Graduate Studies in Biology

Villanova University

Revised March 2009
The Graduate Programs in Biology at Villanova

Mission Statement

The Department of Biology at Villanova University provides research training and advanced coursework in a broad range of the biological sciences. The graduate programs seek to build a diverse, intellectual community that enhances the scholarship of all members. The interactions at all levels between students, faculty, and staff enhance all aspects of inquiry in the Department, and we strongly promote the exchange of different ideas and perspectives as an essential part of scholarship. The intellectual community requires of all its members a dedication to excellence in creative and critical thinking, in the analysis and interpretation of existing knowledge, in the execution of descriptive, experimental, and theoretical research, in teaching and in communication. Scholarship in the community is directed at improving our understanding of biological systems and processes in all their diversity, and communicating this understanding in the broadest possible ways. Thus, the programs provide intellectual experiences in a diversity of formats: laboratory and field study, seminar and independent study, and teaching. Each provides the student with advanced training to develop technical and problem solving skills that have broad application. The Graduate Programs in Biology - built on the principle that science is a continuing human endeavor that encompasses research, learning and teaching - prepare students for lives of continuing inquiry.

Please see the Villanova University Catalog for the Mission Statement of the University
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MASTER OF ARTS DEGREE IN BIOLOGY

The Master of Arts degree in the Department of Biology offers students the opportunity to pursue advanced study in biology. The M.A. degree is designed to provide a breadth of training while still allowing the opportunity to concentrate on an area of interest. Our course offerings, the Comprehensive Examination, and many other extracurricular activities (for example, weekly Departmental Seminars) reflect the breadth and depth within the Department.

1. Specific Degree Requirements for the M.A.

   a. A total of 33 credits.

   b. Course requirements.

      Note: Descriptions of courses may be found on the Department of Biology Web Page (http://www.biology.villanova.edu) and in the Office of Graduate Studies, College of Arts and Sciences Catalog. Policies on registration (including procedures for auditing, drop/add, and withdrawing from a course) and grading may be found in the Graduate Studies Catalog. Non-research courses taken to fulfill the requirements for the degree cannot be taken as Pass/Fail.

      • Research Prospectus (Bio 8920) should be taken during the first year of part-time or full-time graduate study. The course includes instruction in a variety of topics of interest to both M.A. and M.S. students.

      • Coursework—Students may take any graduate course (7000 level and above) that satisfies the requirements for the degree. As of Fall Semester 2001, there is no longer a breadth requirement for students in the M.A. program. Students who entered the program prior to Fall 2001 may chose to satisfy the breadth requirement under the old program (at least one course in each of three categories) or may opt to satisfy the new requirements.

Students who wish to specialize may concentrate their coursework in one of two areas of academic focus within the department: (1) Cell, Molecular and Developmental Biology and (2) Ecology, Evolution and Organismal Biology. The department also offers certificate programs in these two areas. M.A. students who take a minimum of 24 credits in one of these fields will receive a degree with a concentration in either area indicated on their transcript (e.g., “Master of Arts, Biology, with concentration in Cell, Molecular and Developmental Biology” or “Master of Arts, Biology, with concentration in Ecology, Evolution and Organismal Biology”). Please see below for list of courses in each of these areas currently offered in the department. M.A. students who take a broader
selection of courses to meet the degree requirements will receive the traditional M.A. diploma at the completion of their studies.

Graduate Courses by Subject Areas

Cell, Molecular and Developmental Biology (CMDB)
  - BIO 7321 Immunology (2 cr)
  - BIO 7322 Immunology Laboratory (2 cr)
  - BIO 7950 Special Topics in Cellular, Molecular, & Developmental Biology* (2 cr)
  - BIO 7960 Advanced Topics in Cellular, Molecular, & Developmental Biology* (3 cr)
  - BIO 8051 Advanced Bacteriology (2 cr)
  - BIO 8052 Advanced Bacteriology Laboratory (2 cr)
  - BIO 8101 Molecular Genetics (3 cr)
  - BIO 8151 Molecular Cell Biology (3 cr)
  - BIO 8171 Molecular Developmental Biology (2 cr)
  - BIO 8172 Molecular Developmental Lab (2 cr)
  - BIO 8251 Endocrinology (2 cr)
  - BIO 8252 Endocrinology Laboratory (2 cr)
  - BIO 8295 Experimental Methods in Cell and Molecular Biology (4 cr)
  - BIO 8455 Molecular Evolutionary Genetics** (3 cr)
  - BIO 8555 Neurophysiology (4 cr)
  - BIO 8601 Pharmacology (2 cr)
  - BIO 8602 Pharmacology Laboratory (2 cr)
  - BIO 8655 Recombinant DNA Technology (4 cr)
  - BIO 8705 Virology (4 cr)

Ecology, Evolution and Organismal Biology (EEOB)
  - BIO 7105 Vertebrate Ecology (4 cr)
  - BIO 7151 Biogeochemistry (2 cr)
  - BIO 7152 Biogeochemistry Laboratory (2 cr)
  - BIO 7205 Comparative Physiology (4 cr)
  - BIO 7601 Paleobiology (4 cr)
  - BIO 7705 Plant Ecology (4 cr)
  - BIO 7755 Plant Ecophysiology (4 cr)
  - BIO 7905 Eukaryotic Microbiology (4 cr)
  - BIO 7921 Sensory Biology (3 cr)
  - BIO 7970 Special Topics in Ecology, Evolution and Organismal Biology* (2 cr)
  - BIO 7980 Advanced Topics in Ecology, Evolution and Organismal Biology* (3 cr)
  - BIO 7955 Biodiversity and Systematics (4 cr)
  - BIO 8455 Molecular Evolutionary Genetics** (3 cr)

Other Courses (can count for either area)
  - BIO 7801 Practice of Biostatistics (3 cr)
  - BIO 8205 Electron Microscopy (4 cr)
  - BIO 8920 Research Prospectus (1 cr)
  - BIO 9007 Directed Research I (2 cr)
  - BIO 9008 Directed Research II (2 cr)
  - BIO 8900 Seminar* (1 cr)
Notes:
* courses vary in their focus; when the course topic is appropriate to the certificate program (as determined by the Biology Graduate Committee), BIO 7940 and 8940 may be used to count toward completion of the certificate.
** course can be counted towards CMDB or EEOB certificates.

- All students must take at least 4 graduate courses with laboratory.

- All students must take at least one Seminar course. This requirement may be fulfilled by either taking a graduate seminar course (Bio 8900) or a Special Topics (Bio 7940) or Advanced Topics (Bio 8940) course offered in a seminar format. The Director of the Graduate Program or Chair of the Department will advise students regarding which courses fulfill this requirement in any given semester.

Note:
✓ M.A. Students may choose to take Directed Research (Bio 9007, 9008). However, this course does not count as a laboratory course. A maximum of 4 credits of Directed Research can be applied to the M.A. degree.

✓ Students may petition the Biology Graduate Committee to have credit for specific graduate courses taken outside of the Department of Biology count toward the degree. A list of courses offered in departments at Villanova University that will automatically be approved are included in the list entitled, Courses Approved For Credit Towards Masters Degrees in Biology in this booklet. Requests for credit for graduate-level courses taken at other Universities must be submitted to the Director of the Graduate Program using the form (Application For Acceptance of Transfer Credits Graduate Program in Biology) in this packet. Such requests must be received at the time of matriculation. A maximum of 9 credits from outside the department will be allowed; only 6 may be from other universities. Only under very restricted circumstances will requests to transfer credits taken after matriculation be considered.

✓ A maximum of 6 credits from graduate courses taken as an undergraduate at Villanova University may be counted toward the Master’s degree.

c. Successful completion of the Comprehensive Examination.

d. Maintenance of a cumulative grade point average $\geq 3.0$.

e. Attendance at weekly Department of Biology Seminars.
All graduate students are expected to attend the Department of Biology Seminars, held weekly throughout the academic year. Teaching Assistants and Research Fellows supported on University or grant funds are required to attend these Seminars.

2. Academic Advisement

Academic advisors are expected to provide guidance to graduate students with respect to completing the requirements for a Masters degree in a timely manner, consistent with: 1) the goals and aspirations of the student, 2) the mission of the graduate programs in Biology at Villanova University, and 3) the rules and regulations of the Office of Graduate Studies, College of Arts and Sciences. The Department of Biology is committed to academic advising that accommodates the needs of all graduate students, taking into consideration the schedules of full-time and part-time students, as well as of faculty. Rather than a rigid system under which each graduate student is assigned a specific faculty advisor, we offer a more informal structure that guarantees that advisement will be available while providing students flexibility in seeking out advisors.

