

# M.S.I.S. - Biology

## 36-Hour Thesis/Non-thesis Program

The M.S.I.S. degree requires a total of 36 semester hours of graduate credit. An area of concentration must have at least 12 and no more than 18 semester hours in the subject area. At least six hours in the area of concentration must be in upper level (6000) graduate work. In addition, 18-24 hours must be taken in two or more supporting fields outside the area of concentration. For course descriptions and other information related to graduate studies visit our website at <http://utb.edu/vpaa/graduate>.

## Admission Requirements

Evidence of academic achievement and potential for advanced study and research is required for graduate admission. Specific criteria for Unconditional Admission for Master's degree seeking students in Biology are:

- Undergraduate GPA of 3.0
- GRE Verbal score of 500
- GRE Quantitative score of 500
- Two letters of reference from faculty members or supervisors attesting to the applicant's potential to successfully complete graduate work
- A personal statement from the applicant explaining why he/she wishes to pursue graduate study in biology including professional and personal goals, this letter should include the area of interest, and a short list of preferred faculty research supervisors
- Undergraduate studies in biology including completion of a set of core biology and support courses essentially the same as those required by UTB/TSC for the Bachelor Science in Biology. Promising applicants must be accepted if lacking some of this preparation but will be required to complete it thin the first academic year following acceptance in order to continue in the MS program.

Applicants with an undergraduate GPA of at least 2.5 and/or GRE scores lower than those specified are also encouraged to apply.

Notification of decisions on graduate admission is made by the office of Graduate Studies based on the admission criteria and recommendation of the academic department. Information related to application procedures and deadlines is available through the Office of Graduate Studies.

## Careers:



- Biological sciences teacher
- EPA, FDA or Department of Health research staff
- Parks and Wildlife Services research
- Medical School

## Required Courses: 36 hours

Area of Concentration .....	Credit Hours
Biology.....	12-18
(Must include BIOL 6101 and for non-thesis students BIOL 6365; BIOL 6101 must be taken for a total of three credits)	
Two or more supporting fields-which must include ISCI 7300 and ISCI 7301 for thesis students.....	18-24
Total graduate hours for degree.....	36

Each student in the M.S.I.S. degree program will be assigned by the department chairperson, a Faculty Advisor and two additional faculty committee members who teach in Interdisciplinary Studies. The choice of courses in the concentration area and the selection of supporting fields will be determined through consultation between the student, the Faculty Advisor and the committee members. A formal Program of Study as described elsewhere in this catalog will be prepared and submitted for approval. Each candidate for the M.S.I.S. must pass a comprehensive examination over the area of concentration and supporting fields.

## Thesis

As part of their graduate program, students may choose the option of writing a thesis, for which they will receive six hours of graduate credit. Those who take this option must select a thesis committee, composed of a committee chairperson and two other members of the graduate faculty, to approve the topic and to assist in the preparation of the thesis. (See thesis-non-thesis option under "Academic Information.") Students must pass an oral defense of the completed thesis. Students selecting this option will register for ISCI 7300 and 7301 after they have completed their coursework.

## Supporting Fields

Arts, Business Administration\*, Computer Science, Criminal Justice, Education\*, English, Environmental Sciences, Geology, Geography, Government, History, Interdisciplinary Science, Interpreting, Mathematics, Physics, Psychology, Sociology, and Spanish.

\*No more than 12 semester hours total may be taken from the professional schools.

"As a part time graduate student, I had the opportunity to take a variety of diverse biology courses ranging from Evolutionary Biology to Plant Genetics. I have also had a chance to fulfill curriculum requirements by taking courses outside of the Department of Biology such as Environmental Chemistry, Medical Sociology, and Cognitive Psychology. As a result, I have obtained a more comprehensive understanding of biological sciences. My experiences as a graduate student in the M.S.I.S. program allowed me the chance to explore career options as a biologist. Now, I look forward to entering a Ph.D. program."

- Christina Banuelos

## ADVISOR

DR. DAVID HICKS, ADVISOR · LHSB #1.808 · 882-5055 · DAVID.HICKS@UTB.EDU

## Course Descriptions

### BIOL 5127 Coastal Ecology Laboratory

This course is a series of laboratory and field investigations emphasizing identification, biology and ecology of local marine organisms. Lec. 3, Cr. 3

Prerequisite: Graduate standing or consent of the instructor and concurrent enrollment in BIOL 5327.

