

# Biological Sciences

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**Chair:** Dr. Paul Wolf, Professor (<https://www.uah.edu/science/departments/biology/faculty-staff/paul-wolf/>)

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The Biological Sciences department offers the following graduate degree program:

Master of Science - Biological Sciences (<http://catalog.uah.edu/grad/colleges-departments/science/biological-sciences/biological-sciences-ms/>)

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## Admission Requirements

In addition to fulfilling admission requirements set by the Graduate School, applicants must also:

1. Have taken the general GRE exam and TOEFL when applicable
2. Have a Biology degree or related course work
3. Have at least one of either an advanced (upper division): biochemistry, cell biology, ecology, evolution, genetics, molecular biology or physiology course
4. Have a minimum cumulative GPA of 3.0 as well as in the major area of concentration

Applicants demonstrating potential for graduate study in the biological sciences, but having some deficiencies in their previous academic work, may be admitted on a conditional basis. See the Biological Sciences (<http://www.uah.edu/science/departments/biology/>) web page for application information.

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## Program Objective

Faculty members of the Master of Science (M.S.) Graduate Program in the Department of Biological Sciences seek outstanding students to train, mentor, and assist in reaching their full potential as scientists and future leaders in science and society. Graduates have enjoyed exciting and fulfilling careers in academia and industry, including both government and the private sector. The M.S. Graduate Program in Biological Sciences offers three plans of study with emphases in cell biology, genetics, genomics, molecular biology, microbiology, physiology, ecology, and evolutionary biology. Graduate research and coursework are tailored to each individual student. Formal coursework involves traditional lectures, laboratories, discussions, seminars, and field studies. Graduate students also have access to several additional courses in other departments and at Alabama A & M University to further develop skill sets that complement their research and career interests.

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## Learning Outcomes

Students will demonstrate their ability to:

- Utilize the scientific method to resolve biological problems
- Write a scholarly document
- Prepare and deliver an effective oral scientific presentation

## Master's Program in Biological Sciences

- Biological Sciences, MS (<http://catalog.uah.edu/grad/colleges-departments/science/biological-sciences/biological-sciences-ms/>)

BYS 505 - PSYCHOPHARMACOLOGY

Semester Hours: 3

Introduction to drug classification and action with emphasis on physiological and psychological interactions. Same as PY 505.

BYS 519 - GENE STRUCTURE & FUNCTION

Semester Hours: 3

Advanced studies of macromolecular structure and biological function of proteins and nucleic acids involved in the passage of genetic information and cellular response. Structural significance of viruses and molecular evolution included.

**BYS 523 - PRINCIPLES OF VIROLOGY/A&M**

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Principles of viral infectivity, multiplication, and chemical constitution; laboratory techniques for their isolation, cultivation, identification, and enumeration.

**BYS 524 - MYCOLOGY/A&M**

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Lines of phycocomycetes using representative species; various series of actinomycetes; representative pathogenic (crop and vegetative pathogens) and nonpathogenic heterobasidiomycetideae organisms; order and families of homobasidiomycetidae. Ontogenetics, cellular, and structural study applied to all divisions, classes, series, orders, and families.

**BYS 526 - MICROBIAL ECOLOGY**

Semester Hours: 4

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Relationship of soil and aquatic microorganisms and their importance in ammonification, nitrification, and other biological processes.

**BYS 529 - BIOSTATISTICS/AL A&M**

Semester Hours: 4

**BYS 530 - APP. OF GEOSTATISTICS/AL A&M**

Semester Hours: 4

**BYS 531 - BIOLOGICAL DATA SKILLS**

Semester Hours: 3

This course covers a range of computational skills needed specifically for biologists who do not have any training in computer science. The course focuses on command line tools, basic programming in Python, and various aspects of data handling including, data curation, organization, storage, querying, and archiving. The course will include a project that ties together skills that are useful for individual students.

**BYS 532 - MEDICAL PHYSIOLOGY**

Semester Hours: 4

Detailed study of physiology, covering membrane transport, muscle, nerve, heart, lung, gastrointestinal, and renal function. Emphasis will be on homeostasis, genetic disease and pharmacological therapy.

**BYS 532L - LABORATORY**

Semester Hours: 0

**BYS 534 - MEDICAL PHYSIOLOGY II**

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Continuation of mammalian physiology with consideration of kidney function, respiratory, digestive, reproductive, and endocrine systems.

