

Texas A&M International University



Master of Science in Biology

Graduate Handbook

Revised Spring 2008

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I. Introduction

Objectives of the Masters Program

The educational objectives of the MS degree in Biology are:

- To prepare students for a Doctoral Program in Biological Sciences.
- To prepare students for teaching biology in community colleges and institutions of higher education.
- To enrich students' background for teaching Biology in high and middle school.
- To prepare students for jobs related to biology in industry, education, or government.

The principal aim of graduate study is to develop in the student the power of independent work. Consequently, the character of work expected of graduate students is different from that of less-advanced students. A wide knowledge of the major subject and related subjects will be expected. To this end, the student will do assigned readings, attend lectures, and conferences, and make use of the library in equipping himself/herself to do effective study.

With the thesis or research paper and the oral and written examinations, students in the Master of Science in Biology program will demonstrate:

- The ability to do independent research (field, laboratory or library based).
- An understanding of the scientific method.
- Familiarity with the scientific literature relevant to their research.
- Advanced knowledge in specific scientific content areas as chosen by their paper topic and the elective courses they selected.

The specific objectives of the thesis and non-thesis track for MS degree in Biology are:

- The thesis track prepares students for a Doctoral Program in Biological Sciences.
- The non-thesis track prepares students for teaching biology in community colleges and institutions of higher education.
- Both tracks prepare students for careers in industry and governmental positions.

II. Admission

Admission Requirements for the Program

- Admission to a MS program requires a bachelor's degree from an accredited institution with a major in biology, biology with secondary certification, or related field in science. The student's entire record will be considered including the completed application for admission, overall undergraduate GPA, upper level

- GPA, GPA in the discipline, a Statement of Purpose, three sealed letters of reference attesting to the qualifications of the applicant.
- Satisfaction of all other requirements of the Texas A&M International University for graduate admission, including the Graduate Record Examination (GRE). GRE scores must be received by the Office of Graduate Studies before admission to the MS program.
 - Students must submit transcripts from all institutions attended, letters of reference and GRE scores to the Office of Graduate Studies for acceptance into the MS program.
 - Students will not be admitted to the graduate program of the university until all of the above entrance requirements are met. If an applicant does not meet these requirements, the Graduate Council may approve admission of the applicant on a conditional basis.

Stemwork

It is strongly recommended that a student seeking a Master in Biology should have Bachelors degree with a major in Biology or related field. However, if a student is seeking a Master in Biology degree without a Bachelors in Biology, then the following are the minimum requirements as preparation for the graduate coursework: CHEM 1411, CHEM 1412, CHEM 2423, BIOL 1406, BIOL 1411, BIOL 1413, BIOL 3406, BIOL 3410, BIOL 3412, and BIOL 3413.

The student's advisor and/or committee may require additional courses if thought necessary to prepare the student for a specific field in biology.

Financial Support

Office of Graduate Studies has more information on financial support.

SCHOLARSHIPS:

- Tuition up to \$1500 per year (\$500 each semester, including summer).

ASSISTANTSHIPS:

- An assistantship is a financial award to a graduate student for part-time work (15 or 19 hours per week) in teaching, or research while pursuing study towards an advanced degree. Graduate Assistant awards will be up to \$9,100 per year depending on your work assignment.

ELIGIBILITY REQUIREMENTS FOR SCHOLARSHIPS AND ASSISTANTSHIPS:

- Must be a fully admitted graduate student who is working towards a masters or doctoral degree.
- Must enroll in 6 graduate hours each semester (or summer) that you receive scholarship money.

- Must maintain a minimum overall GPA of 3.5.
- Application deadline is July 1 (earlier preferred).

GRE/GMAT REIMBURSEMENTS:

- Up to 200 GRE/GMAT reimbursements per semester will be offered to prospective TAMIU students.

TRAVEL REIMBURSEMENTS:

- Travel reimbursements available for Graduate Students attending conferences. Application available below.

ELIGIBILITY REQUIREMENTS FOR REIMBURSEMENTS:

- Must be a fully admitted graduate student who is working towards a master's or doctoral degree.
- Recipients will be required to pay for the initial GRE/GMAT cost. Once enrolled at TAMIU, the OGS (Office of Graduate Studies) will reimburse your GRE/GMAT expenses.

More information, forms and brochures can be found at the following website:
http://www.tamiau.edu/gradschool/lamar_bruni_vergara.shtml

III. Degree Requirements

There are two program tracks for the Master of Science in Biology degree.