### BIOL 5170 Topics in Biology

Specialized content and/or field experiences not available in other courses. A maximum of 6 SCH will count toward a degree, subsequent enrollment will not count. Lec 0, Lab 3, Cr 1

### BIOL 5300 Graduate Biology for Educators

This course covers integrated biological principles from molecules through the biosphere, with a focus on specific contributions that knowledge of those principles has made to the physical, intellectual, and esthetic welfare of humanity. The course will include lectures, readings of scholarly and popular literature, discussion, and a scholarly and popular literature, discussion and a scholarly paper based on individual investigation of literature. Does not count toward a graduate degree in Biology. Prerequisite: Graduate Standing, eight semester credit hours in undergraduate BIOL, enrollment for a graduate degree outside of BIOL. Lec. 3, Cr. 3

### BIOL 5301 Evolution

This course involves the study of organic evolution with an emphasis on mechanisms, especially genetics and modern theories. This course will provide a common foundation of understanding of the fundamental principles that underpin and explain all of biology for all students. Prerequisite: Graduate standing. BIOL 3403 or equivalent, BIOL 3409 or equivalent. Lec. 3, Cr. 3

### BIOL 5315 Biological Basis of Emerging Diseases

Students will learn the principles that underlie epidemics and emergence of new disease ranging from SARS and HIV to obesity and diabetes with particular emphasis on health threats that affect the US/Mexico border. Factors ranging from human microbial genetics, molecular epidemiology, economics, culture, climate and major social disruptions, such as warfare and migration, will all be explored. Lec. 3, Cr. 3

### BIOL 5327 Coastal Ecology

This course examines the major nearshore habitats and communities of the western Gulf of Mexico including:

beaches, sand dunes, estuaries, salt marshes, mud flats, sea grass meadows, and rocky shores. Emphasis is placed on directed, field-oriented, individual research projects. Lec. 3, Cr. 3 Prerequisite: Graduate standing and one course in general ecology (BIOL 3309) or zoology (BIOL 3314 or BIOL 4302) or consent of the instructor.

### BIOL 5350 Bioenergetics

The use of quantitative analysis of energy resource partitioning to study the evolution of adaptational strategy at the biochemical, cellular, individual, population and ecosystem levels, including quantitative analysis of physiological processes and the life history adaptations in terms of energetic efficiency. Lec.3, Cr. 3

Prerequisite: Graduate standing and one course in general physiology (BIOL 3301 or equivalent) or consent of the instructor.

### BIOL 5370 Topics in Biology

Specialized lecture content topics not available in other courses. May be repeated for credit as content changes. Prerequisite: Graduate standing or consent of instructor. Lec 3, Lab 0, Cr. 3

### BIOL 5402 Marine Zoology

A study of the common marine animals, especially invertebrates in coastal water. Cannot be taken for credit by students with credit for BIOL 4402. Graduate students must complete an independent project. Prerequisite: Graduate standing. Lec. 3, Lab 3, Cr. 4

### BIOL 5404 Ichthyology

Classification, evolution, ecology, and biology of fishes. The lab emphasizes field surveys, taxonomy, and the identification of marine fishes. Graduate students are required to complete an independent project. Credit will not be given for both BIOL 4404 and BIOL 5404. Prerequisite: Graduate standing. Lec. 3, Lab 3, Cr. 4

### BIOL 5414 Plant Taxonomy

Principles of classification, identification of vascular plants with emphasis on native flowering plants. Credit will not be given for both BIOL 4414 and BIOL 5414. Prerequisite: Graduate standing. Lec. 3, Lab 3, Cr. 4

### BIOL 5422 Conservation Biology

Focus on the controlled use and systematic protection of natural resources such as forests, soils, and water systems. Conservation integrates concepts of geography, climatology, geology, geomorphology,

chemistry, and biology into one applied science. Prerequisite: Graduate standing. Lec. 3, Lab 3, Cr. 4

**BIOL 5425 Plant Physiology**

An analysis of cell biology, biochemistry, metabolism, ecophysiology and development of plants. Topics include water relations, respiration, photosynthesis, nitrogen fixation, mineral nutrition, plant hormones, plant molecular biology, genetic engineering and the role of environment signals in plant development. Prerequisite: Graduate standing. Lec. 3, Lab 3, Cr. 4

**BIOL 5430 Animal Behavior**

This course examines the biological basis of animal behavior from an evolutionary perspective. Topics include instincts and learning, behavioral genetics, development of behavior, neural and endocrine mechanisms, adaptive significance of behavior, and social behavior. Prerequisite: Graduate standing, four semester hours of upper-division biology. Lec. 3, Lab 3, Cr. 4

**BIOL 5444 Plant Genetics**

This course studies plant heredity and variation and the connectedness among the four levels at which life is studied: molecules, cells, individuals and populations. Topics include: selection leading to evolution and adaptation among plants, mating systems and population genetic structure, transgenic plant technology and DNA-based markers. Prerequisite: Graduate standing. Lec. 3, Lab 3, Cr. 4

**BIOL 5455 Biostatistics**

This course introduces methods for the collection and statistical analysis of biological data. Topics include descriptive statistics, probability, sampling, confidence intervals, hypothesis testing, analysis of variance, correlation, regression and non para-metric methods. Students will practice data analysis using statistical software and sample data from various fields such as ecology, systematics, and biomedical sciences. Prerequisite: Graduate standing, completion of four upper-level semester hours in biology and completion of college algebra (MATH 1314) or any mathematics course for which college algebra is a prerequisite. Lec. 3, Lab 3, Cr. 4

**BIOL 6101 Graduate Seminar I**

In this course students will learn to choose a topic for scientific investigation, formulate testable hypotheses, design controlled experiments, conduct scientific literature searches, interpret primary literature articles, make proper use of bibliographical citations, write technical papers, and prepare documents associated with a career

in the biological sciences. Prerequisites: Graduate Standing.

