courses. Fall.

BIOL 322 Developmental Biology (4)

Mechanisms by which a fertilized egg becomes a mature organism are explored at both the molecular and cell-tissue level. These patterns and principles of development are considered for a variety of animal species. Laboratories include observation of normal development and experimental manipulations of the normal processes. Prerequisite: 201. Fall.

BIOL 323 Animal Physiology (4)

Structure, function and physiological adaptations in a variety of animals including humans. Metabolism, cardiovascular physiology, nerve and muscle function, salt and water balance, excretion, temperature regulation and endocrinology. Prerequisite: BIOL 201 or instructor's consent. Spring.

BIOL 325 Human Anatomy and Physiology I (4)

Integrated study of cells, tissues, organs, and systems of the human body, with emphasis placed on structure-function relationships. Major concepts stressed are how function at the cellular level governs events observable at the tissue, organ, or systemic tier, and physiological mechanisms necessary for homeostasis. Topics covered include excitable tissue, skeletal system, nervous system, muscular system, endocrine system. Laboratory component involves dissection exercises, study of human models, and inquiry-based investigations of muscle physiology and nervous system function. Prerequisite: BIOL 201 or instructor's consent. Fall.

BIOL 326 Human Anatomy and Physiology II (4)

Integrated study of cells, tissues, organs, and systems of the human body, with emphasis placed on structure-function relationships. Major concepts stressed are how function at the cellular level governs events observable at the tissue, organ, or systemic tier, and physiological mechanism necessary for homeostasis. Topics covered include the cardiovascular system, respiratory system, digestive system, urinary system, reproductive system and water, electrolyte and acid-base balance. Laboratory component involves dissection exercises, study of human models, inquiry-based investigations of cardiovascular, respiratory, and urinary system physiology, and a group independent research project. Prerequisite: BIOL 325 or instructor's consent. Spring.

BIOL 327 Plant Physiology (4)

A study of how plants function and grow. Topics include metabolism, water relations, growth and development, gas exchange and responses to the environment. Laboratory provides a hands-on opportunity to work with plants and learn basic physiological techniques. Prerequisite: BIOL 201. Spring.

BIOL 329 Histology and Technique (4)

Investigation of tissue characteristics, development, and interrelationships. Extensive laboratory experience in applicable microtechnique. Prerequisite: BIOL 221 or 201. Spring.

BIOL 330 Comparative Anatomy of Vertebrates (4)

This course studies vertebrate anatomy in developmental and evolutionary contexts. We examine each of the body's major organ systems within the framework of vertebrate phylogeny so as to begin to understand how and why vertebrate structure has changed over time. Structures are illustrated and compared through dissection of representative vertebrates in the laboratory portion of the course. Prerequisite: BIOL 202. Fall.

BIOL 332 Natural History of Terrestrial Vertebrates (4)

Amphibians, reptiles (including birds), and mammals comprise the Tetrapoda, or terrestrial-vertebrate group. In this course we examine tetrapod anatomy, physiology, behavior, and evolution. Laboratories emphasize identification of, and field experience with, the tetrapods of central Minnesota. Prerequisite: BIOL 202 or instructor's consent. Spring.

BIOL 334 General Ecology (4)

An exploration of the historical, theoretical and empirical development of the science of ecology. Topics include dynamics of populations, interactions among species, and the organization and function of ecosystems. We devote special attention to the interplay between theoretical and empirical studies, with emphasis upon current research whenever possible. In the laboratory, students are expected to work in teams to design and implement a research project and present their findings in a public forum. Prerequisites: BIOL 202 or ENVR 275. Recommended: MATH 124. Fall.

BIOL 336 Behavioral Ecology (4)

A study of animal behavior with emphasis on the ways in which the ecological circumstances surrounding animals help shape their behavior. Laboratory experience in the observation and analysis of behavior in living organisms. Prerequisite: BIOL 121 or 202 or ENVR 175. Spring.

BIOL 337 Aquatic Ecology (4)

An exploration of the ecology of lakes, streams, wetlands and other aquatic ecosystems. Lakes are common features of our landscape and play key roles as habitats and resources. Topics include the formation of lakes, how they change over the year, ecological interactions in lakes and streams, and lake management. Laboratories take place on campus lakes, on shore, and in the lab. Prerequisites: BIOL 201 or ENVR 175.

BIOL 339 Evolution (4)

This course provides a historical and societal context for evolutionary theory, surveys the evidence for evolution, and emphasizes the processes of genetic change. The laboratory focuses on collaborative group projects and deepening students' appreciation for key components of the scientific process including: methodological troubleshooting, interacting with scientific literature, and technical writing. Prerequisite: BIOL 202 or consent of instructor. Spring.