Full-time students just entering the program initially shall be placed under the advisorship of the Director of the Graduate Program, who at a minimum will assist the student in registering for their first semester of courses and will inform the student of the various degree requirements. Graduate students may continue under the advisorship of the Director of the Biology Graduate Program if they wish, but always have the option of seeking advice from any member of the Biology graduate faculty, all of whom have authority to sign course registration forms.

Part-time students represent a particular operational challenge to advising because most are not physically present in Mendel Hall during the day. Therefore, these students are encouraged to contact the Director of the Biology Graduate Program via email or phone.

Students who are approved to pursue the M.S. degree will be advised by their thesis mentor and their thesis Advisory Committee.
3. Comprehensive Examination

a. Philosophy

All students receiving the M.A. Degree will complete a Comprehensive Examination. This examination is considered a capstone experience for M.A. students, for it provides an opportunity for the student to explore specific questions beyond the level typical of most courses. Answering the questions on the examination will require use of both the primary and secondary literature.

The Comprehensive Examination consists of a written and an oral component. The format of the Comprehensive Examination reflects two of the goals of the Master’s programs in Biology. First, the examination is designed to promote critical thinking on the part of the student. This goal is reflected not only in the questions themselves but also in the discussion of the answers in the oral portion of the Examination. Second, both the written and oral portions of the examination promote effective communication of scientific ideas and research results. We view both of these goals as processes; as such, we encourage active interaction between the student and the members of the Examination Panel.

b. Procedures

The Comprehensive Examination involves several steps that require planning well before beginning the Exam. To take the Exam, the M.A. student must be in their last semester or have completed at least 24 hours of course credit. The first step in the process is the formation of an Examination Panel. Each Exam will be administered by a three-member Panel chosen in part by the student and in part by the Graduate Committee. When preparing to take the Comprehensive Examination, the student will choose the Chair of the examination panel from the Villanova Biology Graduate Faculty. In addition, the student will provide the names of five additional Graduate Faculty members willing to serve on the Examination Panel. Research Assistant Professors (or ranks above) may serve as either the Chair or one of the additional members of the M.A. examination panel. Teaching postdoctoral fellows who have taught or are teaching graduate courses, as well as full-time tenured or tenure track faculty members who are not on the Graduate Faculty may serve as panel members, but not as Chair. No more than one such panel member may serve on any single examination panel. The student will notify the Director of the Graduate Program that he/she is ready to take the Comprehensive Exam and to indicate their choices for their Examination Panel by submitting an Application for Comprehensive Examination form (typed or word processed) at least one month prior to the date on which the exam will be given to
the student. Once the form is received, the Department of Biology Graduate Committee will appoint the two additional members from the list provided by the student to serve on the Panel.

The Chair the student chooses will serve an especially important role on the Examination Panel. The Chair will be responsible for overseeing the examination. This includes, (1) helping determine the schedule for both the written and the oral components of the examination in consultation with the student and the other two members of the Examination Panel; (2) ensuring that all members of the examination panel receive copies of the questions asked by the other panel members; and (3) ensuring that all members of the examination panel receive copies of the written answers of the student.

Each member of the Panel will submit three questions (for a total of nine questions for each Comprehensive Examination). At least one of the questions from each Panel member must address the scientific method, including experimental design and hypothesis testing. After receiving the questions, the student will have six weeks to answer any two of the questions asked by each Panel member (total of six questions). At least one of the six answered questions must pertain to the scientific method mentioned above. The test is to be an open note, open book test that will require library work using primary literature and should be appropriately referenced. The student is especially encouraged to approach the Panel members with inquiries regarding the scope and content of the specific questions.

The schedule for the Comprehensive Examination follows a predetermined course; the student and all faculty involved in the Exam must complete the form entitled, *Timetable for the Comprehensive Examination* prior to receiving the questions. The schedule for the Exam is as follows:
The student must return the completed exam to the Panel Chair within the allotted time.

The panel will notify the student in writing of his/her performance on the written portion of the Exam no later than seven weeks after the student receives the questions. To be able to proceed to the oral portion of the Exam, the student must satisfactorily answer four of the six questions (including at least one from each Panel member). The oral portion of the exam will be scheduled at any time that is convenient for the four participants, but no later than eight weeks after the student received the questions. Questions answered unsatisfactorily will be pointed out and the student encouraged to research the topic more thoroughly before taking the oral portion of the Exam. If three or more questions are answered unsatisfactorily (or two questions from any one Panel member), the student will not be permitted to take the oral portion of the Exam, and he/she will have to reapply to take the Exam the following semester. Note that in order to graduate by a specific date, the Exam must be taken prior to the final date for Comprehensive Examinations set by the Office of Graduate Studies in the College of Arts and Sciences.

The oral exam will be scheduled for two hours. Each Panel member will direct two, 20-minute periods for questioning (one during each hour). The written component will be used as a basis for the oral examination; the questions should be an elaboration (or defense) of the written questions, but may go beyond the questions.
and explore new but related areas of biology. The oral Examination need not necessarily cover all six questions during the period.

After the end of the two hours, the Panel will excuse the student to discuss the results of the Exam. To pass the Exam, all three Panel members must agree that the student has performed at a passing level. The student fails if one or more members concludes that the student has performed at a failing level. The student will be notified immediately of the results. At this point, the Comprehensive Examination Report should be completed and filed in the student’s permanent file.

If the student fails the Exam, he/she can retake the Exam the following semester following the same procedures as above. A new Panel will be formed for the second Examination. The Comprehensive Examination can be taken only once during a semester. If the student fails the Examination a second time, he/she will be dropped from the Graduate Program.
CHECKLIST FOR M.A. STUDENTS

This checklist is intended to serve as a guideline for both students and faculty.

☐ 1. Meet with your Academic Advisor.
   You will be assigned an academic advisor. The advisor can provide advice on specific courses as well as information regarding the philosophy and requirements of the degree.

☐ 2. Prepare a program of study.
   Consult your academic advisor and other faculty members in the Department to plan your curriculum. Include Research Prospectus (Bio 8920), at least one course in the seminar format, and four laboratory courses in the program of study. If you want to receive a Concentration in a particular area, include at least 24 credits in one of the two areas (Cell. Molecular and Developmental Biology or Ecology, Evolution and Organismal Biology).

☐ 3. Prepare for the Comprehensive Examination.
   When you are in your last semester and/or after completing at least 24 credits (earning a GPA ≥ 3.0) and at least 1 month before wanting to begin the Exam,
   a. Obtain consent of a faculty member to serve as Chair of Comprehensive Examination Panel.
   b. Obtain consent of five additional faculty members willing to serve on Examination Panel.
   c. Complete the Application for Comprehensive Examination form prepared by the Biology Department and submit to the Director of the Graduate Program. If all requirements are met, the Graduate Committee will create the Panel in part based on areas of interest. Once approved, the form will be placed in the student's file.
   d. Determine the timetable for the Comprehensive Exam, and complete the Timetable for the Comprehensive Examination form, including obtaining signatures of members of the panel. Make copies for the student, the student’s permanent file, and each member of the Examination Panel, and submit the original to the Chair of the Graduate Committee.
   e. Complete and submit an Application for Comprehensive Examination form prepared by Graduate Studies (http://www.villanova.edu/artsci/college/academics/graduate/policies/) and submit to the Graduate Studies Office at least 2 weeks prior to your exam..

☐ 4. Submit Application for Granting of Master's Degree form to the Office of Graduate Studies early in the semester in which you plan to finish.

☐ 5. Take the written portion of the Comprehensive Examination.
   Receive the comprehensive examination questions from the Examination Panel, and research and prepare written answers. Consult with members of the Examination Panel as necessary. Submit answers to the Panel Chair no later than six weeks after receiving the questions.

☐ 6. Receive comments by panel members and schedule oral examination.
   Receive provide feedback from Panel members within one week of finishing the written portion of the Exam. The oral portion of the Exam should be scheduled within two weeks of when the student submitted their answers. Revise answers as necessary to prepare for oral.

☐ 7. Take oral examination and complete the form, Comprehensive Examination Report, and submit to the Director of the Graduate Program.
The members of the Examination Panel will complete the *Comprehensive Examination Report* form indicating whether the student has successfully completed the Exam. Two copies of the completed form should be submitted to the Director of the Biology Graduate Program, one copy for the Dean of Graduate Studies in the College of Arts & Sciences and the other for the student's permanent file.

