FOREWORD


Graduate Committee
Department of Biology, 2016-2017

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GRADUATE PROGRAMS
DEPARTMENT of BIOLOGY, BAYLOR UNIVERSITY

OBJECTIVES of the PROGRAM

The Graduate Program of the Biology Department endeavors to provide an academic atmosphere in which graduate students and faculty can work together as a community of scholars. Through the free exchange of information, it is hoped that each student will broaden his/her intellectual perspectives, prepare for a productive career, and realize his/her potential as an individual and as a responsible and informed member of society.

It is our intent to educate future biologists who are well rounded and possess an area of expertise demonstrated through productive research and other scholarly activity. Graduate students in the Department of Biology should have a broad knowledge of basic concepts in biology, usually obtained through either an undergraduate degree in biology or an allied field. This foundation helps the student (1) promote self-motivated learning in a specialized field of biology, (2) understand the methods employed in biological investigation and, and (3) proceed toward making his/her own contribution to the scientific community.

The Department of Biology offers advanced study leading to doctoral (Ph.D.) and master’s (M.S., M.A.) degrees with emphases in ecology and evolutionary biology and in molecular, cellular and developmental biology. The Ph.D. program involves advanced study in an area of specialty and independent, original research experience culminating in an approved dissertation. The M.S. degrees include advanced coursework and preparation of a research thesis. The M.A. degrees are non-thesis programs meant for students to focus on the breadth of biological studies; however, students still identify a sub-discipline of specialization.

Once a student has completed his/her graduate degree(s), he/she should possess an academic background adequate to enable the graduate to conduct research and teach courses in basic biology. With a broad-based competency, the student should be prepared for a successful career in a variety of biology-related fields. To help a graduate student achieve these goals, the following are suggested:

- Each graduate student is encouraged to teach or otherwise assist the laboratories of at least one biology course during his/her tenure in the program.
- The student should occasionally present the lecture for the course under the supervision of the professor. The student should arrange for such at the beginning of the semester.
- The student is encouraged to expand his/her scientific expertise by taking one or two problem courses (Bio 5V90) independent of thesis or dissertation research. The student is encouraged to present the findings from the problem courses, as well as from dissertation and thesis research, orally at the meetings of some learned organization and/or in a departmental seminar.
- The student is encouraged to synthesize the research data from the thesis and problem courses into publishable manuscripts.
- Graduate students are encouraged to take the initiative in forming ad hoc groups of students and faculty of similar interests for the reading, review, discussion, and debate of current scientific thought and literature.

Best wishes on your academic journey!
PROGRAM of STUDY: DOCTOR of PHILOSOPHY DEGREE in BIOLOGY

The intent of the doctoral program is to develop in the student an extensive working knowledge in a subdiscipline of biology. This program involves an in-depth, independent, original research experience culminating in an approved dissertation. It is expected that the doctoral graduate will be properly equipped with the knowledge and training needed to independently conduct research and to teach introductory biology and advanced topics in his/her area of specialty.

Program Objectives

1. Students will demonstrate proficiency in one of the two concentrations of biology in which the Ph.D. is offered: (1) ecology and evolutionary biology [EEB], or (2) molecular, cellular and developmental biology [MCD]. Proficiency is gained through formal coursework, directed and readings, research collaborations, etc.

Five topical areas are recognized. Because evolution is the fundamental process underlying all of biology, proficiency in this topic is expected for all our doctoral students. For the MCD students, proficiency is expected also in (1) genetics, and (2) cell and molecular biology. For the EEB students, proficiency is expected also in (1) ecology and environmental science, and (2) structure and function. Representative subtopics are listed below for each of the content areas:

EVOLUTION—FOR BOTH EEB AND MCD CONCENTRATIONS
   Age of earth and the fossil record
   Natural selection
   Selection and drift
   Gradualism vs. punctuation
   Phylogeny and systematics
   Analogy, homology, convergence
   Human evolutionary history
   Classification of biodiversity at higher taxonomic levels

CELL & MOLECULAR BIOLOGY—FOR MCD CONCENTRATION
   DNA, protein structure
   Cell signaling, Vesicle Trafficking
   Post-transcriptional processing
   Genomics/proteomics
   Cytoskeletons
   Cell Behaviors: adhesion, proliferation, differentiation, and death.
   Molecular Techniques

GENETICS—FOR MCD CONCENTRATION
   Gene/genome duplication; exon shuffling; gene families
   Gene expression control (change place)
   Mutations, mutation analysis, molecular aging
   Mobile elements and genome anatomy
   Molecular phylogenetics
   Mendelian inheritance

STRUCTURE & FUNCTION—FOR EEB CONCENTRATION
Embryonic development patterns in animals and plants
Support and terrestrialization
Osmoregulation and water balance
Energy processes: photosynthesis, chemosynthesis, cellular respiration
Roles of essential elements
Nature of membranes, proton pumps, etc.
Communication-nervous, endocrine, plant hormones

**ECOLOGY—for EEB CONCENTRATION**
- Population ecology
- Community ecology
- Energy flow and efficiency
- Niche and competition
- Biodiversity, conservation, restoration, and invasion ecology
- Global biogeochemical cycles and ecosystem processes

2. Students will demonstrate familiarity with the relevant literature, and expertise in experimental design, in collection and analysis of data, and in interpretation of results in subject areas pertinent to the student’s dissertation research.

3. Students will progress toward entry into the scientific community through participation in professional activities, such as attendance at professional conferences, grantsmanship, publication of research findings, etc.

**Assessment of Program Objectives**

1. The *written preliminary exam* is administered to each doctoral student during the fourth semester of the student’s program or second semester for advanced students with an M.S. degree and desire to take the exam early. The written exam includes questions over topics appropriate to the student’s selected concentration (i.e. EEB, MCD), including evolution; refer to content areas above. Details about the written exam follow under *Mechanics of the Written Component of the Preliminary Exam*.

2. The *oral preliminary exam* typically is administered to each doctoral student after achievement of a passing score on the written preliminary exam, either in the fourth or fifth semester. The oral exam is a defense of the dissertation proposal. The oral exam covers *relevant scientific literature, experimental design, collection and analysis of data and interpretation of results* as they relate to the dissertation proposal. The oral exam may occur prior to the written exam with approval from the advisor, committee, and graduate program director.

Each faculty member of the examining committee records his/her evaluation of the proposal on the “Assessment Sheet for Oral Preliminary Exam and Proposal Defense, Ph.D. in Biology” [Appendix]. The dissertation committee must approve this proposal before the candidate may register for Dissertation, Bio 6V99.
The oral exam grading scale, in descending order of performance, is: “thorough knowledge and understanding” [score of 5], “better than average” [score of 4], “average” [score of 3], “less than average” [score of 2], and “poor” [score of 1]. Proficiency is indicated in the preliminary examination process by subscores of at least “average.”

3. Successful completion of the written and oral examinations and an approved dissertation proposal results in the student's promotion to doctoral candidacy.

Course work
1. A minimum of 78 semester hours is required for the Ph.D.

2. At least 36 of the 78 semester hours must consist of course work, excluding Bio 6V10, Dissertation Prospectus Research and 6V99, Dissertation.

3. A minimum of 24 of the 36 hours of course work must be 5000-level or higher

4. The following courses are required:
   - Research Methods in Biology I (BIO 5201, 2 hours)
   - Research Methods in Biology II (BIO 5202, 2 hours)
   - Biometrics (BIO 5412, 4 hours, or STA 5300, 3 hours)
   - Seminar (BIO 5100, BMS 5100; minimum of 4 hours).

5. A maximum of 8 combined hours of BIO 5100 and BMS 5100 (or other approved seminars) may count toward degree requirements; repeat credit requires change in topic from previous registrations.

6. Not more than 12 hours of 4000-level course work may be applied to the 36 hours of course work. For 4000-level courses to apply toward the Ph.D., the courses must be listed in the Graduate Catalog and the student must do additional work beyond that required of undergraduates in that course.

7. A maximum of 9 hours of Special Problems (Bio 5V90) can be applied the 36 hours of course work.

8. No coursework at the 1000, 2000, or 3000 levels will count toward the Ph.D.

9. Dissertation (Bio 6V10 and 6V99, minimum of 12 hours) and its associated research generally comprise the remaining 42 semester hours, although a portion may be devoted to additional course and laboratory work at the discretion of the student’s advisory/dissertation committee.

