

Biological Sciences

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Chair: Debra M. Moriarity, Professor

The Biological Sciences department offers the following graduate degree program:

- Master of Science
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Admission Requirements

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

1. Take the general GRE exam and TOEFL when applicable
2. Have a Biology degree or related course work
3. Show competence in an area of life science related to the proposed area of study
4. Complete one year of undergraduate chemistry, including at least one semester each of organic chemistry and biochemistry
5. Complete at least one advanced (upper division) class in any of the following: biochemistry, cell biology, ecology, evolution, genetics, molecular biology, or physiology course
6. Have a minimum cumulative GPA of 3.0 as well as in the major area of concentration
7. A course in statistics is also recommended

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>) webpage for application information.

Program Objective

The UAH Department of Biological Sciences aspires to provide one of the best programs in the Southeast through undergraduate and graduate education and research. Our objective is to educate and train students for the critical analysis, problem solving, and independent thinking skills required in scientific research. Through our M.S programs and the interdisciplinary Biotechnology Ph.D. degree, we aspire thorough training and mentoring, to cultivate future scientists who are trained to serve national needs in education, government, and industry.

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

Program Requirements

A minimum of 25 percent of biological sciences course requirements must be met at the cooperating institution. A minimum of 50 percent of the graduate program must be taken at the 600-level. The graduate program of study cannot include more than 6 semester hours each of BYS 691 (<http://catalog.uah.edu/search/?P=BYS%20691>) or BYS 692 (<http://catalog.uah.edu/search/?P=BYS%20692>). Three semester hours of graduate seminar can be counted toward fulfillment of the graduate program. Titled BYS 691 (<http://catalog.uah.edu/search/?P=BYS%20691>) courses offered on an *ad hoc* basis and instructed as part of the didactic curriculum are exempt from the 6 semester hour maximum.

Students may elect one of the following three plans for the Master's degree:

Plan I – Master of Science with Thesis

Students will complete coursework (minimum of 24 semester hours) and perform original research that will be described in their thesis (minimum of 6 semester hours of *BYS 699* (<http://catalog.uah.edu/search/?P=BYS%20699>)), for a total of 30 semester hours. Students will complete a comprehensive written examination, and final oral examination (seminar presentation of thesis work and master's committee examination of thesis work).

Plan II – Master of Science without Thesis

Students will complete an approved program of study (minimum of 33 semester hours), complete a written comprehensive final examination, and write and present a master's report for the supervisory committee. The report is usually in the form of a literature review, survey, and/or experimentation about some pertinent topic.

Plan III – Master of Science with Education

Alternative Class A

Students with an accredited baccalaureate degree other than teacher education, seeking initial certification (those that do not have a Class B – baccalaureate level teaching certification) will complete coursework in the Department of Education (21 semester hours, including an internship) and the Department of Biological Sciences (24 semester hours) as well as complete a written comprehensive final examination and write a master's report. The master's report is usually in the form of a literature review, survey, and/or experimentation about some pertinent topic.

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 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 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. Prerequisites: 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 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 600 - NEUROSCIENCE

Semester Hours: 3

An advanced survey of the field of neuroscience, from basic neuroanatomy and physiology, to current topics, such as neurodegenerative disease, learning and memory, consciousness, cognitive theory and neurocomputing.

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 hyper sensitivities. Autoimmunity, transplantation and tumor immunology.

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.