BIOL 341 Natural History of Tropical Carbonate Ecosystems (2)

This course provides students with an introduction to the unique ecology and geology of tropical marine carbonate ecosystems, with an emphasis on those of the Bahamas. Topics covered include the evolution of reefs and reef-building organisms, geological history of the Bahamas, and the natural history of modern reef, mangal, and seagrass ecosystems. Environmental challenges facing these ecosystems will also be considered. The course requires participation in a field trip to San Salvador Island, Bahamas, or another tropical carbonate system. As part of the field trip, students will participate in a research project that involves monitoring of the ecological status of a tropical carbonate ecosystem. Prerequisite: BIOL 222 or 202 or ENVR 275. Cross-listed with ENVR 341. Course offered for A-F grading only. Spring AB mod.

BIOL 347 Journal Club (1)

Preparation of a paper and a seminar presentation on a topic of current biological interest. Source materials will be the current research literature. Restricted to juniors or seniors only.

BIOL 348 Biology Seminar Series (1)

This course consists of attendance at department sponsored seminars and seminar preparation sessions. At the preparation sessions students will familiarize themselves with the seminar topic through appropriate readings and discussion with faculty. Restricted to juniors or seniors. S/U grading only. Fall and Spring.

BIOL 371 Individual Learning Project (1-4)

Supervised reading or research at the upper-division level. Permission of department chair and completion and/or concurrent registration of 12 credits within the department required. Credits in 371 cannot be applied towards major requirements.

BIOL 372 Biological Research (1-4)

Original research conducted under the supervision of a staff member. Students will design their own project in consultation with their moderator. Permission of department chair required. Credits in 372 may be applied towards major requirements.

BIOL 373 Special Topics in Biology (1-4)

Readings and discussions in either broad or specific areas of biology not covered in departmental courses. Topics may be either student-or faculty-originated.

BIOL 373A Exploring Medicine (1-2)

The mission of this course is to provide an innovative educational experience for students interested in the health professions so they can make a more informed decision regarding their pursuit of a career in health care. Credits in 373A cannot be applied towards major requirements.

BIOL 373B Exploring Medicine II (1-2)

NO COURSE DESCRIPTION

BIOL 373F Bioinformatics (4)

This course provides an introduction to the field of bioinformatics. Topics will include sequences of DNA, RNA and proteins, comparing sequences, predicting sequences, predicting species; computational techniques such as substitution matrices, sequence databases, dynamic programming and bioinformatics tools. The course will have a seminar format. Prerequisite BIOL 121 or 201.

BIOL 373G Ecology & Evolution of the Amazon Rainforest, the Galapagos Islands and Costal Ecosystems of Ecuador (4)

This course allows students to explore the following disciplines: evolutionary biology, terrestrial ecology, history of science, geology, oceanography and conservation biology. Thus, these islands represent an ideal place to study the interaction of multiple scientific disciplines in one of the most intellectually stimulating place on Earth (not to mention one of the most beautiful). The object of this program is to provide students with a hands-on field experience in conjunction with traditional classroom work. The ultimate goal: to obtain both an academic and an experiential understanding of an iconic ecosystem. Prerequisites: BIOL 221 and 222 or 202, plus the ability to work well in groups, and a degree of physical fitness that allows for extensive snorkeling in cold water and hiking a minimum of five miles over rough terrain. Course offered for A-F grading only. Summer.

BIOL 373H The Omics of Medicine (2)

How will proteomics, genomics impact the study and practice of medicine? This course will use primary literature, real data, and hands-on student research projects to study the impact of modern day “omics” on the field of medicine. Discussions and topics include the role of proteomics and genomics in preventive medicine, diagnostics, and treatments. In addition, students will research the role of “omics” in understanding the evolution of infectious disease in terms of a pathogen’s virulence (ability to cause disease) and the growing resistance to antibiotics. Independent group projects will be a component of the bench work to encourage and develop not only research skills but to also better understand its role in medicine. Prerequisites: BIOL 121 or 201. BIOL 317 or 318 is highly recommended. Spring AB mod.

BIOL 373J Biological Illustration (1)

This course is a hands-on introduction to biological illustration theory and techniques. The class meets weekly. In the first five weeks students are introduced to some of the basic techniques of biological illustration. Students will be encouraged to work with techniques that fit well with their main interest area(s) in biology. Then, students will be required to apply this knowledge by designing and completing an independent project. This project will involve preparing a set of materials that illustrate a concept or topic of interest, and that can be used to help others understand the topic. Each student will be asked to work on an independent project that incorporates their illustrations in a real setting, whether preparing a poster for a research presentation, teaching a lesson, preparing a resource that others could use to teach a lesson, preparing an educational brochure for the Arboretum or a nature center, preparing posters for an elementary school science class, or other similar project. A student who successfully

completes this course should have a basic understanding of the techniques and purposes of biological illustration and be able to use his or her knowledge to successfully convey significant biological information to a target audience. Course offered for S/U grading only. Spring AB mod.