Transfer Credits
Students entering the program with graduate-level course work may petition to apply up to 24 semester hours of approved courses toward the Ph.D. Students must carefully specify courses as 5000/6000 or 4000-level when transferring courses. If courses were 5000/6000 level equivalents at another university, they should be transferred as such. Failure to properly specify courses as 5000/6000 level may result in courses being improperly coded as
4000-level and could force a student to take more 5000/6000 level courses than the student anticipated. Thesis hours (i.e., 5V99 or equivalent) are not transferable toward doctoral requirements.

Courses outside the Major Field
The majority of courses used to complete the course requirements will be in Biology. However, appropriate courses from other departments may be taken upon approval of the major advisor. There are many relevant graduate courses in the departments of Geology, Statistics, Chemistry, and Environmental Science that may highly appropriate for a particular student's course plan.

Residence Study
A minimum of 1 academic year of study must be undertaken in residence at Baylor.

Dissertation
An original research dissertation is required for the Ph.D. degree. A written proposal of the dissertation research must be presented to (and approved by) the student's advisory committee before dissertation research (i.e., registration for Bio 6V99) can begin. Each faculty member of the examining committee records his/her evaluation of the proposal on the “Assessment Sheet for Dissertation Defense and Final Oral Exam, Ph.D. in Biology” [Appendix]. However, students who have successively passed the written component of Ph.D. preliminary exams can begin with his/her dissertation research by registering for Bio 6V10 Dissertation Prospectus Research (a new course) during the transition period from the written to the oral exam. The main purpose of Bio 6V10 Dissertation Prospectus Research is to explore research topics for the dissertation proposal and encourage students to frame research hypothesis that will guide to write a well-focused dissertation research proposal.

Major Advisor and Advisory Committee
Upon arrival at Baylor, the identity of the major advisor already will have been determined during the application process. The major advisor will oversee the student's program of study and the thesis research. The student and the major advisor, with approval of the departmental Graduate Program Director, will appoint an advisory committee for the student, consisting of at least three other members of the graduate faculty in Biology and one member of the Baylor graduate faculty from outside the Department of Biology (five total members). This committee is usually appointed no later than the end of the fourth semester of graduate work, but may be appointed sooner. A committee is not formed until a student has developed a dissertation topic and can provide at least an outline to a prospective faculty member so that they may make an informed decision about serving on that committee. The advisory committee will be responsible for guiding the student as they prepare the Ph.D. proposal and for the evaluation of the comprehensive oral examination and the dissertation defense. A meeting of the entire committee is required for the presentation of the dissertation proposal, the final defense, and at any time during the course of the program that the faculty advisor deems necessary to provide advice and guidance for the student.
Teaching

All doctoral students are required to fulfill a one-year teaching experience under the mentorship of a faculty member. This is usually satisfied by serving as a teaching assistant in laboratories of one or more undergraduate classes. Alternatively, this requirement may be satisfied by other college-level teaching experiences (e.g., instructor of record at community colleges or as a graduate student at a previous university). Students designated as instructor-of-record must complete the Teaching Assistant Preparation Program (TAPPS) offered through the Baylor Graduate School or a similar preparatory course on pedagogy. Participation in these teaching preparatory programs is added to the student’s permanent transcript.

All graduate students in Biology are expected to maintain a minimum GPA of 3.0 throughout their program. In accordance with Graduate School policy, any student whose Baylor graduate GPA falls below 3.0 will be placed on probation. The student must restore his/her GPA to 3.0 by the end of the next 9 credit hours of coursework in order to remain in the graduate program. The student is not eligible to receive financial assistance from the University during the probationary semester(s).

Publication Requirement

Published work demonstrates a student’s capability of an active contribution to their academic discipline. The quality and quantity of peer-reviewed publications at the time of graduation will strongly influence the probability of a student receiving invitations to interview for jobs, particularly in academia. The peer-review process also provides an external review of the quality of the student’s research.

All publications submitted for this requirement will be founded on research and data collected while in residence in the Baylor University’s Department of Biology doctoral program. Prior to scheduling the dissertation defense, students must show evidence to the graduate program director of having authored a minimum of one original manuscript that has been published in a peer-reviewed national or international journal. Any manuscript developed based on research conducted as a part of the biology doctoral program at Baylor must first be edited and approved by your advisor, who should also be a co-author on the manuscript (except in very rare circumstances). Moreover, submission of any paper manuscript based on research conducted at Baylor must be approved by your advisor as well as any co-authors, such that your advisor is all co-authors are aware that the paper has been submitted and supported the decision to submit the paper to the selected journal. Failure to follow this procedure is unethical and may result in suspension or dismissal of a student from the program.

The publication used to fulfill this criterion must be based on his/her dissertation research. Students must be first author and may have secondary authors on this paper. Papers that are considered in press must be documented through communications with the journal’s editorial staff. Publication requirements may vary with faculty; therefore, students are strongly encouraged to discuss this early on in their program with their advisor.

Other Requirements

The department does not have a foreign language requirement for the Ph.D. degree. However, individual advisors and committees may require specific students to satisfy a
language requirement or to demonstrate special research skills. Students are also required to attend as many departmental seminars as possible during their term of residence.

**Preliminary Examination**

The Preliminary Exam, consisting of both written and oral components, marks the transition between the coursework and research phases of the studies of the Ph.D. student. It provides the student with the opportunity to demonstrate not only their knowledge of the topics of biology, but the ability to apply that knowledge in the way that is traditionally associated with the degree. The exam is meant not only to assess the student’s knowledge, but is typically detailed and open ended, allowing the committee to evaluate the ability of the student to apply their knowledge in different contexts.

**Mechanics of the Written Component of the Preliminary Exam**

All graduate students must demonstrate that they are qualified to proceed in the Ph.D. program to PhD degree candidacy by passing both a written and an oral preliminary exam administered by representatives from the Biology faculty during the 2nd year of graduate study. If special circumstances require it, students may petition the Biology Graduate Committee for exceptions to the standard procedures and timetable for the Preliminary examinations. Exceptions may be granted upon a majority vote of the Biology Graduate Committee. All PhD students who are registered for the 2nd semester of the 2nd year (at the fourth semester) in the program will take the written exam at the same time.

The goal of the process is to examine the student over the content areas appropriate to the student’s selected emphasis: (1) ecology and evolutionary biology [EEB], or (2) molecular, cellular and developmental biology [MCD]. The exam will be composed of six, two-hour examination sessions, conducted over a two-day period, normally administered in mid to late spring. In each session, students will select, in a closed book, essay format, one of two questions which are related to the three broad areas within their selected emphasis. Two examination sessions will cover the three broad areas (e.g. Genetics, Evolution, etc.) for a total of six sessions. Questions will be derived from the Department of Biology graduate faculty members, with final selection of questions determined by the graduate committee.

Students will be required to type their answers using word processing software on workstations in the Biology Computer Lab (A.305). Answers to questions will be saved to a USB drive and turned into the exam proctor at the end of each session. Answers will be distributed via email to faculty members for grade assignment. Graded answers will be returned to graduate committee within four weeks after the exam. Students must receive an average of at least 70% in each topic area (1) ecology, structure & function, and evolution [EEB] or (2) molecular and cell biology, genetics, and evolution [MCD]. The departmental graduate director will send exam results to students within six weeks after the exam. Students are allowed to view graded exams after notification of results.

Should a student fail one or more of the sections, two additional graders will be acquired to provide additional evidence about the quality of a student’s answers. The mean of the grades submitted by each of the second and third graders will be used to make a final determination as to whether the student passed or failed the exam. A minimum mean grade of 70% is required to pass each re-graded section of the exam.
Students who have failed any of the three sections of the written exam may take the exam a second time the following year, either in the fifth or sixth semester. Students will only be required to retake the section(s) of the exam on which he/she scored < 70%. Students failing the second exam will be asked to leave the program.