**BIOL 6102 Graduate Seminar II**

In this course, students will be required to employ the skills acquired in BIOL 6101 to prepare scientific documents including scientific proposals, review papers, curriculum vitae, cover letters and preparation of figures leading to the formulation of a thesis prospectus. Prerequisites: BIOL 6101. Lec 1, Cr 1.

**BIOL 6185 Graduate Research**

Faculty supervised research designed for students who are working on a research or the thesis project. A maximum of 6 SCH of Graduate Research will count towards the degree; subsequent enrollments will not count. Lab 2, Cr. 1

**BIOL 6285 Graduate Research**

Faculty supervised research designed for students who are working on a research or the thesis project. A maximum of 6 SCH of Graduate Research will count toward the degree; subsequent enrollments will not count. Lab 4, Cr. 2

**BIOL 6301 Molecular Techniques and Laboratory Instrumentation**

This course studies the theory and application of laboratory techniques, with an emphasis on molecular techniques. The course may be team taught by various members of the Graduate Faculty as expertise dictates. Prerequisite: Graduate Standing. Lec. 2, Lab 3, Cr. 3

**BIOL 6303 Evolutionary Ecology**

The role of genetics and evolution at the individual, population, and community levels. Prerequisite: Graduate standing, Lec 3, Lab 3, Cr 3

**BIOL 6312 Advanced Cellular and Molecular Biology**

An in-depth study of the physical and molecular activity at the cellular level. Topics to be emphasized include: nucleic acid structure and organization, gene expression and its regulation, protein structure and recombinant DNA techniques. Prerequisite: Graduate standing, BIOL 3412 or equivalent, CHEM 3303 or equivalent. Lec. 3, Cr. 3

**BIOL 6330 Molecular and Cellular Evolution**

This course involves the study of the appearance of life on earth and its subsequent evolution at

the molecular and cellular levels. Prerequisite: Graduate standing. Lec. 3, Cr. 3

BIOL 6365 Graduate Biological Research Problems  
Supervised research involving identification and definition of a problem, preparation of a proposal, collection and analysis of data, writing and submission for faculty approval of a report in standard scientific form.  
Prerequisite: Consent of instructor and advisor. Lec 0, Lab 8, Cr 3

BIOL 6385 Graduate Research  
Faculty supervised research designed for students who are working on a research or the thesis project. A maximum of 6 SCH of Graduate Research will count towards the degree; subsequent enrollments will not count.  
Prerequisites: Graduate Standing or consent of instructor. Lab 3, Cr 3.

BIOL 6400 Neuroscience  
This course studies the integrative functions of the animal nervous system from molecules to behavior. Prerequisite: Graduate standing. Lec. 3, Lab. 3, Cr. 4

BIOL 6404 Fish Ecology  
Interactions of fishes especially teleosts, with their physical and biotic environment. The lab emphasizes fieldwork and includes an individual student project. Prerequisite: Graduate standing. Lec 3, Lab 3, Cr. 4

BIOL 6405 Insect Ecology  
A course dealing with the general concepts of ecology as related to insects. Emphasis is on studying insects in nature and concepts of ecology that can be used to understand them. Evolution, interactions between plants and insects, and population dynamics are important parts of this course. The laboratory emphasizes fieldwork and individual investigations. Prerequisite: Graduate Standing, Lec. 3, Lab 3, Cr. 4

BIOL 6406 Field Botany  
A set of field investigative projects, which will focus on the quantitative analysis of local vegetation. Students will be required to collect, analyze and interpret data. Oral presentations and written reports will also be required.  
Prerequisite: Graduate standing. Lec. 3, Lab 3, Cr. 4

BIOL 6485 Graduate Research  
Faculty supervised research designed for students who are working on a research or the thesis project. A maximum of 6 SCH of Graduate Research will count toward the

degree; subsequent enrollments will not count. Lab 8, Cr 4

BIOL 6585 Graduate Research  
Faculty supervised research designed for students who are working on a research or the thesis project. A maximum of 6 SCH of Graduate Research will count toward the degree; subsequent enrollments will not count. Lab 10, Cr. 5

BIOL 6685 Graduate Research  
Faculty supervised research designed for students who are working on a research or the thesis project. A maximum of 6 SCH of Graduate Research will count toward the degree; subsequent enrollments will not count. Lab 12, Cr. 6

BIOL 7300 Thesis  
Supervised research. Will include design of an original research problem with a written proposal, collection and analysis of original data, and writing of a scientific report in acceptable publication format. Prerequisite: Instructor's permission. Cr. 3

BIOL 7301 Thesis  
Continuation of BIOL 7300 Prerequisite: Instructor's permission, Cr. 3