8. Submit the *Grade for Comprehensive Exam* form available on-line (http://www.villanova.edu/artsci/college/academics/graduate/policies/) to the Graduate Studies Office.
MASTER OF SCIENCE DEGREE IN BIOLOGY

The Master of Science degree in the Department of Biology offers students the opportunity to pursue advanced study in biology through both coursework and independent research. All M.S. students will prepare and defend a thesis based on their independent research.

1. Specific Degree Requirements for the M.S.

   a. A total of 30 credits.

   b. Course Requirements.

   Note: Descriptions of courses may be found on the Department of Biology Web Page (http://www.biology.villanova.edu) and in the Office of Graduate Studies, College of Arts and Sciences Catalog. Policies on registration (including procedures for auditing, drop/add, and withdrawing from a course) and grading may be found in the Graduate Studies Catalog. Non-research courses taken to fulfill the requirements for the degree cannot be taken as Pass/Fail.

   • A minimum of 20 credits of formal course work (typically, 7000 level and above; see below) must be completed. This includes Research Prospectus (Bio 8920), which should be taken within the first year of part-time or full-time study.

   • A maximum of 10 research credits (Directed Research: Bio 9007, 9008; Thesis Research: Bio 9307, 9308, 9309) can be applied toward the M.S. degree.

   Directed Research may be taken as introductory research courses prior to the formation of a student's Advisory Committee. At the end of each semester, each student registered for Directed Research will receive either a P (pass) or NP (no pass) grade.

   A student may register for Thesis Research only after that student's Advisory Committee has been formed and a Program of Study has been approved. No more than 5 credits of Thesis Research may be taken in any semester. Students registered for Thesis Research will receive the grade of IP (in progress) at the end of each semester; the IP designations will be converted to P (pass) designations only after the student's Masters thesis has been defended successfully.

   Students may accumulate up to 5 research credits (Directed Research and/or Thesis Research) prior to presenting their thesis research proposal. However,
registration for research credits beyond these first 5 will be allowed only for students who have successfully presented their thesis research proposal.

A student may not register for both Directed Research and Thesis Research in the same semester.

Note:

✓ Students may petition to have credit for specific graduate courses taken outside of the Department of Biology count toward the degree. A maximum of 9 credits for courses taken outside of the Department of Biology may count toward the degree; only 6 may be from other Universities. Courses taken at Villanova, but in departments other than Biology, must be approved by the student's Advisory Committee and must be included on the Program of Study form. A list of courses offered in departments at Villanova University that will automatically be approved are included in the list entitled, Courses Approved For Credit Towards Masters Degrees in Biology in this booklet. Requests for credit for graduate-level courses taken at other Universities must be submitted to the Director of the Graduate Program using the Application for Acceptance of Transfer Credits form. Such requests must be received at the time of matriculation. A maximum of 9 credits from outside the department will be allowed; only 6 may be from other universities. Only under very restricted circumstances will requests to transfer credits taken after matriculation be considered.

✓ A maximum of 4 credits of undergraduate biology courses taught at Villanova (i.e., courses below 7000 level) may be counted toward the degree with the approval of a student's Advisory Committee. Beginning in Spring 2002, rather than registering for the relevant approved undergraduate course number students will sign-up for BIO 9102 (2 credit hours), BIO 9103 (3 credit hours) or BIO 9104 (4 credit hours), depending on the number of credit hours of the course. The student must inform the course instructor that he/she will be invoking this option. It is recommended that this be done as early as possible so that a space in the course may be reserved should the course fill. Undergraduate course credits accumulated prior to entering the M.S. degree program will not count toward the degree.

c. A written thesis research proposal and an oral presentation of the proposed research in a public seminar.

e. Maintenance of a cumulative grade point average \( \geq 3.0 \).

f. Attendance at weekly Department of Biology Seminars.

All graduate students are expected to attend the Department of Biology Seminars, held weekly throughout the academic year. Teaching Assistants and Research Fellows, supported on University or grant funds, are required to attend these Seminars.

2. Provisional Academic Advisor, Thesis Mentor, and Advisory Committee

Students pursuing the M.S. degree are required to conduct independent research under the direction of a Villanova faculty member, the Thesis Mentor. The Thesis Mentor not only will have primary responsibility for directing the student's research, but also will act as the Chair of the student's three-person Advisory Committee. In a general sense, the Advisory Committee is expected to play an active role in guiding the graduate education and intellectual development of the student. More specifically, working with the student, the Advisory Committee has responsibility for approving the student's program of study (formal course work), the student's written thesis research proposal and oral presentation, and the student's written thesis and oral defense. Thus, selection of a Thesis Mentor and an Advisory Committee are important decisions for those students wishing to pursue the M.S. degree.

Many students begin their graduate studies in Biology at Villanova with questions about whether an M.A. or M.S. degree would be more suitable for their own goals. The Department of Biology offers an approach to academic advising that ensures that faculty will be available to both full-time and part-time graduate students (see Academic Advising section). As a part of their academic advisement role, advisors can help a student identify faculty whose research seems to overlap with the student's interests. The brief faculty presentations in the Research Prospectus course also are useful in this regard.

Students contemplating pursuing an M.S. degree are encouraged to make that decision as early as possible in their graduate career. The logical first step toward this end is obtaining a Thesis Mentor. Preferably during the first semester of study for full-time students, and early on in the tenure of part-time students, those contemplating an M.S. degree are encouraged to discuss thesis research possibilities with several Biology Graduate Faculty. Some students may come to Villanova having already discussed thesis research possibilities with one or more faculty
members, and some may come with a preliminary commitment from a particular faculty member to serve as their Thesis Mentor. Prior discussions with and/or commitments from individual Biology faculty are not a requirement for pursuing the M.S. degree.

The Application for Thesis Option form is the vehicle by which the Thesis Mentor and Advisory Committee are created. Through this form, a single Thesis Mentor, who must be a tenured or tenure-track Biology Graduate Faculty member, and exactly two additional Advisory Committee members, are identified. Research Assistant Professors (or ranks above) may serve as either the thesis mentor or as one of the additional members of the M.S. Advisory Committee. Such professors will also be expected to perform other functions associated with the Graduate program upon request (e.g., evaluation of graduate research fellowships, serving as moderator for the thesis proposal and/or thesis presentation, etc.). At most, one member of the Advisory Committee may come from outside the Department of Biology, subject to approval by the Biology Graduate Committee. A Curriculum Vitae for such a potential Advisory Committee member must be submitted along with the Application for Thesis Option form. In addition, these individuals will be required to indicate in writing that they have been made aware of and agree to abide by the rules and regulations of our M.S. program. Of particular relevance, the Thesis Mentor and Advisory Committee members are required to attend the student’s thesis research proposal presentation and thesis defense. The Department of Biology assumes no responsibility for any travel costs that may be incurred by an Advisory Committee member who is not a Villanova Biology Graduate Faculty member to attend either the proposal or thesis presentations.

Changes in the composition of a student’s Advisory Committee may be made only if the student petitions the Chair of the Department of Biology, who will evaluate the petition in consultation with an appointed Review Committee.

3. Program of Study

Once the Application for Thesis Option is approved, the student and the Advisory Committee will work together to formulate a Program of Study for the student. Specifically, the group collectively will decide which courses the student will take during his/her tenure at Villanova. A word-processed or typed Program of Study form, signed by the student and each member of the Advisory Committee, will be submitted to the Director of the Biology Graduate Program. The Director of the Biology Graduate Program, having checked the Program of Study for consistency with all requirements for the degree, will place the completed form in the student’s permanent file. Any subsequent changes to the student’s Program of Study must be
approved by all members of the student's Advisory Committee in a memorandum delivered to the Director of the Biology Graduate Program, who, after verifying that the changes are consistent with all requirements for the degree, will place the memorandum in the student’s permanent file.

4. Restrictions on M.S. Thesis Research

The Department of Biology recognizes that not all research can take place within the confines of Mendel Hall. In particular, field research and studies involving equipment and/or facilities that are not available within the Department may dictate that students conduct some or all of their research elsewhere. Students are not prohibited from conducting research elsewhere when doing so is necessary or intellectually justifiable. However, the Department embraces the concept that the intellectual development of graduate students is enhanced through active participation in Departmental activities. Specifically, all graduate students are expected to attend the weekly Department of Biology Seminars. Also, participation in informal journal clubs, opportunities for impromptu discussions between and among students and faculty, opportunities to meet researchers who "pass through town," etc. require graduate students to be physically present and to be mentally receptive to being active Departmental citizens.