Mechanics of the Oral Component of the Preliminary Exam

Students that pass the written exam are qualified to move on to the oral presentation and defense of their dissertation topic; although it is permitted that some students may complete the proposal defense and oral exam prior to the written exam (please consult with the Graduate Program Director). Students typically register for Bio 6V10 Dissertation Prospectus Research to prepare for dissertation research proposal and the oral exam, although students may register for 6V10 prior to passing the written exam if all other coursework is complete. One semester hour of Bio 6V10 is considered full-time equivalent (FTE), but students may wish to register for 1-2 hours per semester to count toward the required 78 for graduation. **Note that Bio 6V10 will not count toward degree requirements until all coursework is complete.**

Once the student has completed proposal document, a digital (e.g., MS Word or PDF) copy will be distributed to all dissertation committee members before the scheduling the oral exam. Students and dissertation committee members should discuss and determine the schedule for oral exam before the completion of the dissertation proposal. This portion of the preliminary exam should normally be completed within 6 months after the written exam. It is strongly recommended that the proposal should be structured similarly to research grant proposals, and that should include the following key topics:

1. Hypotheses to be tested and/or, research objectives or specific aims derived from your research hypothesis
2. Description of the key background information and preliminary results that serve as the basis for the hypotheses,
3. Designs of experiments to test the hypotheses, accomplish specific aims or objective, and a discussion of possible outcomes and interpretation of those outcomes.
4. A rationale for each experimental approach, possible problems, or alternative plans for the proposed research.
5. A timetable for completion.
6. Titles of manuscripts and expected journals in which to publish research from the dissertation.

During the oral exam the student is expected to present a prepared short summary of the significance and rationale of the proposed experiments and anticipated outcomes (~30-45 minutes). The student should respond to the written feedback from the Preliminary Committee. The presentation is accompanied and followed by questions from the dissertation committee, concerning such issues as the proposed research, alternative hypotheses, and projected outcomes. Although the emphasis of questioning will be on the dissertation research, questions on any area of biology may be asked including, but not limited to, those topics from the written exam where the student is deemed weak by the committee. In preparation for the oral preliminary exam, the student is encouraged to discuss the written
proposal and oral defense with the members of the student's committee to insure that the proposal will pass after the oral exam.

Assessment and Grading of the Oral Preliminary Exam
Each faculty member of the examining committee records his/her scores on the “Assessment Sheet for Oral Preliminary Exam and Proposal Defense, Ph.D. in Biology” [Appendix]. Following the oral component of the Preliminary Exam, the committee will vote on the performance of the student. The exam is meant as a single event, and all portions of the exam are to be considered when the members vote. The dissertation committee will assign the student a decision of Pass, Provisional Pass, or Fail. If the committee decision is Pass, the dissertation committee will notify students with the decision at the meeting. The signed copies of proposal, exam form, and assessment forms should be submitted to the graduate program director. If the committee decision is Provisional Pass or Fail, the committee will notify students and graduate program director with a decision and address specified deficiencies of the proposal in writing. The decision letter has to state details of deficiencies and provide suggestions to improve the proposal. Four of 5 committee members must vote pass in order for a student to pass the examination.

If the candidate fails the oral examination, the student may be given a second opportunity to be examined if the dissertation committee recommends it with the approval of the graduate program director. The second exam must be completed within 6 months. Upon recommendation of the dissertation committee, the student may be required to take formal coursework in a particular area. If a second failure on the oral examination occurs, the candidate will be dismissed from the graduate program.

Seminar Requirement
Each student in the Ph.D. program must present an exit seminar to the Biology faculty on his/her dissertation research.

Final Examination (Dissertation Defense)
After completion of a doctoral dissertation, the candidate has a final oral examination involving presentation and defense of the dissertation. All members of the Graduate Faculty are invited to attend. The Biology Faculty must be notified of the examination date, time, and place at least 2 weeks prior to the examination. The Examination Committee conducts the examination, and other faculty may participate at the invitation of the committee. The oral examination will last approximately 2 hours. At the end of the oral examination, the Examination Committee will assign a grade of "pass" or "not pass", based upon a majority vote of the Examination Committee.

Scheduling of Final Exam (Dissertation Defense)
1. In consultation with the dissertation director and committee, the student arranges the date and location of the examination with the Graduate Program Director and secures approval from the Dean of the Graduate School; submit Announcement of Doctoral Oral Exam form to the Graduate School at least 10 working days before the event.

2. The candidate also posts the Announcement of Doctoral Oral Examination form in the Biology Office. The examination may not be taken sooner than 1 week (5 working days) after submission of the committee-approved dissertation to the Biology Department. The
candidate is responsible for adhering to the official deadlines of the Graduate School and the departmental calendar for that particular semester. See the calendar posted on the Graduate School website.

3. All oral exams must be held on regular class days between the first and last days of class (inclusive) of the semester. No exams may be scheduled on final-exam days or on “study days” or during interims between semesters.

4. All oral exams must be scheduled between 8:00 AM and 5:00 PM such that at least 2 hours are available for the exam (excluding the preceding seminar).

Oral Examination Committee

1. Composition of the Oral Examination Committee consists of the following: the Dissertation Committee and the Graduate Program Director or a designated member of the Biology Graduate Program Committee. The dissertation director in consultation with the Graduate Program Director may appoint additional members to the Examination Committee.

   Attendance at the seminar presented prior to the oral examination is open to the public. The seminar should summarize the dissertation and should last approximately 45 minutes. All members of the Biology faculty are encouraged to participate in each examination. The Examination Committee and the candidate may invite Biology Department graduate students to attend the exam. However, friends and family members of the candidate being examined are specifically excluded from attending the exam because the examination is a formal academic event.

2. The Dean of the Graduate School is invited to attend each oral examination.

3. If a member of the Examination Committee cannot be present, the other members of the Examination Committee (in consultation with the Graduate Program Director, if possible) shall appoint a replacement for the absent member. At least two members of the original Advisory Committee, including the Dissertation Director, must be present.

4. Members of the Examination Committee and others participating in the examination of a Ph.D. candidate should read the dissertation thoroughly prior to the examination.

Voting

1. All members of the Examination Committee shall vote on the proficiency of the candidate. Faculty members who participated in the exam, but who are not official members of the Examination Committee, are invited to discuss the candidate’s performance, but are not eligible to vote.

2. A two-thirds affirmative vote is required for passing.

3. If a candidate fails the oral examination, the Examination Committee will discuss with the candidate the basis for the decision.
MASTER’S PROGRAMS

The Department of Biology has two degree programs in which the large majority of our master's students are enrolled: (1) Master of Science in Biology and (2) Master of Arts, Health Profession. Three additional degrees, Master of Science in Environmental Biology, Master of Science in Limnology, Master of Arts in Biology (general) are older degrees that remain in the Graduate Catalog but enroll relatively few students.

PROGRAM of STUDY: MASTER of SCIENCE in BIOLOGY

The primary purpose of the M.S. degree in Biology is to develop in the student an area of biological expertise. This degree can be pursued in either of two emphases: (1) ecology and evolutionary biology (EEB) or (2) molecular, cellular, and developmental biology (MCD). Such expertise is developed through coursework and an in-depth research experience that culminates in a thesis.

Secondarily, the student is expected to continue development of his/her knowledge in major areas of biology. In addition, candidates are expected to be familiar with research methods in biology and be capable of reading and interpreting original research in their fields of emphasis. Because students are admitted to this program under the expectation of conducting research in pursuit of a thesis, students are not allowed to switch to a non-thesis degree program (i.e. MA) except under extreme conditions that must be approved by a majority vote of the Graduate Committee.

Program Objectives

1. Master’s-level proficiency is expected in one of the two concentrations of biology in which the M.S.-Biology is offered: (1) ecology and evolutionary biology [EEB], or (2) molecular, cellular, and developmental biology [MCD]. Additionally, all M.S.-Biology students must demonstrate proficiency in understanding of evolutionary history and processes.

Five topical areas are recognized. Because evolution is the fundamental process underlying all of biology, proficiency in this topic is expected for all our M.S.-Biology students. For the MCD students, proficiency is expected in (1) genetics, and (2) cell and molecular biology. For the EEB students, proficiency is expected in (1) ecology, and (2) structure and function. Representative subtopics are listed below for each of the content areas:

**EVOLUTION—FOR BOTH EEB AND MCD CONCENTRATIONS**
- Age of earth and the fossil record
- Natural selection
- Selection and drift
- Gradualism vs. punctuation
- Phylogeny and systematics
- Analogy, homology, convergence
- Human evolutionary history
- Classification of biodiversity at higher taxonomic levels

**CELL & MOLECULAR BIOLOGY—FOR MCD CONCENTRATION**
- DNA, protein structure
Cell signaling, Vesicle Trafficking  
Post-transcriptional processing  
Genomics/proteomics  
Cytoskeletons  
Cell Behaviors: adhesion, proliferation, differentiation, and death.

