

# BIOL - BIOLOGY

## BIOL600 Ethics in Scientific Research (2 Credits)

Issues of scientific integrity with emphasis on investigators in the laboratory sciences, including mentoring, scientific record keeping, authorship and peer review, ownership of data, use of animals and humans in research, and conflict of interest.

**Restriction:** Must have completed at least one year of graduate study.

**Credit Only Granted for:** BIOL600 or ZOOL600.

**Formerly:** ZOOL600.

## BIOL608 Biology Seminar (1-2 Credits)

**Repeatable to:** 8 credits if content differs.

**Formerly:** ZOOL608.

## BIOL609 Special Problems in Biology (1-6 Credits)

One seminar per week for each subject selected: A-Cell Biology; B-Developmental Biology; C-Estuarine and Marine Biology; D-Genetics; E-Parasitology; F-Physiology; G-Systematics and Evolutionary Biology; I-Behavior; J-General; K-Endocrinology; L-Ecology.

**Repeatable to:** 6 credits if content differs.

**Formerly:** ZOOL609.

## BIOL613 Recombinant DNA (3 Credits)

An advanced course presenting the tools and procedures of genetic engineering. Theory and practical applications of recombinant DNA techniques to understanding eukaryotic gene structure and expression.

**Prerequisite:** BSCI330 or BSCI230; and BSCI222. Or permission of instructor required.

**Credit Only Granted for:** BIOL613 or ZOOL652.

**Formerly:** ZOOL652.

## BIOL615 Developmental Genetics (3 Credits)

Differential gene function and its regulation in developing systems. Genes and the analysis of developmental processes.

**Prerequisite:** Must have completed courses in molecular genetics and developmental or cell biology; or permission of instructor.

**Credit Only Granted for:** BIOL615 or ZOOL642.

**Formerly:** ZOOL642.

## BIOL620 Cell Biology (3 Credits)

Offered with laboratory as BSCI 421. Molecular basis of cell structure and function in eukaryotes.

## BIOL622 Membrane Transport Phenomena (3 Credits)

The fundamental phenomena related to solute movement in bulk solution and across interfaces. Examination of natural and artificial membrane transport systems, with emphasis placed on their mechanism of action.

**Prerequisite:** (MATH120; or must have completed MATH220); and (BSCI330 or BSCI230). Or permission of instructor.

**Credit Only Granted for:** BIOL622 or ZOOL622.

**Formerly:** ZOOL622.

## BIOL625 Biological Ultrastructure (3 Credits)

The ultrastructure of cells and tissues, with emphasis on interpretation and correlation of ultrastructure and function.

**Prerequisite:** Must have completed a course in Cell Biology or Histology; or permission of instructor.

**Credit Only Granted for:** BIOL625 or ZOOL615.

**Formerly:** ZOOL615.

## BIOL641 Comparative Physiology (4 Credits)

Cellular and biochemical processes used by animals to interact with both the external and cellular environment. Water balance, intermediary metabolism, nitrogen metabolism, anaerobic metabolism, thermal regulation, nerve and muscle physiology in cells from a broad variety of animal species are considered.

**Prerequisite:** One year of biology, one year of organic chemistry, and one semester of physiology.

**Credit Only Granted for:** BIOL641 or ZOOL621.

**Formerly:** ZOOL621.

## BIOL646 Hearing (3 Credits)

Principles of hearing, covering the auditory periphery, the physiology and anatomy of the central auditory system and psychoacoustics.

**Prerequisite:** BSCI330 or BSCI230; or permission of instructor.

## BIOL660 Theoretical Population and Community Ecology (3 Credits)

Application of simple dynamic systems and optimization models to understand the dynamics of populations and ecological communities; population growth, predator-prey interactions, competition, food webs, foraging theory, and evolution of life histories. Instruction and use of the program Mathematica.

**Prerequisite:** Must have completed one year of college calculus. And BSCI462; or students who have taken courses with comparable content may contact the department.

**Credit Only Granted for:** BIOL660 or ZOOL675.

**Formerly:** ZOOL675.

## BIOL667 Mathematical Biology (4 Credits)

Mathematical methods of analyzing deterministic and stochastic biological processes from a variety of areas (including population and evolutionary biology, neurobiology, physiology, and morphogenesis). Qualitative aspects of dynamical systems which are usually given as difference or differential equations. The computer program Mathematica will be used to obtain the numerical solutions of these equations.

**Credit Only Granted for:** BIOL667 or ZOOL625.

**Formerly:** ZOOL625.

## BIOL671 Molecular Evolution (3 Credits)

Basic foundations through advanced concepts in molecular evolution, including patterns and processes of DNA sequence variation, transposable element dynamics, gene duplication and loss, and genome organization. Relevant concepts from genetics, biochemistry, and phylogenetics also will be covered.