The Department of Biology absolutely prohibits students who are gainfully employed as researchers to use the work for which they are paid as thesis research. Thesis research must be an independent activity in which the student has a substantial personal intellectual investment. Work done in the context of a job meets neither of these criteria. Under some circumstances, it may be possible for a student to conduct some parts of their research at their place of employment, as long as: 1) the student is not being paid by the employer to conduct the thesis research, 2) the student’s thesis research is as independent as research that might be done outside of his/her place of employment, and 3) the research is the intellectual product and property of the student and not of the company. The Biology Graduate Committee reserves the right to request that a student's employer certify their assent to and/or compliance with these policies in writing. Wherever thesis research is conducted, it will be carried out under the supervision of a Biology Graduate Faculty Member as Thesis Mentor.
5. Written and Oral Presentation of Proposal for Thesis Research

a. Philosophy

Research is a human endeavor, which begins with an idea and culminates in the dissemination of findings to the larger scientific community. Although characterization of these steps as a linear progression may be overly simplistic, the structure of the M.S. degree acknowledges that research progresses through a series of phases: a conceptualization phase (getting an idea), a design phase, a data collection phase, an interpretation and synthesis phase, and a final writing and dissemination phase. Critical thinking and analysis play a central role through all phases of this progression. As a mechanism for a student to demonstrate mastery of the conceptual and design phases, our program requires the student to prepare a written thesis research proposal and to present the proposed research in a public seminar.

In the written proposal, the student should: 1) demonstrate a thorough knowledge and understanding of the historical and current literature relevant to the proposed research, 2) present a clear statement of hypotheses (objectives, questions), consistent with the literature, 3) present a detailed experimental design and set of procedures needed to address the stated hypotheses, 4) describe how the data obtained will allow for the acceptance or rejection of the stated hypotheses. Preliminary data, especially if presented to demonstrate familiarity with methods, may be included in the written proposal. However, preliminary data are not required. Indeed, given the rationale stated above, the written proposal is not meant as a progress report for thesis research already well into the data collection phase.

The oral presentation of the student’s proposed thesis research is consistent with the Departmental philosophy that scientists need to develop skills to communicate research ideas and results to their colleagues both orally and in writing. More specifically, the oral presentation serves two complementary functions that are not well served by the written proposal. First, the oral presentation informs the faculty and students in the Department of Biology about the proposed research. This sort of communication helps build a spirit of community in a diverse Department. Second, the oral presentation serves as a mechanism by which the student may solicit constructive comments about the proposed research. Research must not be conducted in a vacuum. All researchers need to be intellectually open to comments and to constructive criticism, as well as to new ideas. Discourse and discussion play important roles in this regard.
Satisfactory performance on the written proposal and the oral presentation, as judged only by the student's Advisory Committee, constitutes an endorsement of the student's intent to continue the research into the data collection phase toward eventual completion and defense of a thesis.

b. Procedures

Each M.S. student will submit a written thesis proposal to the members of his/her Advisory Committee for review and comment. It is the responsibility of the Advisory Committee to pass judgment on the written proposal; thus, it is likely that one or more revisions of the written proposal will be required. The Advisory Committee's unanimous approval of the written proposal is indicated by submitting the completed Approval of Written Thesis Proposal form, along with a copy of the proposal, to the Director of the Biology Graduate Program. At this point, the written proposal is considered to be complete; the Advisory Committee may not require further revision. After submitting this form, the student will post an announcement for the oral presentation, giving at least one week's notification between posting and the date of the presentation. The announcement will include: the title of the thesis proposal; the date, place, and time of the oral presentation; and an abstract of the proposed thesis research, directed toward a general biology audience. The announcement should be distributed to all faculty and graduate student mailboxes, and should be posted on the graduate student bulletin board and the Department of Biology seminar bulletin board.

The oral presentation must be attended by all members of the student's Advisory Committee. A Moderator, a Biology faculty member chosen by the student (but who is not on the student's Advisory Committee), will preside at the presentation. The Moderator will introduce the student, identify the student's Thesis Mentor and Advisory Committee members, and announce the protocol for the presentation/defense. During the presentation, which should take about 35-40 minutes, the Thesis Mentor is not allowed to speak. Following the presentation, the student should expect to field questions poised first by the general audience, then by the Advisory Committee members, and finally by the Thesis Mentor. The Moderator will identify questioners and may intervene if, for example, the student seems to not understand a particular question or if a line of questioning seems inappropriate. At the end of the question period, the student and the Advisory Committee will meet privately for an additional session to further discuss aspects of the presentation and/or the proposed research.

Satisfactory performance on the oral presentation (requiring a unanimous vote of the student’s Advisory Committee) will be conveyed to the Director of the Biology
Graduate Program through the submission of the signed *Evaluation of Thesis Proposal Presentation* form. Should the Advisory Committee find the student's performance on the oral presentation to be unsatisfactory (one or more negative votes), the Advisory Committee will provide the student with specific written suggestions for improvement, using the *Evaluation of Thesis Proposal Presentation* form. The student will be allowed to repeat the oral presentation; unsatisfactory performance in the second presentation will result in the student being dropped from the M.S. program. In this event, the student may petition the Biology Graduate Committee to transfer into the M.A. program; the extent to which research credits accumulated as an M.S. student will count toward the M.A. degree will be determined by the Graduate Committee.

6. Written and Oral Presentation of Thesis Research

a. Philosophy

The structure of the M.S. program in Biology dictates that a student's research is planned to address specific hypotheses, objectives, or questions. Successful completion of the proposal phase of the M.S. program represents the Advisory Committee's endorsement of the student to continue his/her research beyond the conceptualization and design stages of the process. After completing data collection, interpretation, and synthesis, the student must successfully complete the dissemination phase through the preparation of a written thesis and defense of the thesis in a public seminar.

The written thesis is the permanent physical record of the research completed by an M.S. student. The written thesis should: 1) reaffirm a thorough knowledge and understanding of the historical and current literature relevant to the research, incorporating information from publications that have appeared since approval of the written thesis proposal, 2) restate the hypotheses (objectives, questions) upon which the research was focused, 3) present the experimental design and procedures that were used in sufficient detail so that the research could be repeated by another investigator, 4) present results, clearly and with appropriate synthesis and/or statistical analysis, 5) interpret the results in light of the specific hypotheses and in light of extant literature, 6) provide a clear statement of conclusions that can be drawn from the research.

The oral thesis defense serves two complementary purposes. First, the thesis defense serves to inform the faculty and students in the Department of Biology about the student's research. Second, and perhaps more importantly, the thesis defense provides a forum in which the student has the opportunity to convince a
general biology audience that the research hypotheses were well-conceived and relevant to a particular discipline within biology, that the experimental design and protocols were appropriate, that the results are sound, and that the interpretations are reasonable. The thesis defense also provides an opportunity to make a strong statement regarding the extent to which the research has advanced science. In requiring the oral thesis defense of M.S. students, the Department of Biology affirms the principle that all scientific research must be disseminated to the greater scientific community, where it can be evaluated critically before the research can be accepted as valid.

b. Procedures

Upon completion of the thesis research, the student will prepare a written thesis following the guidelines of the Department of Biology (Guidelines for the Preparation of a Masters Thesis, available in the Department office) and of the Graduate Studies Office in the College of Arts and Sciences (http://www.villanova.edu/artsci/college/academics/graduate/policies/thesis/). These guidelines (effective January 2006) should be followed precisely, as the Graduate Studies Office will be checking the document before accepting it for submission to ProQuest (see below). A Title Page should be included at the front of the thesis; in addition to the information on the Sample Title Page (see http://www.villanova.edu/artsci/college/academics/graduate/policies/thesis/), include all three members of the Advisory Committee at the bottom. The thesis is then submitted to the Advisory Committee for review and comment. Inasmuch as it is the responsibility of the Advisory Committee to pass judgment on the thesis, it is likely that one or more revisions of the thesis will be required. Before proceeding to the oral presentation and defense, all members of the Advisory Committee must approve the final version of the thesis, indicating their approval by signing the Approval of Written Thesis form. In signing this form, the Advisory Committee indicates that no further substantive revisions of the thesis are required, while leaving open the possibility for relatively minor corrections that could be made in the "page proof" stage of the publication process.