**Techniques**

**GENETICS—for MCD CONCENTRATION**  
Gene/genome duplication; exon shuffling; gene families  
Gene expression control (change place)  
Mutations, mutation analysis, molecular aging  
Mobile elements and genome anatomy  
Molecular phylogenetics  
Mendelian inheritance

**STRUCTURE & FUNCTION—for EEB CONCENTRATION**  
Embryonic development patterns in animals and plants  
Support and terrestrialization  
Osmoregulation and water balance  
Energy processes: photosynthesis, chemosynthesis, cellular respiration  
Roles of essential elements  
Nature of membranes, proton pumps, etc.  
Communication-nervous, endocrine, plant hormones

**ECOLOGY—for EEB CONCENTRATION**  
Population ecology  
Community ecology  
Energy flow and efficiency  
Niche and competition  
Biodiversity, conservation, restoration, and invasion ecology  
Global biogeochemical cycles and ecosystem processes

2. Students will demonstrate familiarity with the relevant literature, and expertise in experimental design, in collection and analysis of data, and in interpretation of results in subject areas pertinent to the student’s thesis research.

3. Students will progress toward entry into the scientific community through participation in professional activities, such as attendance at professional conferences, publication of research findings, etc.

**Assessment of Program Objectives**

1. Admission to master’s candidacy requires preparation and defense of a *thesis proposal*. The student must schedule a meeting with the M.S. committee to discuss and defend the proposed research. An oral presentation of the proposed research is not required, but can be used if the major advisor requests it. The outside member, often called an “outside reader” in other departments, is not required to attend this meeting, but should be invited and can be as involved as other members of the committee if they wish. The committee will scrutinize the proposal and ask questions about the relevant scientific literature,
experimental design, collection and analysis of data, and interpretation of results. This proposal must be approved by the thesis committee before the candidate may register for Thesis, Bio 5V99. However, preliminary research conducted prior to the proposal defense, such as method development or pilot studies, may be included in the proposal and in many cases is strongly encouraged.

2. M.S.-Biology students sit for an oral examination and thesis defense toward the end of the final semester of studies (semester 4 or 5). Approximately half of the examination evaluates knowledge in evolution and the two areas comprising the concentration (EEB or MCD). The other half of the examination pertains directly to the research thesis. Each faculty member of the examining committee records his/her evaluation of the proposal on the “Assessment Sheet for M.S. in Biology” [Appendix].

Coursework and Research
1. A minimum of 30 semester hours, including at least 24 hours of coursework (the remaining 6 hours must be thesis research, Bio 5V99).

These 24 hours must include Research Methods in Biology I (Bio 5201, 2 hours), Research Methods in Biology II (Bio 5202, 2 hours) and Biometrics (Bio 5412, 4 hours) or other approved statistics course (e.g., STA 5300, 3 hours). At least 12 hours of this coursework must be at the 5000 level. No more than 12 hours may be taken at the 4000 level, and 4000 level courses MUST be listed in the Baylor University Graduate Catalog (i.e., not all 4000 level courses are eligible for graduate credit).

2. Up to 4 hours of Seminars in Biology (Bio 5100) and/or Seminars in Biomedical Sciences (BMS 5100) may be applied to the 24 hours of coursework. Repeat credit requires change in topic from previous registrations.

3. Not more than 6 hours of Special Problems in Biology (Bio 5V90) may be applied toward the 24 hours of coursework.

4. Six of the 30 semester hours must be thesis research (Bio 5V99) leading to an approved thesis.

Advisor and Thesis Committee
Students should choose a graduate program largely for the purpose of studying with a particular professor. This professor is the research director (advisor). All students should have identified a faculty advisor during the application process prior to enrolling at Baylor. This professor advises not only in research, but also on the course of study, university and departmental policies, etc.

The advisor and the Graduate Program Director in consultation with the student will select a thesis committee before the research is begun. The committee consists minimally of three professors (including the advisor), two of whom are members of the Biology Department faculty and the third from a department other than Biology. Additional faculty may be included on the committee. The committee is involved in the development of the research plan, although the outside member may play a lesser role.
Thesis Proposal

By the end of the second semester, a thesis research proposal should be developed, presented to and approved by the thesis committee. A copy of the proposal and the Thesis Proposal Approval form (Appendix) must be signed by the committee members must be submitted to the Graduate Program Director. Only those students who have submitted a signed copy of the approved thesis proposal to the Graduate Program Director may register for thesis research (Bio 5V99).

The research proposal demonstrates to all involved that the student is acquainted with the literature relevant to the research problem. It demonstrates that the student understands how to apply the scientific method to this problem. It assures that the experimental design or research protocol involves the methods, materials, sample sizes, and statistical tests appropriate to the question. Basically, it ensures that the student knows what is to be done before the student proceeds. At the committee-student meeting, the above points should be addressed and discussed prior to approval of the proposal.

Preparation of the Thesis

A thesis summarizing the student's original research is required for the Master of Science degree. The thesis should be prepared following the *CBE Style Manual: A Guide for Authors, Editors, and Publishers in the Biological Sciences*, 6th Edition, published by the Council of Biological Editors. In addition, the physical format of the thesis must be consistent with the guidelines set by the Graduate School.

Submission and Review of Thesis

The thesis is written as collaboration between the student and the advisor. An important part of the education and experience involved in the Master of Science degree is the production of a document explaining and describing the student's publishable, original research. Development of the thesis will be a lengthy process typically requiring multiple revisions prior to submission to the committee. The student is expected to submit drafts to his/her advisor according to an agreed-upon schedule. Once the thesis reaches an advanced stage, the other members of the student's committee become involved. Changes required or requested by the committee members will be made prior to approval of the thesis.

Once the committee conditionally approves the thesis, the student can then schedule a thesis defense. At the time of approval, and no less than two weeks prior to the date of the oral defense, the student must place a copy of the final draft of the thesis in the departmental office. Any member of the Biology faculty may review and critique this draft. The candidate should expect to make reasonable changes based on faculty comments made before and during the comprehensive oral examination; inclusion of such changes will be up to the major professor and the student. The appropriately revised thesis is then submitted to the thesis clerk in the Graduate School. It is the student's responsibility to be certain of deadline dates, pay the required fees, and meet all other Graduate School rules. See the calendar posted on the Graduate School website.
Final Comprehensive Oral Exam

During the last semester and after writing a satisfactory thesis that has been approved by the thesis committee, M.S. candidates must take the comprehensive examination. During (or following) the last semester of coursework, M.A. candidates must take the comprehensive examination.

Description of Exam

Each master’s student must present an exit seminar to the Biology Department (faculty and students). Typically, the seminar is presented during the hour immediately preceding the final oral exam. The duration of the seminar is approximately 45 minutes.

Approximately half of the examination evaluates knowledge in evolution and the two areas comprising the concentration (EEB or MCD). The other half of the examination pertains directly to the research thesis. Each faculty member of the examining committee records his/her evaluation of the proposal on the “Assessment Sheet for M.S. in Biology” [Appendix].

The oral exam grading scale, in descending order of performance, is: “thorough knowledge and understanding” [score of 5], “better than average” [score of 4], “average” [score of 3], “less than average” [score of 2], and “poor” [score of 1]. Proficiency is indicated in the preliminary examination process by subscores of at least “average.”

Scheduling of Oral Exam

1. In consultation with the thesis director and committee, the student arranges the date and location of the examination with the Graduate Program Director and secures approval from the Dean of the Graduate School; submit the Announcement of Master’s Oral Exam form to the Graduate School at least 10 working days before the event. This form can be downloaded from the Graduate School website.

2. The candidate also posts the Announcement of Oral Examination form in the Biology office. For thesis degrees, the examination may not be taken sooner than 1 week (5 working days) after submission of the committee-approved thesis to the Biology Department. The candidate is responsible for adhering to the official deadlines of the Graduate School and the departmental calendar for that particular semester.

3. All oral exams must be held on regular class days between the first and last days of class (inclusive) of the semester. No exams may be scheduled on final-exam days or on “study days” or during interims between semesters.

4. All oral exams must be scheduled between 8:00 AM and 5:00 PM such that at least 2 hours are available for the exam (excluding the preceding seminar).