BIOL 373L Mathematical Modelling in Biology (4)

Traditional approaches to mathematical modelling in biology have relied primarily on differential equations models. However, new approaches have and are being developed that rely instead on discrete methods, such as those coming from graph theory, polynomial manipulation and elementary linear algebra. For example, gene regulatory networks have been successfully modelled using Boolean logic. The spread of tick-borne diseases and methods of control have been well described using agent-based models. Graph theoretic models have been used to explore aspects of neuronal network connectivity. This course will survey a variety of discrete modelling approaches, including Boolean models, polynomial dynamical systems, graph theory, agent based modelling, and hidden Markov models. Emphasis will be on examples and applications, which will be drawn from various areas of biology, including problems in gene regulation, population dynamics and neuroscience. The necessary mathematical background will be included in the course. Prerequisite: MATH 119 or permission of instructor.

BIOL 373M Biocontrol: Reintroduction of Wolves into Yellowstone (2)

This course will use primary and popular literature to examine human impact on biological systems. We begin the course with a discussion of the reintroduction of wolves into Yellowstone. We will discuss why the decision was made to bring the wolves back, what researchers predicted the impact would be, and what the data and results suggest. Three major components to this study will be discussed: 1) the role of effective research methods and mechanics from molecular to field work will critiqued. 2) We will examine the molecular, organismal, population, and ecosystem impact of biocontrol. 3) We will discuss the role of societal issues on biocontrol. Although our discussion will begin within the context of wolf reintroduction, we will also use other examples to define and discuss biocontrol. For example, the impact and removal of invasive species in particular ecosystems will also be highlighted. Prerequisites: BIOL 222 or 202. Spring CD mod.

BIOL 373N Statistics in Biology & Medicine (4)

This course explores the principles of experimental design and common inferential statistical techniques used in the biological and medical sciences. Emphasis is placed on the applications of these methods and practical considerations associated with their proper use. An additional focus of the course is using the R statistical computing environment for methodological implementation and generation of high quality scientific figures. Students who do not have access to a laptop should notify the instructor, so that computer access can be arranged. Prerequisites: BIOL 221 or 101.

BIOL 373O Exploring Neurobehavioral and Social Aspects of Medicine (1-2)

Exploring Medicine is a course designed for students interested in the health professions, specifically students seeking a career as a medical doctor, doctor of osteopathy, physician assistant, or nurse practitioner. Students will study various systems of the body and learn the pathophysiology and treatment of a variety of human diseases and conditions. The purpose of this course is to help students see the relevance of their basic sciences, to be better prepared for the MCAT, to help students prepare for medical school, and help them to be a step ahead in their decision to pursue a career in medicine.

BIOL 373P The Art of Healing: A Practical & Benedictine Approach to Caring for Others (1)

Drawing from two decades of medical practice & centuries of literary, philosophical & scientific wisdom, this course hopes to speak to the transcendent art of healing.
In a hurried world of pragmatism and efficiency, we still want our work to be meaningful. Now is the time to ignite the deeper sense of vocation in those aspiring to a career in health care (MD, RN, PA, NP, PT, OT, Pharm, etc.) or in those simply interested in finding enduring meaning in the career they will pursue.
Offered for A-F grading only. Prerequisite BIOL 101.

BIOL 373Q Ecology and Evolution of the Serengeti Ecosystem (4)

Students will study the ecologically and evolutionarily complex Serengeti Ecosystem of Tanzania. Using traditional classroom methods and field-based activities, we will explore the following disciplines: Evolutionary Biology, Terrestrial Ecology, History of Science, Nutrient Cycling, Animal Physiology, Wildlife Conflicts, Geology, Climate and

Conservation Biology. Thus, the Serengeti Ecosystem represents and ideal place to study the interaction of multiple disciplines in one of the most intellectually stimulating place on Earth (not to mention one of the most beautiful). The object of this program is to provide students with both an in-class learning opportunity (C/D modules) and a hands-on field experience to the Serengeti (May) – with an ultimate goal for students to obtain both academic and an intellectual understanding of one of the most unique ecosystems on earth. Prerequisites: Biology 101, 201 and 202.

BIOL 374 Biological Techniques (1-2)

Independent work to develop expertise in special techniques such as electron microscopy, chromosome preparation, tissue culture, and the preparation of specimens of plants, insects or vertebrates. S/U grading only; does not count toward the biology major.