After submitting the signed Approval of Written Thesis form to the Director of the Graduate Program, the student will post an announcement of the upcoming thesis defense, giving at least one week’s notification between posting and the date of the defense. The announcement will include: the full title of the thesis; the date, place, and time of the defense; and an abstract of the thesis, directed toward a general biology audience (typically, this abstract will be different from the Abstract contained in the written thesis). The announcement should be distributed to all
faculty and graduate student mailboxes, and will be posted on the graduate student bulletin board and the Department of Biology seminar bulletin board.

The thesis defense must be attended by all members of the student's Advisory Committee. A Moderator, a Biology faculty member chosen by the student (but who is not on the student's Advisory Committee), will preside at the defense. The Moderator will introduce the student, identify the student’s Thesis Mentor and Advisory Committee members, and announce the protocol for the defense. During the presentation, which should take about 35-40 minutes, the Thesis Mentor is not allowed to speak. Following the presentation, the student should expect to field questions posed first by the general audience, then by the Advisory Committee members, and finally by the Thesis Mentor. The Moderator will identify questioners and may intervene if, for example, the student seems to not understand a particular question or if a line of questioning seems inappropriate. At the end of the question period, the student and the Advisory Committee will meet privately for an additional session to further discuss aspects of the thesis defense.

The Advisory Committee will determine whether the student passes (unanimous vote of the Committee) or fails (one or more negative votes) the thesis defense. Should the student successfully defend the thesis research, the Advisory Committee will sign at least two copies of the Approval Form to accompany the final copy of the thesis (using the Approval Form adapted for the Department of Biology, included at the end of this handbook) after confirming that the format of their written thesis conforms to all of the guidelines set by the Graduate Studies Office (see website above). The thesis must then be approved by the Chair of the Department, who will indicate approval by also signing the Approval Form. The student will then submit one hardcopy of the thesis along with the signed Approval Form to the Graduate Studies Office, College of Arts and Sciences. After approval from the Graduate Studies Office, the student will submit an electronic version of a pdf of the Master’s Thesis (with Approval Form omitted) to the online ProQuest site (http://dissertations.umi.com/villanova/). This site will give specific step-by-step instructions to submit the master’s thesis. Make certain that all fonts and figures are properly embedded in the document. In addition, the student must provide a bound copy of their thesis to the Department of Biology, with a signed copy of the Approval Form inserted immediately following the Title Page. (If the student intends to produce additional bound copies of the thesis, additional signed copies of the Approval Form will be needed.) It is customary to provide a bound copy of the thesis to each member of the Advisory Committee as well, but students should check with their committee members to see if they would prefer an electronic or hard copy version. To obtain bound copies ($15 per
copy in 2009), deliver the desired number of collated hard copies to the Current Periodical Room in Falvey Memorial Library; check the website (http://library.villanova.edu/howdoi/ThesesGuidelines.htm) for more information.

Should the student fail the thesis defense, the Advisory Committee will communicate both the reasons for failure and recommendations to remedy the situation to the student immediately using the Unsuccessful Defense of Thesis form. The student will be afforded a second opportunity to present the thesis defense, which must be passed for the student to receive the M.S. degree.

Include a title page for your thesis as page 1. Use the following format (note: (1) fields indicated with “< >” are unique to student (do not include brackets in final!); (2) adjust final copy to full page format with proper spacing):

FULL TITLE OF THESIS

A Thesis presented to
the faculty of the Department of Biology
Villanova University

In Partial Fulfillment
of the Requirements for the Degree of
Master of Science in Biology

By
Student name
<Month, Year thesis completed>
7. Transfer from M.S. Degree option to M.A. Degree option

Transfer from the M.S. program to the M.A. program is possible, but may result in the loss of some credits. Students planning such a change should discuss it with their thesis mentor and the director of the graduate program. Notification (hard copy) that this change is being made should then be sent to the director of the graduate program in Biology and to the Graduate Dean’s office. In such cases, any thesis research credits taken will be assigned a grade of "WX" and will not count towards the 33 credits needed for completion of the degree. Up to 4 research credits taken as Directed Research, however, can be counted towards the M.A. and will be unaffected by the transfer from one program to the other. It is the responsibility of the student to register and pay for any additional courses that may be necessitated because of the withdrawal from thesis research courses or the additional credit requirement (33 vs 30 credits) of the M.A. program relative to the M.S.
CHECKLIST FOR M.S. STUDENTS

This checklist is intended to serve as a guideline for both students and faculty. Note that the items listed below must be completed in the order in which they are listed.

1. Determine a Thesis Mentor and form an Advisory Committee.

   The completed Application for Thesis Option form should be submitted to the Director of the Biology Graduate Program. If an Advisory Committee member is not a full-time Villanova Biology faculty member, a Curriculum Vitae and a written statement that he/she has been made aware of and agrees to abide by the rules and regulations of our M.S. program must accompany this form. The student should submit the completed form to the Director of the Biology Graduate Program. Subsequent to Biology Graduate Committee approval, the Director of the Biology Graduate Program will place the form in the student’s permanent file.

2. Prepare a program of study.

   The completed Program of Study form should be submitted to the Director of the Biology Graduate Program who, after checking the Program of Study for consistency with all requirements for the degree, will place the form in the student’s permanent file.


   The student should submit the completed Approval of Written Thesis Proposal form to the Director of the Biology Graduate Program who will place the form, along with a copy of the written thesis proposal, in the student’s permanent file. After submitting this form, the student will post an announcement of the oral presentation, giving at least one week’s notification between posting and the date of the presentation.

4. Present the thesis proposal in a public seminar.

   Using the Evaluation of Thesis Proposal Presentation form, the student's Advisory Committee will indicate that the oral presentation of the thesis proposal was either satisfactory or deficient. The Thesis Mentor should submit the completed form to the Director of the Biology Graduate Program who will place the form in the student's permanent file.

5. Prepare written thesis and receive its approval by the Advisory Committee.

   In preparing the thesis, the student should consult the most recent A Guide to the Writing of the Master’s Thesis distributed by the Office of Graduate Studies in the College of Arts and Sciences for a general description of the required format for the written thesis. In addition, the student should follow the guidelines distributed by the Department of Biology (Guidelines for the Preparation of a Masters Thesis) for more specific details concerning both content and format.

   The Advisory Committee must unanimously approve the final version of the thesis, indicating their approval by signing the Approval of Written Thesis form. In signing this form, the Advisory
Committee indicates that no further substantive revisions of the thesis are required, while leaving open the possibility for relatively minor corrections that could be made in the “page proof” stage of the publication process. The completed form should be submitted to the Director of the Biology Graduate Program who will place the form in the student’s permanent file.

☐ 6. Submit *Application for Granting of Master’s Degree* form to the Office of Graduate Studies early in the semester in which you plan to defend.


After submitting the *Approval of Written Thesis* form, the student will post an announcement of the upcoming thesis defense, giving at least one week’s notification between posting and the date of the defense. In the event that the student’s Advisory Committee finds that the student’s defense of the thesis research was deficient, explanation of the Committee’s decision and recommendations for remedying the student’s status must be communicated to the student using the *Unsuccessful Defense of Thesis* form. Thesis Mentor should submit the completed form to the Director of the Biology Graduate Program who will place the form in the student’s permanent file.

☐ 8. Complete and submit the Approval Page to the Graduate Studies Office.

☐ 9. Submit the Thesis to the Office of Graduate Studies, College of Arts and Sciences

After the Advisory Committee approves the final version of the thesis, complete an *Approval Form* available through the Graduate Studies Office (see the website [http://www.villanova.edu/artscl/college/academics/graduate/policies/thesis/](http://www.villanova.edu/artscl/college/academics/graduate/policies/thesis/) for a Sample *Approval Form*) by obtaining all of the necessary signatures and submit to the Graduate Studies Office. After approval from the Graduate Studies Office, submit an electronic version of a pdf of the Master’s Thesis to the on-line ProQuest site ([http://dissertations.umi.com/villanova/](http://dissertations.umi.com/villanova/)). Make certain that all fonts and figures are properly embedded in the document. In addition, provide four additional copies of their thesis (one for the Department of Biology, and one for each Advisory Committee member); these copies can be bound in the Current Periodical Room in Falvey Memorial Library for a small fee ($15 per copy in 2006); check the website ([http://library.villanova.edu/howdoi/ThesesGuidelines.htm](http://library.villanova.edu/howdoi/ThesesGuidelines.htm)) for more information.