Examination Committee

1. Attendance at the seminar presented prior to the oral examination is open to the public. All members of the Biology faculty are encouraged to participate in each examination.
The Examination Committee and the candidate may invite Biology Department graduate students to attend the exam. However, friends and family members of the candidate being examined are specifically excluded from attending the exam because this examination is a formal academic event.

2. The Dean of the Graduate School is invited to attend each oral examination.

3. If a member of the Examination Committee cannot be present, the other members of the Examination Committee (in consultation with the Graduate Program Director, if possible) shall appoint a replacement for the absent member. At least two members of the original Advisory Committee, including the Thesis Director, must be present.

4. Members of the Examination Committee and others participating in the examination of a M.S. candidate should read the thesis thoroughly prior to the examination.

Voting

1. All members of the Examination Committee shall vote on the proficiency of the candidate. Faculty members who participated in the exam, but who are not official members of the Examination Committee, are invited to discuss the candidate's performance, but are not eligible to vote.

2. A two-thirds affirmative vote is required for passing.

3. If a candidate fails the oral examination, the Examination Committee will discuss with the candidate the basis for the decision.
PROGRAM of STUDY: MASTER of ARTS DEGREE in BIOLOGY – HEALTH PROFESSION

The purpose of the M.A. degree in Biology, Health Profession (MA-HP) is to provide students with advanced education in the life sciences for students in which non-thesis option is best for their career options. Students transitioning to a doctoral health-related graduate program are to benefit from this program that boosts their knowledge and skills related to medicine and human biology. This program is specifically designed for students who want to complete this degree within a year in anticipation of entering medical/dental schools the following year. Thus, students admitted to the program must begin studies during the first summer session and complete their studies in time for graduation the following May.

The student will take several advanced courses in this field, will conduct an independent research project, and will present a research seminar on a topic within this field of emphasis.

Candidates for the MA-HP are expected to have general knowledge of all major areas of biology. They are expected to demonstrate more-advanced knowledge in their field of emphasis. In addition, candidates are expected to be familiar with research methods in biology and be capable of reading and interpreting original research in their field of emphasis.

Assessment of Objectives

MA-HP students sit for an exit examination toward the end of the final semester of studies. The exit exam begins with a 30-45 minute public presentation of the student's laboratory project. Following the presentation and questions from the audience, only members of the examination committee remain the room. Approximately half of the examination evaluates knowledge areas comprising the health profession concentration (Cell Foundation, Genetics, and Disease Etiology and Human Response). The other half of the examination pertains directly to their research experience. Each faculty member of the examining committee records his/her evaluation of the proposal on the “Assessment Sheet for the M.A.-Health Profession” [Appendix].

The grading scale, in descending order of performance, is: “thorough knowledge and understanding” [score of 5], “better than average” [score of 4], “average” [score of 3], “less than average” [score of 2], and “poor” [score of 1]. Proficiency is indicated by subscores of at least “average.”

Coursework

1. A minimum of 30 semester hours of coursework. These 30 hours must include Research Methods in Biology I (Bio 5201; 2 hours), Research Methods in Biology II (5202; 2 hours), and Biometrics (Bio 5412) or other approved statistics course (e.g., STA 5300). At least 12 hours of this coursework must be at the 5000 level. No more than 12 hours may be taken at the 4000 level, and 4000 level courses MUST be listed in the Baylor University Graduate Catalog (i.e., not all 4000 level courses are eligible for graduate credit).

An important feature to the MA-HP program is the core areas that are consistent with a general biology degree and pre-health training that is important to the future of medical education. These core areas include: Cellular Foundation (CF), Genetics (G), and Disease
Etiology and Human Response (DE/HR). Students will take at least one course from each of these areas as they complete the coursework requirement for the degree: Students should consult the Graduate Catalog to determine whether courses are valid for graduate credit.

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<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Designation</th>
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<tbody>
<tr>
<td>4104</td>
<td>Medical Entomology Laboratory (DE/HR)</td>
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<td>4106</td>
<td>Molecular Genetics Laboratory (G)</td>
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<td>4107</td>
<td>Laboratory Studies in Cell Physiology (CF)</td>
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<td>4108</td>
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<td>4123</td>
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<td>4301</td>
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<td>4306</td>
<td>Molecular Genetics (G)</td>
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<td>Physiology and Biochemistry of the Cell (CF)</td>
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<td>4310</td>
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<td>Advanced Cell Biology (CF)</td>
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<td>5310</td>
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<td>5311</td>
<td>Advanced Genetics Analysis (G)</td>
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<td>5320</td>
<td>Ecological Biophysics (Elective)</td>
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<td>5325</td>
<td>Advanced topics in Evolutionary Biology (Elective)</td>
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<tr>
<td>5380</td>
<td>Integrative Ecophysiology (Elective)</td>
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</table>
5399 Experimental Design and Research Communications for Molecular Biologists (Elective)
5400 Population Genetics (G)
5401 Microbial Ecology (DE/HR)
5404 Wetland Ecology and Management (Elective)
5412 Biometrics (Required, or STA 5300)
5425 Molecular Ecology (G)

2. Up to 4 hours of Seminars in Biology (Bio 5100) and/or Seminars in Biomedical Sciences (BMS 5100) may be applied toward the 30 hours of coursework. Repeat credit requires change in topic from previous registrations.

4. Five or six hours of Special Problems in Biology (Bio 5V90) must be applied toward the 30 hours of coursework. Additional hours of Bio 5V90 beyond the 5-6 hour requirement will not count toward the degree.

Advisor and Exit Exam Committee

In consultation with the MA-HP program coordinator (Dr. Myeongwoo Lee; Myeongwoo_Lee@Baylor.edu), the student should select an advisor from among the MA-HP core faculty (consult with Dr. Lee for more information about MA-HP core faculty) no later than early in the fall semester, preferably in summer when they first arrive. The selected advisor should serve as the director of the student's independent research project (Bio 5V90) and exit seminar. Thus, students should approach faculty who are conducting research of interest to them prior to selecting an advisor. The advisor also will help the student select appropriate courses in accordance with the MA-HP essential core.

During the fall or no later than early spring semester of study, the student will select an advisory committee, consisting of the advisor, at least one additional Graduate Faculty member from the Department of Biology, and one representative from graduate faculty outside the Department of Biology. The committee will administer the exit examination, which follows the student's research seminar near the end of the last semester.

Exit Seminar

Each MA-HP student must present a seminar to the Biology Department (faculty and students). The topic of the seminar must relate to a research project conducted under Special Problems (Bio 5V90) registration involving laboratory or literature research under the guidance of the student's advisor (MA-HP core faculty, in most cases).

The seminar is presented prior to the exit examination. The seminar should be approved by the advisor, exit exam committee, and graduate school at least 10 days prior to the event. Students should provide a 1-page synopsis or abstract of their research to the advisor and exit exam committee prior to the seminar. The seminar is a public event; students are encouraged to invite friends, family and peers. The seminar is almost exclusively presented during the hour immediately preceding the exit exam. The duration of the seminar is usually 30-45 minutes, followed questions from the audience, which may include questions from the exit exam committee.
Scheduling of Exit Seminar and Exam

1. In consultation with the MA-HP advisor and exit exam committee, the student arranges the date and location of the examination and secures approval from the Graduate Program Director and Dean of the Graduate School; submit the *Announcement of Master’s Oral Exam* form to the Graduate School at least 10 working days before the event.

2. The candidate also posts the *Announcement of Oral Examination* form in the Biology office. For thesis degrees, the examination may not be taken sooner than 1 week (5 working days) after submission of the committee-approved thesis to the Biology Department. The candidate is responsible for adhering to the official deadlines of the Graduate School and the departmental calendar for that particular semester. See the [calendar](#) posted on the Graduate School website:

3. All oral exams must be held on regular class days between the first and last days of class (inclusive) of the semester. **No exams may be scheduled on final exam days or on “study days” or during interims between semesters.**

4. All oral exams must be scheduled between 8:00 AM and 5:00 PM such that at least 2 hours are available for the exam (excluding the preceding seminar).

Voting

1. All members of the Examination Committee shall vote on the proficiency of the candidate. Faculty members who participated in the exam, but who are not official members of the Examination Committee, are invited to discuss the candidate's performance, but are not eligible to vote.