Thesis Program

Required Courses:

BIOL 5290 Graduate Seminar ¹	4 hours
BIOL 5401 Biometry ²	4 hours
Biology Electives	16 hours
Thesis	
BIOL 5398 and 5399 Thesis	6 hours
Total for Degree:	30 hours

¹To be repeated once when the topic changes to fulfill the requirement of four SCH.

²To be taken in the first three semesters of student's graduate work.

Non-Thesis Program

Required Courses:

BIOL 5290 Graduate Seminar ¹	4 hours
BIOL 5295 Research Problems in Biology ²	4 hours
BIOL 5401 Biometry ³	4 hours

Biology Electives 24 hours

Total for Degree: 36 hours

¹ To be repeated once when the topic changes to fulfill the requirement of four SCH.

² To be successfully completed twice to fulfill the requirement of four SCH.

³ To be taken in the first three semesters of student’s graduate work.

Thesis / Non-Thesis Program Comparison

	Non-thesis	Thesis
Required Courses	BIOL 5290 Graduate Seminar 4 BIOL 5401 Biometry 4	BIOL 5290 Graduate Seminar 4 BIOL 5401 Biometry 4
	BIOL 5295 Research Problems In Biology 4	
Elective Courses	Graduate Biology Courses 24	Graduate Biology Courses 16
Thesis		BIOL 5398/5399 Thesis 6
TOTAL SCH	36	30

Additional Degree Requirement Details

- Thesis track requires a thesis, seminar on the thesis and a successful defense. Thesis research can be laboratory or field based, or both.
- Non-thesis track requires evidence of research; literature, field and/or laboratory based, a seminar on the research and a successful defense.
- Students in the thesis and non-thesis tracks must pass a written comprehensive exam (valid for one year). If the written exam is failed three times, the entire program will need to be repeated. Thesis students must pass the comprehensive

- exam before taking the Thesis courses (BIOL 5398/5399). Non-thesis students must complete the exam by mid-November or mid-April prior to graduation.
- Courses taken in this program will be valid for five years.
 - A graduate student cannot take an undergraduate course for credit, but can take courses cross-listed as undergraduate and graduate for credit.
 - A graduate student cannot take a cross-listed course for graduate credit if the student has passed (with an A, B, or C) a similar course for undergraduate credit.

Retention Requirements (see Academic Regulations – Graduate in University catalog)

- A minimum grade point average of 3.0 (“B”) on a 4.0 scale computed on all graduate work attempted must be maintained in the major.
- No more than six (6) semester credit hours with a letter grade of “C” earned at this university will be accepted for a master’s degree.

Timeline / Deadlines

These are suggested times for completing the thesis or non-thesis degree in two years.

1. University Application Filed
 - First working day in April for summer or fall semester entry.
 - First working day in November for spring semester entry.
2. GRE & Transcripts in Office of Graduate Studies
 - Transcripts should be submitted with application.
 - Only six hours of graduate work in program before GRE submitted to office.
3. Dean's Acceptance Letter
 - May for summer or fall semester entry.
 - January for spring semester entry.
4. Approved Degree Plan
 - Complete advisory committee form.
 - Request a faculty member for advisory committee no later than end of second semester.
 - Degree plan approved no later than end of second semester.
 - Discussion of thesis proposal by the end of second semester.
5. Thesis Proposal Submitted (if applicable)
 - By the beginning of third semester.
6. Thesis Proposal Approved (If applicable)
 - By the beginning of the third semester including completed thesis proposal coversheet form.

7. Completion of Course Work
 - Third semester for thesis, fourth semester for non-thesis.
8. Comprehensive Exam
 - Taking the comprehensive exam during last semester of course work.
 - Last day to take exam in fall semester is last Friday of October.
 - Last day to take exam in spring semester is last Friday of March.
9. Application for Graduation
 - Beginning of final semester.
10. Oral Defense (If applicable)
 - Middle of final semester.
11. Final Thesis Cleared (If applicable)
 - Two weeks before graduation.

All degree requirements must be completed within 5 years of the beginning of the master's degree.

Thesis Advisory Committee

The student on the thesis track will have a thesis committee that will design a degree plan in consultation with the student; prepare and evaluate the comprehensive examination; assist with the thesis; reading and evaluating the thesis; and preparing, administering and evaluating the defense of the thesis. The committee will consist of three members of the graduate faculty from the Department of Biology and Chemistry chosen by the student with advice from the student's advisor and/or department chair. Another member of the committee from another department or university can be added by the student's request, if the committee agrees that the additional member can contribute to the student's thesis research. The chair of the advisory committee will be the student's major professor for the thesis research.

