

## Biology Courses

**Course Descriptions:** The hours identified with each course description represent the amount of time spent in the classroom, laboratory and clinical area per week during a semester.

**Prerequisite:** A prerequisite indicates a course which must be successfully completed before enrolling in other courses as indicated.

**Corequisite:** This indicates a course which must be taken no later than the same semester as the course described.

**Recommended Background:** Indicates level of course background or other criteria a student needs to be successful in a course.

### **BIOL 121**

#### GENERAL BIOLOGY I

3 Hrs

Fundamental facts and principles of living things. Emphasis on ecological principles and conservation, classical genetics and evolution. Studies the major groups of plants and animals and their phylogenetic relationships. Students carry out a research project. (Lecture 2 hours, Lab 3 hours)

*Fall*

### **BIOL 122**

#### GENERAL BIOLOGY II

3 Hrs

Fundamental facts and principles of living things. Emphasis on human anatomy, physiology, nutrition, growth, development, cells, cell metabolism, and molecular genetics. Students prepare a term paper and original proposal based on a literature search. Writing intensive. (Lecture 2 hours, Lab 3 hours)

*Spring*

### **BIOL 125**

#### NATURAL HISTORY OF INDIANA

3 Hrs

Natural history of Indiana flora and fauna: observation, collection and identification of plants and animals. Students visit various Indiana locations. Course requires daily field trips. (Lecture 2 hours, Lab 2 hours)

*Summer*

### **BIOL 190**

#### PRINCIPLES OF BIOLOGY I

4 Hrs

This course focuses on the morphology, physiology, life history and ecology of animals. Special attention is paid to the practice and history of the science of

biology, and to the principles of organic evolution. Students conduct a research project and prepare a written report. The laboratory introduces general principles and specific examples of taxonomy and phylogeny. Writing intensive. (Lecture 3 hours, Lab 3 hours)

*Fall*

**BIOL 191**

PRINCIPLES OF BIOLOGY II

4 Hrs

Basic cell metabolism and principles of molecular genetics are introduced. Thallophytes and tracheophytes are studied emphasizing principles of plant taxonomy, anatomy, morphology, biochemistry and biogeography. Students prepare a research proposal based on an extensive literature search. Writing intensive (Lecture 3 hours, Lab 3 hours)

*Spring*

**BIOL 215**

NUTRITION

3 Hrs

Principles of nutrition in relationship to human physiology, biochemistry, life cycle, health and disease prevention and treatment.

*Fall, Spring*

Prerequisite: BIOL 122 or BIOL 222 or BIOL 262

**BIOL 221**

HUMAN ANATOMY AND PHYSIOLOGY I

3 Hrs

Structure and function of various cells, tissues, organs, and organ systems of the human body, with special emphasis on the integumentary, skeletal, muscular, nervous system, and sense organs. Mammalian dissection in laboratory. (Lecture 2 hours, Lab 3 hours)

*Fall, Spring*

**BIOL 222**

HUMAN ANATOMY AND PHYSIOLOGY II

3 Hrs

Structure and function of various systems of the human body with special emphasis on the circulatory, respiratory, digestive, endocrine, urinary, and reproductive systems. Mammalian dissection in laboratory. (Lecture 2 hours, Lab 3 hours)

*Fall, Spring*

Prerequisite: BIOL 221 OR BIOL 261

**BIOL 223**

INTRODUCTION TO MICROBIOLOGY

3 Hrs

The study of the biology of microorganisms and their significance to human health with emphasis on microbial structure and function, pathogenicity, control, and chemotherapeutic agents. (Lecture 2 hours, Lab 3 hours)

*Fall, Spring*

Prerequisite: BIOL 221 and BIOL 222 or BIOL 261 and BIOL 262 or BIOL 122

### **BIOL 226**

#### **MICROBIOLOGY**

4 Hrs

Morphology, physiology, ecology, epidemiology, and genetics of microorganisms. Nutritional and cultural requirements. Relationships of microorganisms to infectious disease and introduction to immunology. Laboratory emphasis on culturing, methods of transfer, isolation, identification, and staining techniques. (Lecture 3 hours, Lab 3 hours)

*Spring, odd years*

Prerequisite: BIOL ~~180~~ 190 or CHEM 141

### **BIOL 227**

#### **MARINE BIOLOGY**

3 Hrs

This course explores basic principles of oceanic and estuarine life. Topics include biological and physical factors that influence the survival and ecology of marine organisms. Special emphasis is given to groups of organisms unique to the marine environment, such as whales, corals, penguins, plankton, and multicellular algae. (Lecture 2 hours, Lab 3 hours and one day-long weekend fieldtrip)

*As needed*

Prerequisite: BIOL 121 or BIOL 190 or BIOL 191

### **BIOL 240**

#### **SECTIONAL ANATOMY**

3 Hrs

The study of human anatomy from the perspective of transverse, sagittal and coronal views. Particular emphasis is given to organ and vessel relationships important in understanding anatomy applicable to radiologic science and imaging modalities. (Lecture 2 hours, Lab 2 hours)