2. A two-thirds affirmative vote is required for passing.

3. If a candidate fails the oral examination, the Examination Committee will discuss with the candidate the basis for the decision.
PROGRAM of STUDY: MASTER of SCIENCE in ENVIRONMENTAL BIOLOGY

The Master of Science in Environmental Biology is a specialized degree for students who wish to receive advanced education in environmental aspects of biology. The degree is administered through the Department of Biology, but the student takes coursework in Biology and in Environmental Science and, as appropriate for a particular student, in other appropriate supporting fields. Additionally, at least one member of the advisory and examination committees must be from the Department of Environmental Science. Refer to the section "Program of Study for the Master of Science in Biology" for information regarding assessment of program objectives, advisory committee, thesis proposal, and preparation and submission of thesis.

Program Objectives

1. Students will develop master’s-level knowledge and expertise in ecological and environmental aspects of biology.

   Terrestrial and Aquatic Ecology
   Biomes and Aquatic Life Zones
   Ecosystem Processes and Functions
   Succession
   Evolution
   Human Impacts on Ecosystems

   Invasion and Conservation Ecology
   Human Population Growth
   Human Systems and Sustainability
   Biology of Non-native Species
   Biodiversity
   Extinction

   Environmental Pollution
   Toxicology and Risk Assessment
   Air, Water and Noise Pollution
   Pesticides
   Hazardous and Solid Wastes

   Environmental Management
   Forest and Rangelands
   Wilderness
   Water Resources
   Pollution
   Terrestrial and Aquatic Restoration

   Environmental Ethics
   Frontier Mentality
   Shared Resources
   Leopold’s Land Ethic
   Ecological Design

2. Students will demonstrate familiarity with the relevant literature, and expertise in experimental design, in collection and analysis of data, and in interpretation of results in subject areas pertinent to the student’s thesis research.
3. Students will progress toward entry into the scientific community through participation in professional activities, such as attendance at professional conferences, grantsmanship, publication of research findings, etc.

**Coursework and Research**

Coursework requirements for the M.S. in Environmental Biology are identical to the M.S. degree in Biology, except:

- Six of the 30 semester hours must be selected from 4000-5000 level courses in Environmental Science.
PROGRAM of STUDY: MASTER of SCIENCE DEGREE in LIMNOLOGY

The Master of Science in Limnology is a specialized degree for students who wish to receive advanced education in limnology. Because many students bring diverse undergraduate backgrounds (including biology, other sciences, math, engineering) to this program, a bachelor's degree in biology is not required for admission. As limnology is a field comprising not only biological, but also physical, chemical, geological, and other subdisciplines, each student's curriculum will be designed to match the student's background and career orientation. Hence, it is inappropriate to expect M.S.-Limnology students to develop the same biological background as required for students in the other master's programs in Biology. Refer to the section "Program of Study for the Master of Science in Biology" for information regarding assessment of program objectives, advisory committee, thesis proposal, and preparation and submission of thesis.

Program Objectives

1. The M.S.-Limnology student is expected to develop master’s-level knowledge and expertise in limnology and aquatic biology
   - Limnology
   - Aquatic Ecology
   - Invasion Ecology
   - Restoration & Conservation Ecology
   - Environmental Policy

2. Students will demonstrate familiarity with the relevant literature, and expertise in experimental design, in collection and analysis of data, and in interpretation of results in subject areas pertinent to the student’s thesis research.

3. Students will progress toward entry into the scientific community through participation in professional activities, such as attendance at professional conferences, grantsmanship, publication of research findings, etc.

Coursework and Research

Coursework requirements for the M.S. in Limnology are identical to the M.S. degree in Biology.
PROGRAM of STUDY: MASTER of ARTS DEGREE in BIOLOGY

The purpose of the M.A. degree in Biology is to provide students with advanced education in biology intended to provide the student with a broad perspective of the discipline. For their coursework and study, M.A. students will select one of these as their emphasis: (1) ecology and evolutionary biology, or (2) molecular, cellular and developmental biology. The student should select a graduate advisor with expertise in a field of emphasis. Normally, the student will take several advanced courses in this field, will do an independent research project or independent readings in this field, and will present a research seminar on a topic within this field of emphasis.

Candidates for the M.A. degree are expected to have general knowledge of all major areas of biology. They are expected to demonstrate more-advanced knowledge in their field of emphasis. In addition, candidates are expected to be familiar with research methods in biology and be capable of reading and interpreting original research in their field of emphasis. Students in this degree track are allowed to switch to the thesis degree (i.e. M.S.) during the first year of their program with approval of their faculty mentor.

Objectives

1. Master’s-level proficiency is expected in the five major areas of biology: (1) structure and function, (2) genetics, (3) evolution, (4) cellular and molecular biology, and (5) ecology. M.A.-Biology students select either molecular, cellular, and developmental biology [MCD] or ecology and evolutionary biology [EEB] as their area of concentration:

   **EVOLUTION—FOR BOTH EEB AND MCD CONCENTRATIONS**
   - Age of earth and the fossil record
   - Natural selection
   - Selection and drift
   - Gradualism vs. punctuation
   - Phylogeny and systematics
   - Analogy, homology, convergence
   - Human evolutionary history
   - Classification of biodiversity at higher taxonomic levels

   **CELL & MOLECULAR BIOLOGY—FOR MCD CONCENTRATION**
   - DNA, protein structure
   - Cell signaling, Vesicle Trafficking
   - Post-transcriptional processing
   - Genomics/proteomics
   - Cytoskeletons
   - Cell Behaviors: adhesion, proliferation, differentiation, and death. Techniques

   **GENETICS—FOR MCD CONCENTRATION**
   - Gene/genome duplication; exon shuffling; gene families
   - Gene expression control (change place)
   - Mutations, mutation analysis, molecular aging
   - Mobile elements and genome anatomy
   - Molecular phylogenetics
Mendelian inheritance

**STRUCTURE & FUNCTION—for EEB CONCENTRATION**
- Embryonic development patterns in animals and plants
- Support and terrestrialization
- Osmoregulation and water balance
- Energy processes: photosynthesis, chemosynthesis, cellular respiration
- Roles of essential elements
- Nature of membranes, proton pumps, etc.
- Communication-nervous, endocrine, plant hormones

**ECOLOGY & ENVIRONMENTAL SCIENCE—for EEB CONCENTRATION**
- Population growth
- Community structure
- Energy flow and efficiency
- Niche and competition
- Biodiversity, conservation, restoration, and invasion ecology
- Global biogeochemical cycles and ecosystem processes

2. Students will progress toward entry into the scientific community through participation in professional activities, such as attendance at professional conferences, grantsmanship, publication of research findings, etc.

**Assessment of Objectives**

1. To assess level of expertise, M.A.-Biology students sit for an *oral examination* toward the end of the final semester of studies. Approximately half of the examination evaluates knowledge in evolution and the two areas comprising the concentration (EEB or MCD). The other portion of the examination pertains directly to the research thesis. Each faculty member of the examining committee records his/her evaluation of the proposal on the “Assessment Sheet for the M.A. in Biology” [Appendix].

   The grading scale, in descending order of performance, is: “thorough knowledge and understanding” [score of 5], “better than average” [score of 4], “average” [score of 3], “less than average” [score of 2], and “poor” [score of 1]. Proficiency is indicated by subscores of at least “average.”

**Coursework**

1. A minimum of 30 semester hours of coursework. These 30 hours must include Research Methods in Biology I (Bio 5201; 2 hours), Research Methods in Biology II (5202; 2 hours), and Biometrics (Bio 5412) or other approved statistics course (e.g., STA 5300). At least 12 hours of this coursework must be at the 5000 level. **No more than 12 hours may be taken at the 4000 level, and 4000 level courses MUST be listed in the Baylor University Graduate Catalog (i.e., not all 4000 level courses are eligible for graduate credit).**
2. Up to 4 hours of Seminars in Biology (Bio 5100) and/or Seminars in Biomedical Sciences (BMS 5100) may be applied to the 30 hours of coursework. Repeat credit requires change in topic from previous registrations.

3. Not more than 6 hours of Special Problems in Biology (Bio 5V90) may be applied toward the 30 hours of coursework.

**Advisor and Exit Exam Committee**

The student should select an advisor in the fall semester. The selected advisor should serve as the director of the student's independent research project (5V90 project) and exit seminar. Thus, students should approach faculty who are conducting research of interest to them prior to selecting an advisor. The advisor also will help the student select appropriate courses in accordance with the MA-HP essential core.