BIOL 375 Natural History of Maple Syrup (1)

A springtime ritual throughout NE United States, including St. John's, is the production of maple syrup from the sap of the sugar maple tree. This course provides an introduction to the history of the process, methods for producing syrup, and the biological and chemical principles underlying the production of sap and syrup. Prerequisite: BIOL 201 or 221 or instructor consent. Spring C mod.

BIOL 380 Senior Capstone (2)

Starting in Fall 2018, the Biology Department will offer a 2-credit capstone experience that must be taken in the senior year. In order to complete the Biology capstone requirements, students will complete a capstone project in which they will 1) execute an empirical research study that culminates in the writing of a scientific paper. 2) write a grant proposal that justifies and details a proposed research study or 3) write a review paper that investigates a novel thesis and/or synthesizes novel connections All projects will culminate in an oral presentation of the project in a public venue. Prerequisite: BIOL 202 and MATH 124. Fall and Spring.

BIOL 380A Pathophysiology and Epidemiology of Diseases Transmitted by Insect Vectors (2)

Student projects will focus on the transmission, pathophysiology, and treatment of human infectious diseases transmitted by insect vectors. Student teams will pick a particular disease and research the various aspects listed above. The bloodier and more bizarre, the better! Different levels of biology (i.e., cellular, organismal, ecological) should be addressed, allowing students with different backgrounds to contribute to each project. Prerequisite BIOL 202 & MATH 124

BIOL 380B A World of Unintended Consequences (2)

From hunting, gathering, and the ability to control fire, through domestication of plants and animals, long-distance voyages, industry, to the editing of genomes, humans have been interacting with the rest of the biosphere to varying degrees for thousands, perhaps millions, of years. Few, if any, locations on Earth are free from the influence of humanity, and many of the challenges our ecosystems and societies face result from unintended consequences of human activity. In this course, students will analyze biological legacies of past actions or predict biological outcomes of choices that currently face humanity. They will then make recommendations for addressing the biological and societal impacts (extant or anticipated) they document. Prerequisite BIOL 202 & MATH 124

BIOL 380C The Magic of Microorganisms (2)

Bacterial systems present a multitude of questions of biological interest given their competition for resources, adaptability to distinct environments, and propensity to evolve new biochemical capabilities. Students in this course isolate, identify and characterize bacterial samples from sites in and around CSB/SJU of personal interest or in conjunction with other studies currently underway. These projects will include some combination of library, laboratory and written work that hopefully ties together many of the levels of current biological inquiry. Prerequisites: BIOL 202 (307 & 317 strongly recommended) & MATH 124 or consent of instructor.

BIOL 380D Biological Extremophiles (2)

Life is amazing. Some organisms can tolerate extreme desiccation, radiation, heat, cold, acidity, alkalinity, pressure or salinity. How do they do it? The focus of this course will be the organisms capable of surviving extreme environmental conditions. Students will select a phenomenon to study, prepare a review paper about the topic, and then present their results in a public forum. Prerequisites: BIOL 202 & MATH 124

BIOL 380E Climate Change (2)

During the coming decades, Earth's changing climate is likely to generate a diversity of disruptions ranging in severity from exasperating to existential. In this capstone, student teams will produce a research paper that explains the biological foundations for a projected consequence of climate change that interests them, and will also explain and evaluate adjustments that society might make to mitigate climate-associated challenges. Each team's research will be presented on Scholarship and Creativity Day. Prerequisite BIOL 202 & MATH 124

BIOL 380F Genome Editing with CRISPR/Cas9 (2)

CRISPR/Cas9 is one of the most exciting advancements in modern biology. Students will learn about what CRISPR/Cas9 is, what is can be used for, and design/carry-out their own projects using CRISPR/Cas9 technology. Students will learn bioinformatics, and a number of wet-bench skills including molecular biology and biochemistry techniques to carry out their project. These projects will include some combination of library, laboratory, and written work that hopefully ties together many of the levels of current biological inquiry. Additionally, students will discuss the ethics implications of the variety of CRISPR/Cas9 applications and new developments in this rapidly evolving field. Prerequisite BIOL 202 & MATH 124.

BIOL 380G Feeding 10 Billion (2)

By the end of this century the population of this planet is projected to exceed 10 billion people. How will we feed them? The solutions to this problem may depend on our understanding of biology from molecular biology (as in genetic engineering) to ecology (as in agronomy). Prerequisite BIOL 202 & MATH 124

BIOL 397 Internship (1-16)

Completed Application for Internship Form REQUIRED. See Internship Office Web Page.