

M.S. - Biology

36-Hour Thesis/Non Thesis Program

Master of Science without Thesis: The Masters degree program for non-thesis students will require a total of 36 semester credit hours (SCH). Foundation Courses: Non-thesis graduate students may be required to take up to 30 SCH of undergraduate coursework in biology or support areas, not applied to the degree program, to make up deficiencies in undergraduate preparation. Courses required of all non-thesis MS students: Ten credit hours of core courses will be taken by all non-thesis MS students in the program. The following core courses are required:

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 within 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.



Master of Science Non-Thesis

BIOL 6101 Graduate Seminar I	1 SCH
BIOL 6102 Graduate Seminar II	1 SCH
BIOL 5455 Biostatistics	4 SCH
BIOL 6365 Graduate Biological Research Problems	3 SCH

Courses freely elected by non-thesis MS students: The following courses are considered as free electives for non-thesis students and will be chosen by the GAC with input from the graduate student (minimum of 27 SCH).

BIOL 5301 Evolution	3 SCH
BIOL 5370 Topics in Biology	3 SCH
BIOL 5402 Marine Zoology	4 SCH
BIOL 5414 Plant Taxonomy	4 SCH
BIOL 6301 Molecular Tech. Lab Instrumentation	3 SCH
BIOL 6303 Evolutionary Ecology	3 SCH
BIOL 6312 Advanced Cell & Molecular Biology	3 SCH
BIOL 6330 Molecular and Cellular Evolution	3 SCH
BIOL 6385 Graduate Research	3 SCH
BIOL 6390 Biology Internship	3 SCH
BIOL 6400 Neuroscience	3 SCH
BIOL 6405 Insect Ecology	4 SCH

Professional paper: Non-thesis students are required to write a professional paper based on work done in BIOL 6365 Graduate Biological Research Problems. The paper will be on a topic approved by the student's graduate committee and will demonstrate the student's ability in organization, data collecting and scientific writing.

Comprehensive Exam: Non-thesis students must take a comprehensive written examination covering the student's understanding of advanced biological concepts. The comprehensive exam will be administered by the student's GAC and its content will be contingent on prescribed coursework. The comprehensive exam will not be scheduled prior to the student's final semester of coursework.



ADVISORS

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Master of Science with Thesis

The thesis MS program track will require a total of 36 semester credit hours (SCH). Students may be required to take up to 30 credits of undergraduate coursework in biology or support areas, not applied to the degree program, to make up deficiencies in undergraduate preparation. Twelve credit hours of core courses will be taken by all students in the program. The remaining 24 hours will be considered electives and will be chosen by the GAC with input from the student. The following courses are required by all thesis students:

BIOL 6101 Graduate Seminar I	1 SCH
BIOL 6102 Graduate Seminar II	1 SCH
BIOL 5455 Biostatistics	4 SCH
BIOL 7300 Thesis	3 SCH
BIOL 7301 Thesis	3 SCH

Elective courses prescribed for all MS with Thesis students: There are no prescribed elective courses. Courses freely elected by MS with Thesis students: Students may choose to specialize in (1) cellular molecular biology including biotechnology; (2) organismal biology including zoology, marine biology or botany; (3) environmental biology including ecology, evolution, (4) Microbiology and Infectious Disease, (5) Neuroscience and Neurochemistry, or (6) Clinical Medicine including oncology and nutrition by appropriate course selection (below) as guided by the GAC (minimum of 24 SCH).

BIOL 5301 Evolution	3 SCH
BIOL 5370 Topics in Biology	3 SCH
BIOL 5402 Marine Zoology	4 SCH
BIOL 5414 Plant Taxonomy	4 SCH
BIOL 6301 Molecular Tech. Lab Instrumentation	3 SCH
BIOL 6303 Evolutionary Ecology	3 SCH
BIOL 6312 Advanced Cell & Molecular Biology	3 SCH
BIOL 6330 Molecular and Cellular Evolution	3 SCH
BIOL 6385 Graduate Research	3 SCH
BIOL 6390 Biology Internship	3 SCH
BIOL 6400 Neuroscience	3 SCH
BIOL 6405 Insect Ecology	4 SCH

Thesis

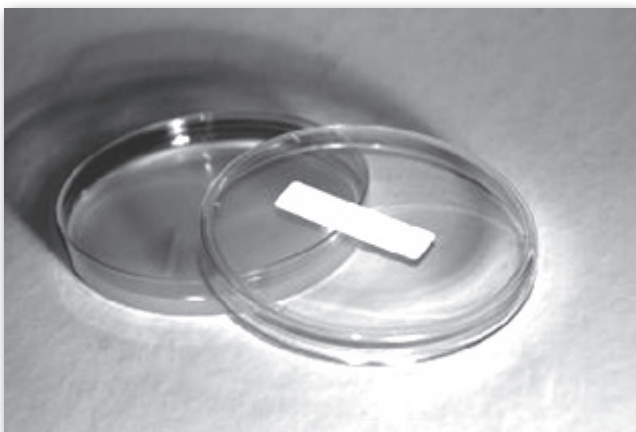
A research project as described under BIOL 7300 and 7301. The thesis topic and accompanying thesis research prospective must be approved in writing by the Faculty Advisor and GAC, Department Chair, and the Dean of Graduate Studies prior to the onset of thesis research projects. All research involving vertebrate subjects must also be approved by the Institutional Animal Care and Use Committee prior to commencing experiments. All research using human subjects must be approved by the Human Subjects Research Review Committee prior to collection of any data. Seminar Presentation: open to all students, faculty and the population at large. Oral Defense: An oral examination over the thesis research as well as broad aspects of biology administered by the three members of the Student's GAC.

“ 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. Now, I look forward to entering a Ph.D. program.”

- Christina Banuelos

Careers:

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



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 principals 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 mechanics, 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 toward the degree; subsequent enrollments will not count. Prerequisites: Graduate standing or consent of instructor. Lec. 0, Lab 2, Cr. 1.

BIOL 6285 Graduate Research

Faculty supervised research designed for students who are working on a reserach or the thesis project. A maximum of 6 SCH of Graduate Research will count toward the degree; subsequent enrolments will not count. Lec. 0, 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 toward 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