☐ 10. Submit (through your mentor) a *Change of Grade Form* (available through Department office) in order to count any credits earned in Research II and Research III.
CERTIFICATE AND ADVANCED CERTIFICATE
OF GRADUATE STUDY IN BIOLOGY

The Graduate Program in the Biology Department offers two Certificate programs for students who do not wish to pursue the full Master’s degree. These programs are suitable for either full- or part-time students, and include coursework primarily in one of two areas – Cell, Molecular, and Developmental Biology or Ecology, Evolution and Organismal Biology. Qualified students in a certificate program may apply for acceptance to either the M.A. or the M.S. degree programs.

1. Specific Course Requirements for the Certificate and Advanced Certificate

A Certificate of Graduate Study in Biology requires:
- a minimum of 16 credit hours of courses
- at least three lab courses from the list associated with the subject area.

A Certificate of Advanced Graduate Study in Biology requires:
- a minimum of 24 credit hours of courses
- at least four lab courses from the list associated with the subject area.

Students must maintain a 3.0 GPA in their program courses in order to receive a certificate.

Graduate Courses by Subject Areas

**Cell, Molecular and Developmental Biology (CMDB)**
- BIO 7321 Immunology (2 cr)
- BIO 7322 Immunology Laboratory (2 cr)
- BIO 7950 Special Topics in Cellular, Molecular, Developmental Biology* (2 cr)
- BIO 7960 Advanced Topics in Cellular, Molecular, Developmental Biology* (3 cr)
- BIO 8051 Advanced Bacteriology (2 cr)
- BIO 8052 Advanced Bacteriology Laboratory (2 cr)
- BIO 8101 Molecular Genetics (3 cr)
- BIO 8151 Molecular Cell Biology (3 cr)
- BIO 8171 Molecular Developmental Biology (2 cr)
- BIO 8172 Molecular Developmental Lab (2 cr)
- BIO 8251 Endocrinology (2 cr)
- BIO 8252 Endocrinology Laboratory (2 cr)
- BIO 8295 Experimental Methods in Cell and Molecular Biology (4 cr)
- BIO 8455 Molecular Evolutionary Genetics** (3 cr)
- BIO 8555 Neurophysiology (4 cr)
- BIO 8601 Pharmacology (2 cr)
BIO 8602 Pharmacology Laboratory (2 cr)
BIO 8655 Recombinant DNA Technology (4 cr)
BIO 8705 Virology (4 cr)

Ecology, Evolution and Organismal Biology (EEOB)
BIO 7105 Vertebrate Ecology (4 cr)
BIO 7151 Biogeochemistry (2 cr)
BIO 7152 Biogeochemistry Laboratory (2 cr)
BIO 7205 Comparative Physiology (4 cr)
BIO 7601 Paleobiology (4 cr)
BIO 7705 Plant Ecology (4 cr)
BIO 7755 Plant Ecophysiology (4 cr)
BIO 7905 Eukaryotic Microbiology (4 cr)
BIO 7921 Sensory Biology (3 cr)
BIO 7970 Special Topics in Ecology, Evolution and Organismal Biology* (2 cr)
BIO 7980 Advanced Topics in Ecology, Evolution and Organismal Biology* (3 cr)
BIO 7955 Biodiversity and Systematics (4 cr)
BIO 8455 Molecular Evolutionary Genetics** (3 cr)

Notes:
* courses vary in their focus; when the course topic is appropriate to the certificate program (as determined by the Biology Graduate Committee), BIO 7940 and 8940 may be used to count toward completion of the certificate.
** course can be counted towards CMDB or EEOB certificates.

Important: Students in the Certificate programs may take any graduate courses in the Biology Department (for a complete listing see the University Course Catalogue on Novasis) . However, only those in their chosen field (CMDB or EEOB) will count towards fulfillment of the certificate requirements. If and when the student matriculates into the Masters program (see point 3 below) any other course credits earned will be applied toward the M.A. or M.S.

2. Admission to certificate programs

Students who meet the criteria for acceptance with matriculated status may enter the certificate programs. Students who are not matriculated may enter the certificate program with non-matriculated status at the discretion of the Biology Graduate Committee. Such students must provide official transcripts from their undergraduate institution(s) but the requirements for GRE scores and letters of recommendation may be waived. Prospective students should consult the Director of the Graduate Program for further details and to determine if they are appropriate candidates for the Certificate Program.
3. Transfer to and from certificate programs

Those with special student status wishing to continue in one of the certificate programs must petition the Biology Graduate Committee for a reevaluation of their status (and should provide transcripts if they have not done so already). Students in a certificate program may apply for acceptance to either the M.A. or the M.S. degree programs. This is dependent upon approval of matriculated status. Students who have successfully completed a basic or advanced certificate program and have achieved a grade of 3.0 or higher in each course taken will, upon request, automatically be accepted into the M.A. program and may apply for the M.S. degree option. At the time of matriculation, any Villanova graduate courses in Biology taken outside the area of the student’s certificate will be credited towards the Masters degree. Students enrolled in the M.A. or M.S. program who do not want to complete the degree program but have completed the requirements for a certificate, will receive that certificate. Departmental or University support in the form of teaching or research fellowships or other awards is open only to those students enrolled as matriculated students in the M.A. or M.S. programs.
TEACHING ASSISTANTSHIPS AND RESEARCH FELLOWSHIPS

Department of Biology Guidelines

The Department of Biology provides financial support on a competitive basis to graduate students in the form of Teaching Assistantships, Research Fellowships, and Tuition Scholarships. The primary purpose of this support is to facilitate a student's progress toward completing the degree requirements, while also providing opportunities to develop teaching, research, and learning skills. Departmental resources allocated to the financial support of graduate students are finite. The amount of support available is determined by the Office of Graduate Studies, College of Arts and Sciences, which is the source of the funds. The general guidelines given here are intended both to affirm policies of the Office of Graduate Studies in the College of Arts and Sciences and to state additional Departmental policies. We emphasize that the Departmental goal is to allocate Departmental resources fairly and effectively in order to maximize our ability to support students in their pursuit of graduate education.

Academic-year Teaching Assistantships, Research Fellowships, and Tuition Scholarships — The most common form of support available is as a Teaching Assistantship, requiring a maximum of 20 hours per week of teaching-related effort, on average. Teaching Assistants' responsibilities may include teaching laboratory sections of lower level undergraduate courses, assisting in laboratory sections of upper level (3000 or higher) undergraduate courses, or attending lectures and running regularly scheduled help sessions for certain courses. The Department of Biology also awards a limited number of academic year (9-month) Research Fellowships. The purpose of the Research Fellowship is to foster the development and progress of M.S. students whose potential for research is deemed outstanding through a competitive award process. Research Fellows are expected to devote themselves enthusiastically and wholeheartedly to the execution of their research, while making progress toward completing their required coursework. Tuition scholarships require a maximum of 7 hours per week of service to the department, on average. This service will involve either filling a Teaching Assistant position for one section of an upper level undergraduate, laboratory course, or attending lectures and running regularly scheduled help sessions for certain courses.

To be eligible for a Teaching Assistantship, Research Fellowship, or Tuition Scholarship, a student must have matriculated status, may have no more than two unfilled undergraduate course prerequisites, and must have a grade point average in all graduate courses taken at Villanova to date of at least 3.0. In addition, to be eligible to compete for a Research Fellowship, a student must have successfully written and orally presented their Masters thesis research proposal. Teaching Assistants and Research
Fellows receive a monthly stipend along with a Tuition Scholarship. Students receiving a Tuition Scholarship only do not receive a stipend. The Tuition Scholarship provides a waiver of tuition costs during the academic year and during the following summer (only one summer of tuition waiver support is available to any particular student through this mechanism).

If a student with unfilled undergraduate prerequisites is awarded a Teaching Assistantship or Tuition Scholarship, those prerequisites must be remedied within the first year of support. If a student with unfilled undergraduate prerequisites is awarded a Research Fellowship, those prerequisites must be remedied while supported as a Research Fellow. At the time of writing by an agreement with the Dean of Graduate Studies in the College of Arts and Sciences, a Tuition Scholarship awarded to a Teaching Assistant, Research Fellow, or Tuition Scholar will cover the costs of up to two courses (maximum 8 credits) taken to remedy undergraduate prerequisites. This policy is being reviewed, however, and is subject to change. Prerequisite undergraduate courses may be taken on a pass/fail basis and may be taken either at Villanova or at another four-year institution, although these courses will only be financially supported if taken at Villanova. In some cases, undergraduate prerequisites may be satisfied by taking a Villanova graduate level course (e.g., in Statistics or Biochemistry). Students considering this option must obtain prior written approval from the Biology Graduate Committee and must secure a final grade of at least B in the graduate course. Failure to remedy undergraduate prerequisites within the first year of support will disqualify a student from being reappointed as a Teaching Assistant, Research Fellow, or Tuition Scholar.