During the fall or no later than early spring semester of study, the student will select an advisory committee, consisting of the advisor, at least one additional Graduate Faculty member from the Department of Biology, and one representative from graduate faculty outside the Department of Biology. The committee will administer the exit examination, which follows the student's research seminar near the end of the last semester.

For information on the mechanics of the exit seminar and exam, please refer to the *Scheduling of Exit Seminar and Exam* and *Voting* sections under the **MA-Health Profession**.
GENERAL REGULATIONS and POLICIES

1. All courses taken by the student must be approved by the student's major professor in consultation with the Graduate Program Director. Suitability of courses for credit in the student's program depends on the level of the course (i.e., 4000-level vs. non-4000 level undergraduate courses, undergraduate vs. graduate level) and its relevance to the student's program. The Graduate Program Director, in consultation with the student's major professor, may decline to use tuition remission funds to pay for courses that are not so approved. Additionally, courses not related closely to the objectives of the Biology graduate program also may not be approved for credit toward the graduate degree.

2. Required or other core courses (Research Methods, Professional Skills, Statistics) should be taken during the first year of study.

3. When selecting courses for next semester or when adjusting your schedule for the current semester, be sure to consult with your thesis/dissertation advisor. The Graduate Program Director is another valuable resource in matters related to course selection, registration, etc. Upon completion of registration and any subsequent schedule changes, the student must provide a copy of the printed class schedule to the Graduate Program Director. This copy of your official class schedule is essential for the Graduate Program Director to allocate appropriate tuition scholarship funds to you.

4. The graduate student is expected to maintain a minimum graduate GPA of 3.0 (B) throughout his/her program. Any student failing to maintain this average will be placed on probation; notification of such is by letter from the Graduate Dean. The graduate GPA must be restored to 3.0 during the next 9 hours of coursework in order to remain in the graduate program and regain non-probationary status. The student may not receive financial support (i.e., graduate assistantship or tuition scholarship) from the University while on probation.

5. Continuous enrollment during a graduate career is not required, though enrollment is required during any semester when the student is taking courses or is in residence (i.e., using university facilities and faculty resources) for the purpose of conducting research or writing. Enrollment is required during the semester of graduation. During a semester when a student is not enrolled, he/she is not eligible for a teaching or research stipend or for tuition remission. Additionally, a student may not maintain an office in the Biology Department during a semester when he/she is not enrolled.

6. Computing resources are generally available in various student labs across campus. The Biology Department supports graduate-student computer needs by equipping faculty research labs with computers. Graduate students are generally granted access to computers in the labs of their major professor. Biology maintains a computer teaching lab (BSB A.305) that may be accessed by students when courses are not in session upon request.

7. The Biology Office (BSB B.207) is open and available to graduate students from 8:00 AM until 5:00 PM on business days. Access to the Biology Office is not authorized at other times.
8. Graduate students are allowed to conduct limited photocopying on the machine in the Biology Office. These privileges pertain primarily to copying associated with graduate assistantship duties. Where possible, use reprint cards or email to request research articles from authors. Reprint cards are available free from the Biology Office and the department will pay the postage for these.

9. Several vehicles are operated by the Biology Department to serve teaching and research needs and other purposes of official business. These may be checked out through the departmental office, after proper registration as driver with the department and university (forms available in Biology Office). Posted rules for vehicle use are to be followed by all drivers. Consult with Dr. Baldridge with questions concerning vehicle-use policy.

10. Use of departmental letterhead is restricted to purposes of official university business, such as corresponding with researchers at other institutions, applying for grant support, applying for admission into other academic programs, etc. No one is authorized to use departmental letterhead for making political statements or statements of position; these could be misconstrued as University policy. No student is authorized to use departmental letterhead to request complimentary copies of textbooks; professors may assist in obtaining these.

11. Use of postage, like other departmental resources, is restricted to official University business. The major advisor is always a good source of advice and information on this and many other matters.

12. Each graduate student is assigned a mail slot in the Biology Department office (B.207). This mail slot is one of the places where memoranda, phone messages, and other official and important communications will be placed. It is important to check your mail slot at least once each business day. Failing to check the slot at least once daily may well result in missing an opportunity, such as stipend or tuition support, a seminar announced at the last minute, etc.

13. Each graduate student will have an official (i.e., first_last@baylor.edu) electronic mail account. This has become the predominant means of official communication between the Graduate Program Director and graduate students. **You will need to check your e-mail account several times daily.**

14. **Graduate students are expected to attend regularly scheduled departmental seminars.** No matter what the topic or how well the seminar is presented, you will surely learn something of value by participating. Please view these seminars as part of your graduate educational experience.
FINANCIAL SUPPORT

Application for Graduate Assistantships

A student who is admitted to regular membership in the Biology graduate program may apply for a graduate assistantship by so notifying, in writing, the Graduate Program Director. Generally, teaching assistantships are the only type of graduate assistantships through the departmental graduate budget. Assistantships are awarded to qualified applicants with preference given to those students working toward the Ph.D. degree, although many additional criteria (e.g., GPA, GRE scores, meaningful progress toward the degree) are considered. M.S. students may be supported if funds remain after doctoral students are funded. Nevertheless, early application is desirable as more students may be accepted than there are funds available to support.

Stipend and Tuition Remission

1. Award of stipend support after the first year in the program will be contingent on quality of work performance and on progress made toward the chosen degree. Funding for doctoral students is potentially available for up to 5 years. However, doctoral students and their mentors should strive to obtain external funds for research assistantships for the student’s third and subsequent years. For M.S. students, funding is generally for 2 years. After a student has earned the minimum number of hours required to satisfy degree requirements, generally no further stipend support will be provided.

2. Generally, a maximum of 18 - 20 semester hours of tuition scholarship will be allowed per 12-month academic year (Summer through Spring semesters). Award of tuition scholarships after the first year in the program will be contingent on progress made toward the chosen degree. After a student has earned the minimum number of hours required to satisfy degree requirements, generally no further tuition scholarships will be provided.
Assignment of Graduate-Student Teaching Duties

The intent of assignment of graduate student teaching duties is to provide a strong educational experience for undergraduate students in the supported courses, as well as to provide on-the-job education (in both content and pedagogy) for the teaching assistants. Undergraduate courses with large enrollments generally receive highest priority in staffing with graduate assistants. When possible, graduate assistants will be assigned to courses in which they have prior academic education. Preferences of faculty and graduate students for particular students and courses will be honored when it is feasible.

Responsibilities of Graduate Assistants

1. In accepting the appointment as a graduate assistant in the Biology Department, the student becomes an integral part of the department’s instructional personnel. As such, he/she is obligated to support the standards and policies of the department and the University. Student attitude, appearance, and conduct are expected to be of the highest professional level. Inappropriate behavior, including fraternizing with students, failure to follow directions specified by the Laboratory Coordinator or Instructor, tardiness, violating laboratory safety regulations (e.g., food or beverages in the lab, etc.), and disrespectful behavior to students, staff, or faculty, will be treated very seriously by the Graduate Program Director and Department Chair. Depending upon the severity of the offense, the student will be issued a formal reprimand or be removed from as teaching assistant for one semester. Repeat offenses will result in dismissal from the program.

2. Approximately 15 clock-hours of work per week are required for the full assistantship. This may include required lecture attendance and prep sessions, and grading. If a teaching assignment does not require 15 hours, the graduate assistant will devote the remaining hours to support of his/her major professor's research program.

3. The responsibilities of the graduate assistant may include:

   a. Assuming the responsibility, under the direction of the responsible faculty member, for the highest quality laboratory experience for the student.

   b. Supervising of undergraduate assistants.

   c. Meeting weekly planning and education sessions with the responsible faculty member and undergraduate assistants.

   d. Assuming responsibility for having all necessary equipment and supplies in place prior to the laboratory period and for cleaning the laboratory and equipment and returning these materials to storage when the laboratory is concluded.

   e. Maintaining records of student attendance and equipment breakage and submitting these to the responsible faculty member. Assuming responsibility for maintaining animal-bite or other injury records and informing the appropriate faculty member.

   f. Assisting in preparation, administration, and grading of tests.

   g. Attending course lectures and assisting in roll-taking.
h. Exhibiting an interest in the academic progress of their students by reporting low grades, lack of interest, etc., to the responsible faculty member.

i. Aiding in other general academic duties such as administration of departmental examinations, etc.