Advice to Graduate Students Following the Thesis Program

You choose your own faculty advisor for a thesis-based degree plan. Some students enter the university with the intention of working with a particular member of the faculty; others are not as certain about their specific interests, or have a thesis topic in mind. Upon entering, you will be assigned a temporary advisor to guide you in planning your course work and in selecting a possible thesis topic. You are under no obligation to conduct thesis research with your temporary advisor, and many students decide to work with another faculty member. The faculty has your best interests in mind, and will help you make the best choice of advisor and thesis topic.

The overall timetable for completion of the MS-degree requirements usually spans two to two and a half calendar years. Some students are able to finish earlier, while others require more time. During the first semester, your temporary advisor will advise you in planning your course of study. During the second semester, the student chooses a thesis advisor and establishes a thesis committee. Field and analytical work on the thesis are ordinarily conducted during the summer semester, although course work may be arranged so that fieldwork is conducted during the winter and early spring. During the third semester, the student generally completes necessary course work while continuing thesis research, and the fourth semester is generally devoted to completion of the thesis research, writing, and defense of the thesis.

Many students find it necessary to complete the thesis during the second summer. Others require more time to complete the degree requirements because of the nature of the research, financial needs, or other factors. The Graduate School has established a time limit of 5 calendar years for completion of the MS degree.

Thesis

College of Arts and Sciences has a thesis manual available online. However, consult with your advisor and committee on the format of your thesis.

IV Curriculum

Courses

BIOL 5290 Graduate Seminar in Biology. Two semester hours. A seminar on current topics in biology. Emphasis will be on recent research in a field of biology. May be repeated once when topic changes. Prerequisite: Graduate standing and permission of the instructor.

BIOL 5295 Research Problems in Biology. Two semester hours. A course in directed literature-based, laboratory or field research in biology for non-thesis students. Non-thesis students must successfully complete the course twice. Prerequisite: Graduate standing and permission of the instructor.

BIOL 5371-5471 Special Topics in Biology. Three-four semester hours. A seminar course on topics of interest in biology. Laboratory section at discretion of instructor. May be repeated when topic changes. Prerequisite: Graduate standing and permission of the instructor. Laboratory fee: \$30.00, if appropriate.

BIOL 5398 Thesis. Three semester hours. Includes thesis and research. To be scheduled by the student in consultation with student's major professor. Prerequisite: Approval of the major professor and the Department Chair. If grade of IP is received, student must

enroll again for credit. Evaluation of performance in this course is on CR/NC basis. Laboratory fee: \$30.00.

BIOL 5399 Thesis. Three semester hours. Includes thesis, research, seminar, and defense. To be scheduled by the student in consultation with student's major professor. Prerequisite: Approval of the major professor and the Department Chair. If grade of IP is received, student must enroll again for credit. Evaluation of performance in this course is on CR/NC basis. Laboratory fee: \$30.00.

BIOL 5401 Biometry. Four semester hours. A course in experimental design and statistical analysis. The course will include techniques used in different fields of biological research and the application of these techniques for the student's own research. Prerequisite: Graduate standing and permission of the instructor.

BIOL 5402 Advanced Mammalogy. Four semester hours. A study of anatomy, evolution, distribution, systematics, ecology, and physiology of mammals – with special emphasis on local representatives. Prerequisite: Graduate standing and permission of the instructor. Saturday field trips required. Laboratory fee: \$30.00.

BIOL 5404 Advanced Herpetology. Four semester hours. A study of anatomy, evolution, distribution, systematics, ecology, and physiology of amphibians and reptiles; primarily North American species with special emphasis on local representatives. Prerequisite: Graduate standing and permission of the instructor. Saturday field trips required. Laboratory fee: \$30.00.

BIOL 5407 Behavioral Ecology. Four semester hours. A course in the function of behavior in the context of ecology and evolution. Topics will include foraging behavior, habitat selection, mating behavior, parental care, and social behavior. Prerequisite: Graduate standing and permission of the instructor.

BIOL 5408 Advanced Entomology. Four semester hours. An advanced study of insects (and arachnids). Topics will include anatomy and physiology, evolution, ecology, and behavior. Special emphasis will be placed on insect diversity and identification of local families of insects (and arachnids). A collection of local representatives is required. Prerequisite: Graduate standing and permission of the instructor. Saturday field trips required. Laboratory fee: \$30.00.