Teaching Assistants, Research Fellows, and Tuition Scholars must register for either a minimum of seven credits of coursework that will count toward a Masters degree per semester or a minimum of 14 credits of coursework that will count toward a Masters degree in two consecutive semesters. Supported students who need fewer than seven credits to complete their degree requirements may register for fewer than seven credits in their final semester of graduate study. All Teaching Assistants, Research Fellows, and Tuition Scholars are required to attend the weekly Department of Biology seminars. The Department of Biology endorses and will enforce the policy of the Office of Graduate Studies in the College of Arts and Sciences that prohibits students supported as Teaching Assistants or Research Fellows to engage in any additional employment during the periods in which they are so supported. Students supported solely as Tuition Scholars may engage in additional employment as long as no scheduling conflict exists between the student’s Departmental responsibilities and employment. Consistent with the policies of the Office of Graduate Studies, no student will be awarded more than two academic years (four semesters) of support as a Teaching Assistant, Research Fellow, or Tuition Scholar.
Applications for support as a Teaching Assistant or Tuition Scholar are available in the Department of Biology office or from the Office of Graduate Studies in the College. The Department of Biology’s Graduate Committee evaluates all applications and makes decisions about awards based on undergraduate grade point average, scores on the Graduate Record Examination General and Subject (Biology or Biochemistry) tests, letters of recommendation that were submitted with the student’s application to graduate school, and progress to date in graduate courses taken at Villanova (where applicable). By February 1 of each year, the Director of the Graduate Program will poll current Teaching Assistants, Research Fellows, and Tuition Scholars to determine which students wish to be considered for reappointment for the following academic year. Reappointment will be contingent upon satisfactory performance as a Teaching Assistant or Tuition Scholar to date, satisfactory performance in graduate coursework (a cumulative graduate grade point average of at least 3.0), and completion of any undergraduate course prerequisites. Occasionally Teaching Assistantships or Tuition Scholarships become available for the spring semester. Unsupported students who wish to be considered for these should contact the Director of the Graduate Program.

The Director of the Graduate Program will make available applications for support as a Research Fellow by March 1 of each year. Completed applications must be submitted to the Director of the Biology Graduate Program by 5:00 PM on the third Wednesday in April. The application consists of a written proposal that includes an Abstract (200 word maximum), followed by no more than two pages of single-spaced typed text and no more than three pages of supporting material (e.g., References, Tables, and Figures). Students should write their proposals with the understanding that the members of the proposal Review Committee may not necessarily be experts in the student’s particular field of interest.

Proposals will be evaluated by a Review Committee of three faculty, appointed by the Director of the Graduate Program in consultation with the Department Chair. Faculty who are Thesis Advisors for students submitting proposals and the Director of the Graduate Program will be excluded from serving on the Review Committee. The Director of the Graduate Program will serve as the Moderator for the Review Committee, and as such will distribute proposals to the Review Committee, moderate Review Committee meetings, collate scores and review comments, and inform students of the award outcome. In the event that the Director of the Graduate Program is the Thesis Advisor to a student submitting a proposal, the Chair of the Department will appoint another faculty member to serve as Moderator.

Each member of the Review Committee will individually read and review each proposal, basing their evaluation on the following seven equally weighted criteria: clear statement of objectives and/or hypotheses, significance of the proposed work,
appropriateness of the experimental design, criteria for support versus rejection of the stated hypotheses, reasonableness of the projected schedule, demonstration of ability and/or knowledge to conduct the proposed study, and the student’s record to date in graduate level courses. Using their best judgment and interpretation in applying these criteria, each member of the Review Committee will provide a numerical score for each of the seven criteria and will also provide written comments on the proposal as a part of their review.

The Review Committee Moderator will collate the scores and the written comments from the individual reviews and distribute the collated evaluations to Review Committee members prior to a meeting in which Review Committee deliberations lead to the selection of the students to receive the Research Fellowships. The Research Fellowships are intended to be academic year (9-month) awards. However, in cases where two applications are judged to be so similar in merit to preclude a clear-cut decision, the Review Committee may elect to split an academic year award between those two applicants, with each applicant receiving one semester of Research Fellowship support. Normally, similarity in merit will represent the only justification for single semester awards. Award decisions will be announced by 15 May. Announcement will occur in writing only through distribution of a memorandum to all Biology faculty and graduate students; simultaneously, all applicants will be notified in writing of the fate of their proposal and will receive copies of the numerical scores and the anonymous verbatim comments of the reviewers. The Review Committee Moderator will place a copy of each student’s proposal, written evaluation, and announcement letter in each student’s permanent file.

**Summer Teaching Assistantships and Research Fellowships** — The Department of Biology will endeavor to support a limited number of graduate students during the summer months through the award of Summer Teaching Assistantships and Summer Research Fellowships. The objective of the Department is to support as many students as possible, bearing in mind that these awards will be made on a competitive basis. An individual student can receive a maximum of two months of support each summer for no more than three summers. Teaching Assistantships are linked to Summer Session periods. Research Fellowships are available for June and/or July. An individual graduate student may apply for support as a Teaching Assistant, Research Fellow, or both.

The Director of the Graduate Program will make available applications for support as a Summer Teaching Assistant or Summer Research Fellow by March 1 of each year. Applications are due on the second Wednesday of April, and awards will be announced before 1 May. Applications for Summer Teaching Assistantships will be evaluated by the Biology Graduate Committee, taking into consideration four criteria:
previous performance as a Teaching Assistant during the academic year, academic record, status (number of years in the program, nearness to completion of the program), and compatibility of the student with the course material and course instructor. To be eligible for a Summer Research Fellowship, a student must have successfully written and orally presented their Masters thesis research proposal no later than the third Wednesday of April. The one page Summer Research Fellowship application will consist of a synopsis of progress to date and a brief description of the research to be accomplished during the months of July and August. These one page proposals will be evaluated by the Biology Graduate Committee taking into consideration the following criteria: clarity of presentation of the written proposal, performance to date in graduate school, and the likelihood that the Summer Research Fellowship will substantially enhance the student's progress toward completion of the thesis research. Because the intent of the Summer Research Fellowships is to foster research, students receiving an award are discouraged from taking courses during the summer sessions. Students receiving Summer Research Fellowships are not permitted to engage in any additional outside employment during the two-month Fellowship period.

Additional Types and Sources of Support — Occasionally, Fellowship support, often with Tuition Scholarships, is available through research grants under the jurisdiction of individual faculty. Individual faculty members are solely responsible for decisions about award of such Fellowships. The Department of Biology discourages supporting any individual student for more than three years, and prohibits any student from receiving more than two years of support as a Teaching Assistant and Research Fellowship from Departmental funds. A student who has been supported through external grant funds as a Fellow for up to two years may apply for Departmental support as a Teaching Assistant for up to a maximum of three years of total support. A student who has been supported through external grant funds for two years will be considered ineligible to apply for a third year of support as a Departmental Research Fellow.