**Evaluation**

Graduate assistants will be evaluated by the supervising faculty member each semester. The Graduate Program Director will make these forms available to each faculty member and will make the forms an official part of each graduate student's file. A copy of the evaluation form is included in the Appendix.
APPENDIX of ASSORTED FORMS

This appendix includes many of the forms that you’ll need as you progress through your graduate program at Baylor University. These forms are available to you at the Graduate School or Biology websites.

The following forms are included in this Appendix:

- Progress Checklist for Doctoral Students
- Approval Form for Dissertation/Thesis Proposal
- Assessment Sheet—Assessment of Oral Preliminary Exam and Dissertation Proposal Defense, Ph.D. in Biology
- Assessment Sheet—Assessment of Dissertation Defense and Final Oral Exam, Ph.D. in Biology
- Assessment Sheet—M.S. in Biology
- Assessment Sheet—M.S. in Environmental Biology
- Assessment Sheet—M.S. in Limnology
- Assessment Sheet—M.A. in Biology / MAHP

### Forms Available For Download:

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<tr>
<td>Announcement of Master's Thesis Defense</td>
<td></td>
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</tr>
<tr>
<td>Result of Master's Thesis Defense and Oral Examination</td>
<td></td>
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</tr>
<tr>
<td>Result of Doctoral Preliminary Examination</td>
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<td></td>
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<tr>
<td>Application for Admission to Doctoral Candidacy</td>
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<tr>
<td>Announcement of Doctoral Dissertation Defense</td>
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<td>Result of Doctoral Dissertation Defense and Examination</td>
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<td>Preliminary Review Checklist for Dissertations and Theses</td>
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<td>Final Review Checklist for Dissertations and Theses</td>
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<td>Approval of Final Dissertation/Thesis Copy</td>
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Forms/Materials Not Available For Download?
Contact Sherry_Sims@baylor.edu, or at 710-4610.
# Progress Checklist for Doctoral Students

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</tr>
<tr>
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<td></td>
<td>Bio 5000 (or 4000)</td>
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</tr>
<tr>
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<td>Bio 5202</td>
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<td></td>
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</tr>
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<td></td>
<td>Bio 5000 (or 4000)</td>
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<td>1-7</td>
<td>72-85</td>
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</table>

Notes:
--This schedule pertains for doctoral students not already having a master’s degree. Finishing in 4 years is desirable, although the nature of the dissertation project will be a significant factor in determining whether more than 4 years will be needed to complete degree requirements.

--Doctoral students with a master’s degree can/should accelerate this schedule.
Approval Form for Dissertation/Thesis Proposal  
Department of Biology, Baylor University

In accordance with policies adopted by the faculty of the Department of Biology, graduate students pursuing the Ph.D. or M.S. programs must have prepared a dissertation/thesis proposal that has been approved by all members of the student’s dissertation/thesis advisory committee before he/she is allowed to register for hours of dissertation/thesis research (Bio 6V99/5V99).

Approval of the proposal by the student’s full committee is indicated by presence of their signatures on the appropriate blanks below. Once all signatures are obtained, the student should attach this form to a copy of the proposal, then deliver these to the departmental Graduate Program Director. Thereafter, the student will be allowed to register for thesis research hours.

Date of Thesis Committee Meeting: _________________________

Name of graduate student: ___________________________________________

Title of dissertation/thesis: ___________________________________________

__________________________________________

__________________________________________

Names, Departments, and Signatures

Dissertation/Thesis advisor: ______________________________

Additional Biology Department member: _________________________

Additional Biology Department member: _________________________

Additional Biology Department member: _________________________

Outside of Biology Department member: _________________________

Date submitted to Graduate Program Director: _________________________
**Assessment of Oral Preliminary Exam and Dissertation Proposal Defense**

**Ph.D. in Biology**

Department of Biology, Baylor University

Student Name: ________________________________
Degree: Ph.D. in Biology _______________________
Advisor: ______________________________________
Date of proposal defense: ______________________

<table>
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<tr>
<td>Cell and Molecular Biology</td>
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<td></td>
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<tr>
<td>Genetics</td>
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<tr>
<td>Structure and Function</td>
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<td>Ecology</td>
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<tr>
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<td>Collection and Analysis of Data</td>
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</tr>
<tr>
<td>Effectiveness of Writing or Oral Presentation</td>
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**Summary Scores**

The scores above represent my assessment of this student’s performance on the doctoral oral preliminary exam and dissertation proposal.

Signature of assessing professor: ___________________________ Date: ____________

**Grading Scale:**
- 5: “thorough knowledge and understanding”
- 4: “better than average”
- 3: “average”
- 2: “less than average”
- 1: “poor”
Assessment of Dissertation Defense and Final Oral Exam
Ph.D. in Biology
Department of Biology, Baylor University

Student Name: ________________________________
Degree: Ph.D. in Biology ____________________________
Advisor: ________________________________
Date of proposal defense: ____________________________

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<th>Area</th>
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<td>Cell and Molecular Biology</td>
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<tr>
<td>Ecology</td>
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<tr>
<td>Familiarity with Relevant Literature</td>
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<td>Collection and Analysis of Data</td>
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<tr>
<td>Effectiveness of Writing or Oral Presentation</td>
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</table>

Summary Scores

The scores above represent my assessment of this student’s performance on the doctoral oral preliminary exam and dissertation proposal.

Signature of assessing professor: ____________________________ Date: ______________

Grading Scale:
5: “thorough knowledge and understanding”
4: “better than average”
3: “average”
2: “less than average”
1: “poor”
Assessment Sheet Master of Science in Biology  
Department of Biology, Baylor University

Student Name: ________________________________  
Degree:  M.S. in Biology  
Advisor: ________________________________  
Date of seminar and oral exam: __________________________

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<tr>
<th>Area</th>
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<th>Oral Exam &amp; Thesis Defense</th>
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<tr>
<td>Evolution</td>
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<td>Cell and Molecular Biology</td>
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<td>Summary Scores</td>
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The scores above represent my assessment of this student’s performance on the thesis proposal, exit seminar, and oral thesis defense.

Signature of assessing professor: ___________________________  Date: __________

Grading Scale:  
5: “thorough knowledge and understanding”  
4: “better than average”  
3: “average”  
2: “less than average”  
1: “poor”
Assessment Sheet Master of Science in Environmental Biology
Department of Biology, Baylor University

Student Name: 
Degree: M.S. in Environmental Biology
Advisor: 
Date of exit seminar and/or oral exam: 

<table>
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<td>Invasion and Conservation Ecology</td>
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<td>Environmental Pollution</td>
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<td>Environmental Management</td>
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<tr>
<td>Effectiveness of Writing, Presentation</td>
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Summary scores

The scores above represent my assessment of this student’s performance on the thesis proposal, exit seminar, and oral thesis defense.

Signature of assessing professor: ____________________________ Date: ____________

Evaluation Scale:
5: “thorough knowledge and understanding”
4: “better than average”
3: “average”
2: “less than average”
1: “poor”
**Assessment Sheet Master of Science in Limnology**  
Department of Biology, Baylor University

Student Name: ________________________________  
Degree: M.S. in Limnology  
Advisor: ________________________________  
Date of exit seminar and/or oral exam: ____________

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**Summary scores**

The scores above represent my assessment of this student’s performance on the thesis proposal, exit seminar, and oral thesis defense.

Signature of assessing professor: ___________________________  
Date: ______________

**Evaluation Scale:**
5: “thorough knowledge and understanding”  
4: “better than average”  
3: “average”  
2: “less than average”  
1: “poor”
## Assessment Sheet Master of Arts in Biology, Health Profession

Department of Biology, Baylor University

Student Name: ____________________________
Degree: M.A. in Biology-Health Profession
Advisor: _________________________________
Date of seminar and/or oral exam: ________________

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<td>Genetics</td>
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<tr>
<td>Disease Etiology and Human Response</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Familiarity with Relevant Literature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Design, if applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collection and Analysis of Data, if applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpretation of Results, if applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summary Scores</td>
<td></td>
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</tbody>
</table>

The scores above represent my assessment of this student’s performance on the exit seminar, and oral exam.

Signature of assessing professor: ____________________________ Date: ________________

Grading Scale:
- 5: “thorough knowledge and understanding”
- 4: “better than average”
- 3: “average”
- 2: “less than average”
- 1: “poor”