*Fall*

Prerequisites: BIOL 221 and BIOL 222 or BIOL 261 and BIOL 262

### **BIOL 261**

#### **ADVANCED ANATOMY AND PHYSIOLOGY I**

4 Hrs

Detailed study of the cell, cellular metabolism, tissues and organs of the human. The structure and physiology of the integumentary, skeletal, muscular, and nervous systems will be examined in depth. Mammalian dissection in the laboratory. (Lecture 3 hours, Lab 3 hours)

*Fall, Spring*

**BIOL 262**

ADVANCED ANATOMY AND PHYSIOLOGY II 4 Hrs

The structure and physiology of the respiratory, cardiovascular, digestive, excretory, endocrine, and reproductive systems will be examined in depth. Mammalian dissection in the laboratory. (Lecture 3 hours, Lab 3 hours)

*Fall, Spring*

Prerequisite: BIOL 221 or BIOL 261

**BIOL 270**

PATHOPHYSIOLOGY 3 Hrs

The physiologic pathology of selected diseases and dysfunction. Focus on a working knowledge of current concepts and common conditions seen in healthcare practice.

*Fall, Spring*

Prerequisites: BIOL 221 and BIOL 222 or BIOL 261 and BIOL 262

**BIOL 290**

COMPARATIVE ANATOMY 4 Hrs

Comparative study of the structure of the vertebrate body emphasizing the functional morphology of the anatomical systems and the major adaptive changes encountered in vertebrate evolution. Laboratory work will emphasize dissection of representative vertebrates as well as appropriate physiological experiences. (Lecture 3 hours, Lab 3 hours)

*Spring, odd*

Prerequisites: BIOL 190 and BIOL 191

**BIOL 295**

GENETICS 4 Hrs

Introduction to the concepts and principles. Transmission (classical) genetics, molecular genetics and population genetics with an emphasis on recent developments in these areas. Laboratory activities will involve a variety of organisms and stress data collection, interpretation and presentation. Writing intensive, technology applications. (Lecture 3 hours, Lab 3 hours)

*Fall*

Prerequisites: BIOL 190 and BIOL 191

**BIOL 344**

DEVELOPMENTAL BIOLOGY 3 Hrs

Examination of the development of animals from the single celled egg to the multicellular adult. The organisms to be studied will include the nematode,

*Caenorhabditis*, the insect, *Drosophila*, and vertebrates including the frog, chicken and mouse. Genetic, cellular and molecular mechanisms and processes will be emphasized. (Lecture 2 hours, Lab 3 hours)

*As needed*

Prerequisite: BIOL 295

**BIOL 349**

VERTEBRATE PHYSIOLOGY

4 Hrs

A study of the mechanisms underlying vertebrate function. Emphasis on homeostasis of the organism. Technology applications. (Lecture 3 hours, Lab 3 hours)

*Spring, even*

Prerequisites: BIOL 190 and BIOL 191

**BIOL 350**

CELL BIOLOGY

3 Hrs

This course covers various topics in cell biology including: membrane transport, cell-cell communication, intracellular trafficking of biological molecules, the cell cycle, intracellular signaling cascades and their receptors, the cytoskeleton, extracellular matrix, cell motility and cancer.

*Spring*

Prerequisites: BIOL 290 and BIOL 291

**BIOL 355**

SOUTHWESTERN FIELD STUDIES

3 Hrs

Using the Grand Canyon and/or the Sonoran Desert as field locations, this course immerses students in the geology, ecology and anthropology of the desert southwest. Requires strenuous hiking and backpacking. Taught in Arizona and other southwestern states. Additional fees are assessed to cover food, travel and lodging expenses. Contact the Department of Biology office for details. Writing intensive.

*Summer, even*

**BIOL 356**

SOUTHERN APPALACHIAN FIELD STUDIES

3 Hrs

Alternates with BIOL 355 and studies the geology, ecology and flora of the Southern Appalachian Mountains. Requires strenuous hiking and backpacking. The course is taught in the Great Smokey Mountains and surrounding national forests of North Carolina. Additional fees are assessed to cover food, travel and lodging expenses. Contact the Department of Biology office for details.

Writing intensive.

*Summer, odd*

**BIOL 360****BAHAMIAN FIELD STUDIES** 3 Hrs

A survey course based in the Bahamas. Students participate in a one-week laboratory experience (42 hours) at a field station on Andros Island examining geology, biology, ecology, and marine science. There are several required pre- and post-session meetings with lectures, as well as lectures during the experience. A research paper and oral presentation are required. The Andros trip is taken during the winter break. Writing intensive.

*Fall, Spring*

**BIOL 361****BAHAMIAN FIELD RESEARCH** 3 Hrs

Student prepares an extensive research proposal to carry out a research project on Andros Island in the Bahamas. Involves a minimum of a one-week period devoted to data collecting in the field. Completion of the project involves preparation of a research report on the field experience including the data collected. Writing intensive.