**Credit Only Granted for:** BIOL671 or ZOOL645.

**Formerly:** ZOOL645.

## BIOL704 Cell Biology from a Biophysical Perspective (3 Credits)

An approach to cell biology by focusing on mechanisms and unifying paradigms. It will not assume a great deal of factual biological knowledge, but will expect a background that prepares students to think quantitatively and mechanistically.

**Recommended:** BSCI330, PHYS121, and PHYS122. Cross-listed with: BIPH704. Jointly offered with: BSCI404.

**Credit Only Granted for:** BSCI404, BIOL704, BIOL708O, or BIPH704.

**Formerly:** BIOL708O.

**BIOL705 Statistics & Modeling for Biologists (3 Credits)**

An overview of essential probability and statistics using R with a focus on biological problems. Topics include: parameter estimation (likelihood, Bayesian), confidence intervals and hypothesis testing, multiple testing, experimental design and power analysis, and resampling-based measures of uncertainty. Practical use of computers will be emphasized.

**Restriction:** Must be in the Biological Sciences Graduate program; or permission of Biology Department.

**Credit Only Granted for:** BIOL705 or BIOL709F.

**Formerly:** BIOL709F.

**BIOL708 Advanced Topics in Biology (1-4 Credits)**

Lectures, experimental courses and other special instructions in various zoological subjects.

**Repeatable to:** 8 credits if content differs.

**Credit Only Granted for:** BIOL708 or ZOOL708.

**Formerly:** ZOOL708.

**BIOL709 Selected Advanced Topics in Biology (1-4 Credits)**

Lectures, experimental courses and other special instructions in various biological subjects.

**Repeatable to:** 16 credits.

**BIOL710 Plant Ecological Genetics (3 Credits)**

Plant ecological genetics is focused on the processes responsible for evolution in plant populations. Covers the basic principle of population genetics, then quickly shifts towards understanding how allele frequencies can change in an ecological context. Emphasis is placed on the role of drift and selection in evolution, and particular attention is placed on plant mating system evolution.

**Prerequisite:** BSCI472 and BSCI222; or permission of instructor.

**Credit Only Granted for:** BIOL710 or PBI0745.

**Formerly:** PBI0745.

**BIOL721 Mathematical Population Biology (3 Credits)**

Foundational principles for modeling and analysis of real-life phenomena in population biology. Topics include design and analysis of models for general classes of unstructured (single species discrete-time and continuous-time, interacting populations etc.) and structured (spatially-structured, age-structured, sex-structured) population biology models in ecology and epidemiology, dynamics analysis of population biology models (asymptotic stability and bifurcation theory), numerical discretization of continuous-time models, statistical analysis (parameter estimation, uncertainty quantification).

**Prerequisite:** Calculus, differential equations, modeling, linear algebra, familiarity with mathematical software and programming languages (e.g., MATLAB, R, Python etc.); or permission of instructor. Cross-listed with: AMSC721.

**Credit Only Granted for:** AMSC721 or BIOL721.

**Additional Information:** Open to advanced undergraduates by permission of instructor.

**BIOL762 Physiological Plant Ecology (2 Credits)**

Environmental effects on plant ecophysiology. Microclimatology, leaf energy balance, plant responses to temperature and radiation, physiological adaptations, water relations and plant gas exchange.

**Prerequisite:** BSCI460; or students who have taken courses with comparable content may contact the department.

**Credit Only Granted for:** BIOL762 or PBI0755.

**Formerly:** PBI0755.

**BIOL765 Sociobiology (4 Credits)**

Deals with the description and analysis of animal social organizations the adaptive nature of animal societies, the effects of early experience, and the role of communication in the integration of animal groups.

**Prerequisite:** Must have completed a course in behavior.

**Restriction:** Permission of instructor.

**Credit Only Granted for:** BIOL765 or ZOOL665.

**Formerly:** ZOOL665.

**BIOL767 Behavioral Endocrinology (3 Credits)**

The interactive effects of hormones and behavior. Emphasis on the reproductive and stress hormones as they affect the brain and behavior.

**Prerequisite:** BSCI342 or BSCI447.

**Credit Only Granted for:** BIOL767 or ZOOL627.

**Formerly:** ZOOL627.

**BIOL799 Master's Thesis Research (1-6 Credits)**

**Formerly:** ZOOL799.

**BIOL898 Pre-Candidacy Research (1-8 Credits)****BIOL899 Doctoral Dissertation Research (1-8 Credits)**

**Formerly:** ZOOL899.