BIOL 5409 Molecular Systems Biology and Chemical Genetics. Four semester hours. A course dedicated to the discussion of current approaches to study “Omics” or systems biology, and the impact of chemical genetics in understanding how to activate or inactivate gene products as a way to determine the cellular function of proteins. Molecular Systems Biology and Chemical Genetics covers topics at the molecular level, including research in the evolving areas of genomics, proteomics, metabolomics, bioinformatics, microbial systems, and the integration of cell signaling and regulatory

networks. Prerequisite: Graduate standing and permission of instructor. Lab fee: \$30.00. (Cross-listed with BIOL 4409 and CHEM 4409)

BIOL 5410 Advanced Ecology-- Populations and Communities. Four semester hours. An advanced study of biotic and abiotic ecosystem interactions emphasizing field measurements, statistical procedures, and computer simulations of the growth of populations. Topics will include social and species interactions within populations, analysis of population composition and change, the distribution of communities, and functioning of ecosystems. Independent study of a selected ecological topic required.

BIOL 5415 Population Genetics. Four semester hours. A study of population genetics models, including genetic variation, selection, inbreeding, genetic drift, mutation, gene flow, linkage disequilibrium and recombination. Prerequisite: Graduate standing and permission of instructor. Lecture/laboratory.

BIOL 5420 Advanced Environmental Microbiology. Four semester hours. An overview of the relationship between microbial metabolism, physiology, and the environment with a discussion of the primary literature. The application of modern microbiological concepts to address and solve current environmental problems is emphasized. Topics include air, water and soil microbiology, geochemical activities of microbes, biotransformations, pollution, and pollution abatement using microbes. Prerequisite: Graduate standing and permission of instructor. Laboratory fee: \$30.00. (Cross-listed with ENSC 4420/BIOL 4420)

BIOL 5425 Advanced Immunology. Four semester hours. A detailed study of the immune response and related events, with a discussion of primary literature. Emphasis is placed on cellular and humoral branches of immunity, including the study of blood (serology) as a diagnostic tool. Prerequisite: Graduate standing and permission of instructor. Laboratory fee: \$30.00. (Cross-listed with BIOL 542)

BIOL 5440 Advanced Plant Systematics. Four semester hours. An introduction to plant systematics with an emphasis on flowering plants. Topics will include principles of classification, rules of nomenclature, plant identification and the use of keys, the evolutionary relationships among plant groups, species concepts, and experimental approaches to systematics. Prerequisite: Graduate standing and permission of the instructor. Laboratory fee: \$30.00. (Cross-listed with BIOL 4440)

BIOL 5441 Advanced Plant Physiological Ecology. Four semester hours. This course will examine plant physiological mechanisms that explain ecological patterns. Topics will include the physiological characteristics of plants (photosynthesis, energy balance, water relations, mineral nutrition, growth, and development) and how those characteristics are adaptive to various environments. Prerequisite: graduate standing and permission of the instructor. (Cross-listed with BIOL 4441)

BIOL 5450 Molecular Genetics and Regulation of Gene Expression. Four semester hours. An advanced course on the molecular mechanisms by which genes are controlled and regulated. Topics include induction, activation, repression and RNA interference of gene function. Prerequisite: Graduate standing and permission of the instructor.

BIOL 5452 Advanced Biochemistry. Four semester hours. (SP) A detailed study, using primary literature sources, of carbohydrate, amino acids, nucleic acids, and lipid metabolic pathways. Special attention is given to human metabolism in health and disease. Prerequisite: one semester (3 SCH or more) of biochemistry for majors or permission of instructor. (Cross-listed with CHEM 4452)

BIOL 5480 Field Biology. Four semester hours. A field course on the diversity and ecology of populations and communities along the Rio Grande. A field trip of two to three weeks will be required. Prerequisite: Graduate standing and permission of the instructor. Laboratory fee: \$30.00.

Two-Year Cycle for Graduate Courses (subject to change)

Courses for Majors	F08	S08	SS1	SS2	F09	S10	SS1	SS2
BIOL 5401 Biometry		X				X		
BIOL 5402 Advanced Mammalogy					X			
BIOL 5404 Advanced Herpetology	X							
BIOL 5407 Behavioral Ecology	X							
BIOL 5408 Advanced Entomology					X			
BIOL 5409 Molecular Systems Biology and Chemical Genetics								
BIOL 5410 Advanced Ecology								
BIOL 5415 Population Genetics					X			
BIOL 5420 Advanced Environmental Microbiology						X		
BIOL 5425 Advanced Immunology	X							
BIOL 5310 Environmental Toxicology (not in catalog)						X		
BIOL 5430 Limnology (not in catalog)		X						
BIOL 5440 Advanced Plant Systematics						X		
BIOL 5441 Advanced Plant Physiological Ecology		X						
BIOL 5450 Molecular Genetics and Regulation of Gene Expression					X			
BIOL 5452 Advanced Biochemistry						X		
BIOL 5480 Field Biology							X	