*Fall, Spring*

Prerequisite: BIOL 360

**BIOL 366****EXPERIMENTAL DESIGN AND RESEARCH METHODS** 3 Hrs

This course introduces the experimental and statistical methodology used in scientific research. Student problem-solving skills are developed. Collection and analysis of data, record keeping, testing of hypotheses, literature searching, elements of experimental design, reading and writing of journal articles, and the use of technology is emphasized.

*As needed*

**BIOL 367****BIOTECHNOLOGY LABORATORY** 1 Hr

This course introduces the molecular and biochemical techniques used in a modern biotechnology laboratory. Chromatography, PCR, blotting, spectrophotometry, ELISA, and centrifugation. Technology Applications.

*Spring*

Corequisite: BIOL 440 or CHEM 333

**BIOL 401****SENIOR CAPSTONE IN BIOLOGY** 3 Hrs

The capstone experience for the biology major consists of a research project or internship approved by the Biology Department that meets USF general

education learning outcomes required of a capstone course. Writing intensive.  
*Fall or Spring, Senior Year*

**BIOL 421**

ECOLOGY 4 Hrs

Characteristics of the population, community and ecosystem; organisms in the environment. Off-campus field trips in September and October on some weekends. Students prepare a research proposal based on extensive literature research. (Lecture 3 hours, Lab 3 hours)

*Fall*

Prerequisites: BIOL 190 and BIOL 191

**BIOL 438**

EVOLUTION 3 Hrs

The history and philosophy of science and evolutionary thought. Microevolution, speciation, macroevolution, geological record, trends, rates, extinction, and biogeography. An exploration of human evolution. (Lecture 2 hours, Lab 3 hours)

*As needed*

Prerequisite: BIOL 295

**BIOL 439**

INTRODUCTION TO ORNITHOLOGY 3 Hrs

Birds: their anatomy, physiology, behavior, ecology, phylogeny, and field identification. (Lecture 2 hours, Lab 2 hours)

*As needed*

Prerequisite: BIOL 190

**BIOL 440**

MOLECULAR BIOLOGY 3 Hrs

In-depth examination of fundamental cellular processes, such as DNA replication, transcription, splicing, translation, and post-translational processing.

*As needed*

Prerequisites: BIOL 295 and CHEM 142

**BIOL 448**

TAXONOMY OF FLOWERING PLANTS 3 Hrs

Vascular plant families: their phylogeny, identification, classification, and preservation. (Lecture 2 hours, Lab 2 hours)

*Summer*

Prerequisite: BIOL 191

**BIOL 465****ADVANCED PHYSIOLOGY/PATHOPHYSIOLOGY** 3 Hrs

Begins with an in-depth study of cell structure and function as a foundation to understanding physiologic as well as pathophysiologic processes. A systems perspective is used to examine normal human physiology followed by the pathophysiology of common diseases, including the incidence, etiology, manifestation, and prognosis. The physiologic basis for selected complementary/alternative therapeutic interventions is addressed. Emphasis placed on students' ability to analyze and articulate the changes in normal physiologic function that occurs with disease as a basis for advanced practice assessment and intervention in primary healthcare settings. Application is stressed through use of critical thinking and case studies.

*Spring*

Prerequisite: BIOL 221 and BIOL 222 or BIOL 261 and BIOL 262

Recommended: Anatomy and Physiology taken within the last 5 years

**BIOL 471****IMMUNOLOGY** 3 Hrs

Antibody-antigen reactions, antibody structure and formation, complement, natural resistance and acquired immunity, antibody-mediated and cell mediated hypersensitivity and immunity and antigens on cell surfaces. Relationships to human health and disease.

*Spring*

Prerequisites: BIOL 295

**BIOL 474****VIROLOGY** 3 Hrs

An introduction to the structure and function of the major classes of viruses. Emphasis is placed on the molecular mechanisms controlling viral replication cycles, immune response to infection, epidemiology and newly emerging diseases.

*As needed*

Prerequisite: BIOL 295

**BIOL 480****BIOLOGY SEMINAR** 0 Hrs

Readings, discussion and presentations on current scientific topics and student research. All biology majors are required to take the seminar each semester.

*Fall, Spring*

**BIOL 481**

**BIOLOGY SEMINAR**

1 Hr

Readings, discussion and presentations on current scientific topics and student research. All biology majors are required to take the seminar each semester. Students take BIOL 480 for seven semesters and BIOL 481 one semester for one hour.

*Fall and Spring*

**BIOL 496-499**

**SPECIAL PROBLEMS IN BIOLOGY**

1-3 Hrs

Research project planned and conducted by the student and supervised by a biology faculty member; an in-depth investigation of a topic or problem.

Written proposal and final report. Writing intensive

*Fall, Spring*

Prerequisite: BIOL 190 and BIOL 191 and permission form signed by faculty supervisor

Recommended: BIOL 366