The human immune system, but other species will be rejection, and hypersensitivity. The not so beneficial aspects in infection prevention and resolution, cancer prevention will explore the beneficial aspects of the immune response individual.

The goal of this course is to expand the student understanding of the immune system in both health and disease conditions and pathologies. The lecture portion of the course provides students with background information about these topics. The laboratory portion provides students with the opportunity to experimentally explore how these processes work using cutting-edge equipment and techniques.

This course is about how animals develop from the fertilized egg to the adult, though it also includes how sperm and eggs are made and the fertilization process itself. Following fertilization, it will cover the next period of rapid cell division known as cleavage, the formation of the germ layers (gastrulation), and then the formation and differentiation of the organs (organogenesis). It will emphasize cell movement and tissue interactions as part of the development process. The diversity of animals will be represented using model animals such as the sea urchin, fruit fly, frog, chick, and the mouse and human representing mammals. The laboratory will include the study of the microanatomy of development, using live fertilization, video image analysis, and graphic reconstruction, but will also include observations and experiments with live sea urchin, frog and chick embryos.

The goal of this course is to expand the student’s understanding of the immune system in both health and disease. This is accomplished by first understanding the molecular mechanisms of the immune system, then examining the cell to cell interactions, and finally, looking at the function of the immune system at the level of an individual. While examining the system from this level, we will explore the beneficial aspects of the immune response - infection prevention and resolution, cancer prevention - and the not so beneficial aspects - autoimmunity, transplant rejection, and hypersensitivity. The focus of the course is on the human immune system, but other species will be included for comparison and contrast.
2019 FALL BIOLOGY
Course Descriptions:

BIOL 3100
Evolution, Ecology and the Nature of Science - (3 cr.) 3 hrs. Lecture
The course is discussion-oriented and will be centered on student presentations based on readings from recent books and papers. In this course we will explore the following themes: (1) How organisms interact with one another and with the abiotic world, (2) the genetic continuity of all life, (3) how the past has influenced and determined the current life on earth, (4) the centrality of evolutionary theory in biology, and (5) what science is and how it is practiced. Participation in this course will better your critical thinking, public speaking, reading and writing skills and will enhance your understanding of scientific methodology.

BIOL 3101
Anatomy and Physiology I - (4 cr.) 3 hrs. Lecture, 2 hrs. Lab
University elective only—cannot be used for biology credit
This course, the first of a two semester sequence in Anatomy and Physiology, is designed to provide students with basic information about the structure and function of the human body. Topics include anatomical terminology and directional terms, basic cell membrane physiology, tissues, the skeletal system, muscular system and nervous system. The course is specifically designed for students planning to enter the various health professions (medicine, physical therapy, dentistry, nursing, etc.) or athletic training, though individual in other majors (psychology, communication disorders, etc.) may find the content relevant to their field of study. Body systems covered in this semester include the cardiovascular, immune, respiratory, digestive, urinary, endocrine, and reproductive systems, as well as the special senses, acid-base balance and the basics of genetic inheritance. Laboratory activities include various physiology experiments, (electrocardiograms, muscle stimulation, respiratory physiology, vision and hearing physiology, etc.), dissection of specimens, and identification of anatomical features of the human body. Common disease processes (pathophysiology) are included in both the lecture and the laboratory portions of the course. As in Anatomy and Physiology I, lecture and lab assignments emphasize application of content to “real-life” clinical situations. At the completion of the Anatomy and Physiology sequence, students should have an in-depth understanding of the human body, the interrelationships between anatomy and physiology, and interactions of various organ systems with one another.

BIOL 3140
Genetics - (4 cr.) 3 hrs. Lecture, 2 hrs. Lab
Genetics is foundational to biology. Taking this class will improve your understanding of how genes are inherited, how they affect how a cell functions, and how mutations of those genes can lead to malfunctioning cells and disease, or to improvements that are favored by natural selection. We will explore how gene expression is controlled, how it leads to different types of cells, and what happens when gene expression is not controlled properly, as is the case with diseases such as cancer. Also covered will be how genes have changed and continue to change through time. A two-hour lab session each week allows for discussion and hands-on activities.

BIOL 3151
General Microbiology - (4 cr.) 2 hrs. Lecture, 4 hrs. Lab
Bacteria and viruses are the most numerous and diverse forms of life on Earth. Human history and culture are inexorably bound with microbes. Sex, food, life, death and decomposition: you have always interacted with microbes or their products and will continue to do so for as long as you live... and for a little while after that too! This was unknown before the ‘germ theory of disease’ allowed study of microorganisms, the control of many plagues, and the unending struggle toward better public health. This course covers the fundamentals of microbiology and the role of microorganisms in the environment and in human affairs. Viruses, bacteria, algae, protozoa and fungi are described and their economic importance is discussed. Other topics include cell structure and metabolism; microbial genetics; medical, food, water and soil microbiology. Emphasis is given to medical aspects - bacterial and viral diseases, immunology, chemotherapy, diagnosis, transmission, epidemiology and an understanding of the genetics of host-parasite dynamics. In the General Microbiology lab, you will employ logical reasoning, time-tested and modern methodologies to ask questions, design and carry out experiments and interpret data about the microbial world, including characterization, identification, propagation, detection and control. Experiments involve aseptic technique and manipulation of microorganisms under laboratory conditions to illustrate the basic principles of microbiology.

BIOL 4105/5105
Wildlife Ecology - (4 cr.) 3 hrs. Lecture, 3 hrs. Lab
Throughout our history, humans have interacted with populations of free-ranging wildlife. Indeed, we owe much of our “success” as a species to our ability to manipulate and manage these interactions. Whether our interest is (1) sustainably harvesting wildlife species that provide us with valuable resources; (2) controlling species that negatively affect humans, domestic animals, or crops; or (3) conserving declining wildlife populations threatened by human activities, the practice of wildlife management is fundamentally about applying ecological knowledge to achieve a population objective. We will spend the lecture/discussion portion of the course reviewing the ecological basis for wildlife management and studying how ecological principles are applied in the practical management of wildlife populations.

In addition to a strong foundation in ecology, wildlife professionals must possess a set of technical skills that enable them to collect and interpret relevant data and to use that information to make informed decisions and support public policy development. In the “lab” portion of the course, we’ll focus on learning various methods and techniques for detecting and/or counting animals, studying animal movement, and monitoring wildlife habitat. In addition, we’ll explore the use of simple mathematical models to estimate population trends and to examine the potential effects of management actions on wildlife populations.

BIOL 4121/5121
Plant Biotechnology - (4 cr.) 2 hrs. Lecture, 4 hrs. Lab
We use plants for food, shelter, medicine, fuel, clothing, and as raw materials for various other products. Plant biotechnology has become a major player in the effort to increase food production and enhance the quality of plants and plant products. This course will introduce students to the applications of plant biotechnology. It will cover such topics as the culturing of plants on artificial media, genetic engineering of plants to improve yield and nutrition, use of molecular markers in crop breeding, and safety and ethical issues surrounding plant biotechnology. Furthermore, advances in biotechnology bring complex issues of patent rights. The course concludes by highlighting the role of intellectual property rights on availability of plant biotechnology products. The course includes lectures, labs, and student presentations. The labs will give students hands-on experience in plant tissue culture, genetic engineering of plants, how to screen genetically modified plants, and the importance of safety in plant biotechnology research.