BIOL 5290 Graduate Seminar	X	X			X	X		
BIOL 5295 Research Problems in Biology	X	X			X	X		
BIOL 5398 and 5399 Thesis	X	X			X	X		
BIOL 5371-5471 Special Topics	X	X			X	X		

For courses cross-listed as undergraduate (4000 level) and graduate (5000 level), graduate students will be required to do one of the following:

- Attain a higher percentage score.
- Write a research paper.
- Make a research presentation at the departmental or college level.
- Show evidence of a more detailed study in some aspect of the course.

V. Graduate Faculty

Faculty Member	Degree & Institution	Field of Study	Teaching & Research
Dr. David Beck	Ph.D. University of Virginia	Microbiology	Microbiology, Immunology
Dr. Mario Garcia Rios	Ph.D. Purdue University	Molecular Genetics	Genetics, Biochemistry, Recombinant DNA
Dr. Sushma Krishnamurthy	Ph.D. U of Maryland Eastern Shore	Aquatic Biology and Toxicology	Biology, Environmental Biology
Dr. C. Neal McReynolds	Ph.D. Vanderbilt University	Behavioral Ecology, Arthropod Biology	Evolution, Zoology, Animal Behavior
Dr. Daniel Mott	Ph.D. Southern Illinois University	Systematics of Spiders	General Zoology, Human Anatomy
Dr. Fernando Quintana	Ph.D. North Carolina State University	Applied Statistics	Population Genetics, Biometry
Dr. Josh Stevenson	Ph.D. University of Texas at Austin	Plant Structure and Function	Plant Biology
Dr. Kenneth Tobin	Ph.D. University of Tennessee	Geology	Geomicrobiology, Paleoecology
Dr. Ruby Ynalvez	Ph.D. Louisiana State University	Cell Biology, Molecular Biology, Biochemistry	Endocrinology, Molecular Biology Techniques
Dr. Thomas Vaughan	Ph.D. University of Arizona	Water quality in Rio Grande Valley	Ecology, Vertebrate Biology

TEXAS A&M INTERNATIONAL UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

CHECKLIST FOR GRADUATE STUDENTS AND FACULTY ADVISORS

Student's Name: _____ Major: _____

Advisory Committee Chair: _____ Dept.: _____

This checklist is provided to help you and your Advisory Committee keep track of your progress through the various stages of graduate study.

ACTIVITY	COMPLETION DATE	EXPECTED COMPLETION DATE
1. Univ. & Dept. Applications Filed	_____	_____
2. GRE & Transcripts in Admissions Office	_____	_____
3. Dean's Acceptance Letter	_____	_____
4. Approved Degree Plan	_____	_____
5. Completion of Course Work	_____	_____
6. Comprehensive Exam for Major	_____	_____
7. Comprehensive Exam for Minor	_____	_____
8. Thesis Proposal Submitted (If applicable)	_____	_____
9. Thesis Proposal Approved (If applicable)	_____	_____
10. Oral Defense (If applicable)	_____	_____
11. Final Thesis Cleared (If applicable)	_____	_____
12. Application for Graduation	_____	_____



TEXAS A&M INTERNATIONAL UNIVERSITY

A Member of The Texas A&M University System

College of Arts and Sciences

REQUEST FOR SERVICE ON A GRADUATE ADVISORY COMMITTEE

Name _____ Social Security Number _____

Degree _____ Catalog Year _____

The above student has requested that I serve on his/her Graduate Advisory Committee. I understand that serving on this committee requires that I be reasonably available to this student for consultation and guidance. Additionally, I understand that I, along with the other members of the committee, have a particular and direct responsibility for the following:

- ▶ Designing a degree plan in consultation with the student
- ▶ Preparing and evaluating the comprehensive examination
- ▶ Assisting with the thesis
- ▶ Reading and evaluating the thesis
- ▶ Preparing, administering and evaluating the defense of the thesis

Cognizant of the above responsibilities, I agree to serve on the Graduate Advisory Committee of the above named student.

_____	_____
Advisory Committee Chair	Date
_____	_____
Advisory Committee Member	Date
_____	_____
Advisory Committee Member	Date

TEXAS A&M INTERNATIONAL UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

THESIS CLEARANCE FORM

Name

Date Submitted

Degree

Student ID Number

Graduation Date

Major Subject

Committee Chair

Major Department

Thesis Title:

Items to clear:

Committee Chair Signature

Date cleared