**BYS 535 - ADVANCED MICROBIOLOGY**

Semester Hours: 3

Aspects of microbial behavior, development, morphogenesis or physiology.

**BYS 537 - PSYCHOBIOLOGY STRESS & ILLNESS**

Semester Hours: 3

Overview of physiological stress responses and their influence on health, behavior, and illness. Same as PY 536.

**BYS 542 - NUTRITIONAL PHYSIOLOGY**

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Advanced laboratory dealing with modern techniques of molecular biology and biochemistry.

**BYS 543 - MOLECULAR BIOLOGY OF THE CELL**

Semester Hours: 3

Advanced study of cell structure and function of macromolecules (lipids, proteins, carbohydrates and nucleotides). In depth literature readings on subcellular organelles, metabolic pathways, cell cycle, cancer, and cell differentiation.

**BYS 547 - BIOCHEMISTRY I**

Semester Hours: 3

Structural chemistry and function of biomolecules, mechanisms of biochemical reactions, and enzyme kinetics. Same as: CH 561.

**BYS 548 - BIOCHEMISTRY II**

Semester Hours: 3

Energy transduction, metabolism, biosynthesis of macromolecular precursors, storage, transmission, and expression of genetic information. Same as CH 562. Prerequisites: BYS 547 or CH 561.

**BYS 556 - ADV MOLECULAR TECHNIQUES**

Semester Hours: 3

Laboratory techniques in molecular biology including current methodology in genomics, proteomics, and RNA analysis. Prerequisite: BYS 519 with concurrency.

**BYS 560 - ENVIRONMENTAL BIOLOGY/A&M**

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Principles of interaction between living systems and their resources. Current problems in management of natural resources including new approaches in management of pest populations.

**BYS 561 - HERPETOLOGY**

Semester Hours: 4

Classification, diversity, anatomy function, ecology, behavior, and evolution of amphibians and reptiles. Laboratory and field trips devoted to anatomy and identification, with an emphasis on Alabama and southeastern U.S. species.

**BYS 562 - COMMUNITY ECOLOGY**

Semester Hours: 4

Detailed consideration of ecological principles and concepts, as well as biotic and abiotic factors relevant to development of communities and ecosystems. Field trips required.

**BYS 563 - POPULATION ECOLOGY**

Semester Hours: 4

Distribution, population dynamics, and behavior of populations in relation to environmental factors. Field trips required.

**BYS 564 - LIMNOLOGY**

Semester Hours: 3

Fresh-water environments and organisms exemplified by lakes, ponds, and streams in North Alabama.

**BYS 601 - BIOINFORMATICS I**

Semester Hours: 3

Practical use in bioinformatics and X-ray crystallography.

**BYS 602 - BIOINFORMATICS II**

Semester Hours: 3

Practical use in bioinformatics and applied genomics.

**BYS 619 - MICROBIAL GENETICS**

Semester Hours: 3

Transmission, expression, and evolution of genes in microorganisms. Studies of chromosomes, plasmids, transposons, bacteriophages, and other genetic elements.

**BYS 630 - IMMUNOLOGY**

Semester Hours: 4

Innate, humoral, and cell-mediated immunity. Immune deficiencies and hypersensitivities. Autoimmunity, transplantation, and tumor immunology.

**BYS 631 - MEDICAL PHARMACOLOGY/A&M**

Semester Hours: 3

Course offered jointly by Alabama A&M University and UAH but which is taught on the A&M campus. Drug-receptor interaction, kinetics of drug absorption, distribution and elimination, and discussion of drugs affecting different systems. Pharmacogenetics, toxicity, mutagenesis, teratogenesis, carcinogenesis, and drug interactions. Mechanism of action of drugs, in relation to their use as therapeutic agents in medicine.

BYS 690 - SEMINAR

Semester Hour: 1

Student reports on current journal articles, research, or assigned readings. Graduate students should attend whether enrolled for credit or not. May be taken up to three times for credit.

BYS 691 - SPECIAL TOPICS

Semester Hours: 1-4

Directed readings and/or written reports on topics of individual student interest carried out under the supervision of an instructor. Prerequisite: permission of instructor required before registration.

BYS 692 - RESEARCH

Semester Hours: 2-4

Individual investigations of biological problems under supervision of a graduate faculty member. Permission of instructor required before registration.

BYS 699 - MASTER'S THESIS

Semester Hours: 1-6

Required each semester student is working on and receiving direction on master's thesis. Minimum of six hours required for M.S. thesis students.