Occasionally, the Department of Biology has a need for Teaching Assistants in excess of the number allocated by the Office of Graduate Studies, College of Arts and Sciences. Such Teaching Assistants are paid from Departmental funds, typically without an associated Tuition Scholarship. The number of these positions available is determined on a semester by semester basis by the Chair of the Department. When positions become available, all matriculated graduate students in the program or accepted into the program will constitute the applicant pool. Award decisions will be made by the Chair of the Department in consultation with the Graduate Committee. Factors bearing on these award decisions will include satisfying the immediate needs of the Department, striving for parity (with regard to such issues as stipend, workload, undergraduate course deficiencies) between Teaching Assistants supported on funds.
allocated from the Office of Graduate Studies versus those paid from Departmental funds, and the general Departmental philosophy of discouraging more than three years of support for any individual student.
Courses Pre-approved For Graduate Credit in Biology

The following courses offered at Villanova may, with the approval of the relevant instructors and departments, be taken for graduate credit, and applied toward the Masters degree in Biology without specific approval from the Graduate Committee:

Chemistry

- CHM 7697  Advanced Biochemistry
- CHM 8662  Intermediary Metabolism
- CHM 8665  Enzymes
- CHM 9661 Special Topics in Biochemistry I
- CHM 9662 Special Topics in Biochemistry II
- CHM 9663 Special Topics in Biochemistry III
- CHM 9664 Special Topics in Biochemistry IV

Mathematics

- MAT 7404  Statistical Methods I
- MAT 7405  Statistical Methods II

Psychology

- PSY 8050  Biopsychology
- PSY 8100  Statistics and Experimental Design

Civil and Environmental Engineering

- CE 7701  Aquatic Chemistry for Environmental Engineers

Other courses will be considered on an individual basis by the Graduate Committee.
Forms
APPLICATION FOR ACCEPTANCE OF TRANSFER CREDITS
GRADUATE PROGRAM IN BIOLOGY

Student Name:_________________________ Date Submitted:_________________________

Social Security Number: __________________________

In some cases, the Graduate Program in the Department of Biology will accept transfer credit for a course taken elsewhere. Note that courses petitioned to count for the Master’s degree at Villanova must be offered for graduate credit at the host institution and may not be applied toward any other degree.

Background Information
   Date of completion of Undergraduate degree: __________________________
   Date of graduate matriculation at Villanova: __________________________
   Expected date of graduation: __________________________

Course Information
   Course Title: __________________________
   Institution offering course: __________________________
   Department: __________________________ Grade in course: ________

Rationale for requesting approval for transfer credit for the course:

Attach to this form a catalog description, syllabus, and official transcript for the course.

I understand that I will not be permitted to enroll in a course at Villanova that the Graduate Committee deems to have similar or overlapping content as the course above and receive graduate credit. I further certify that the credits received in this course have not and will not be applied toward any other degree.

________________________________________________________________________

Student signature __________________________ Date __________________________

The student should submit the completed form to the Director of the Biology Graduate Program who will place the form in the student’s permanent file.
APPLICATION FOR COMPREHENSIVE EXAMINATION

Student Name: ___________________________ Date Submitted: ________________

Student Signature: _______________________ Graduate credits completed to date: ______

Student Number: _________________________ Graduate GPA to date*: ____________

The following Faculty member has agreed to serve as the Chair of my Examination Panel:

________________________________________, Chair

In addition, the following five members of the Biology Graduate Faculty have agreed to serve as Panel members on my Comprehensive Examination Panel, and have indicated their availability during the time in which I plan to take the Exam:

________________________________________

________________________________________

________________________________________

I wish to receive the questions on: ____________________________

* A minimum cumulative GPA of 3.0 is required for approval.

The student should submit this form to the Director of the Biology Graduate Program, at least one month prior to receiving the questions. If all requirements are met, the Graduate Committee will create the Panel in part based on areas of interest. Subsequent to approval by the Graduate Committee, the form will be placed in the student’s permanent file.
**TIMETABLE FOR THE COMPREHENSIVE EXAMINATION**

Student Name: ___________________________ Date Submitted: _____________

In signing this form, all parties agree to abide by the specified schedule for conducting the Comprehensive Examination (see *Master's Degrees in Biology* booklet). Further, in signing this form, the student pledges to behave honestly in completing the Examination.

The Comprehensive Examination questions will be picked up by the student on:

________________________________________

date

The written responses to the questions on the Comprehensive Examination will be submitted to the Chair of the Examination Panel six weeks after the student receives the questions, i.e., by:

________________________________________

date

The Examination Panel will read the written responses and, if the responses are judged satisfactory, the oral portion of the Comprehensive Exam will be administered no later than 2 weeks after the student submits the written responses to the Panel. Therefore the oral portion of the Comprehensive Examination is tentatively scheduled for

________________________________________

date/time/place

Signatures of Examination Panel:

________________________________________
Chair of the Examination Panel

________________________________________
Examination Panel Member

________________________________________
Examination Panel Member

I understand that the written portion of this Examination is open book, open note, and will require library work using primary literature. On my honor, I pledge that I will neither seek nor accept any outside assistance of any sort during the course of this Examination. I understand that I may direct questions about the Examination to my Examination Panel members only. I will not discuss the Examination with any other students, other faculty, or any other individuals, regardless of their affiliation with Villanova University.

________________________________________
Student signature

________________________________________
Date

*The student should submit the completed form to the Director of the Biology Graduate Program prior to initiating the Comprehensive Examination process. Copies should be made for the graduate student, the student’s permanent file, and for each member of the Examination Panel.*
Villanova University
Graduate Studies, Liberal Arts and Sciences

APPLICATION FOR COMPREHENSIVE EXAMINATION

This form is to be completed by the Chairperson and is to be forwarded to the Graduate Studies Office at least two weeks prior to the examination.

Student ID Number __________________________

Please print or type.

Name ____________________________________________
First   Middle   Last

Address ________________________________________________

I am prepared to take the comprehensive examination

oral  written  essay

Field __________________________________________

Date ____________________

Time ____________________

Building ____________________

Room ____________________

G.P.A. ____________________  Is this a re-examination? ____________________

Semester Hours (including current registration) ____________________

Student Signature ____________________ Date ____________________

Chairperson Signature ____________________ Date ____________________

*You must have a minimum GPA of 3.0 to be eligible to sit for the Comprehensive Examination. In the case of extreme mitigating circumstances, you may appeal this restriction with a written request to the Dean of Graduate Studies.
VILLANOVA UNIVERSITY
GRADUATE STUDIES
LIBERAL ARTS AND SCIENCES

GRADE FOR COMPREHENSIVE EXAMINATION

This form is to be used **only** for reporting the student's grade for the Comprehensive Examination and should be forwarded to the Graduate Studies Office as soon as possible so that the student may be informed without delay. *Please do not submit any other forms.*

Department ___________________________ Student ID No. ________________

Name ________________________________________________________________

First Middle Last

Address ______________________________________________________________

---

Oral Comprehensive Passed ___ Failed ___ Date ____________

Written Comprehensive Passed ___ Failed ___ Date ____________

Comprehensive Essay Passed ___ Failed ___ Date ____________

---

Chairperson’s Signature __________________________________________ Date ____________

---
APPLICATION FOR THESIS OPTION

Student Name: ___________________    Date Submitted: ___________________

Student Signature: ___________________    Graduate credits completed to date: ______

Social Security Number: ___________________   Graduate GPA to date*: ______

My Advisory Committee will consist of**:

________________________________________, Thesis Mentor

______________________________________________

______________________________________________

Provide a short statement indicating your reasons for wishing to pursue the thesis option:

* A minimum cumulative GPA of 3.0 is required for approval.

** If an Advisory Committee member is not a full-time Villanova Biology faculty member, a Curriculum Vitae and a written statement that he/she has been made aware of and agrees to abide by the rules and regulations of our M.S. program must accompany this form. Of particular relevance, the Thesis Mentor and Advisory Committee members are required to attend the student’s thesis research proposal presentation and thesis defense.

The student should submit the completed form to the Director of the Biology Graduate Program. Subsequent to Biology Graduate Committee approval, the Director of the Biology Graduate Program will place the form in the student’s permanent file.
# Program of Study for M.S. Degree in Biology

Student Name: ___________________________ Date Submitted: ___________________

Social Security Number: _________________ Date Admitted to Program: ____________

Anticipated Date of Degree: _______________________

Tentative Title of Thesis Research: ____________________________________________

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th># of Credits</th>
<th>Year/Semester</th>
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</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

Advisory Committee Signatures:

______________________________ , Thesis Mentor


*The student should submit the completed form to the Director of the Biology Graduate Program who, after checking the Program of Study for consistency with all requirements for the degree, will place the form in the student’s permanent file.*
The student should submit the completed form to the Director of the Biology Graduate Program who will place the form, along with a copy of the written thesis proposal, in the student’s permanent file.

After submitting this form, the student will post an announcement of the upcoming oral presentation, giving at least one week’s notification between posting and the date of the presentation. The announcement will include: the title of the thesis proposal; the date, place, and time of the oral presentation; and an abstract of the proposed thesis research, directed toward a general biology audience. The announcement should be distributed to all faculty and graduate student mailboxes, and should be posted on the graduate student bulletin board and the Department of Biology seminar bulletin board.
EVALUATION OF THESIS PROPOSAL PRESENTATION

Student Name: ________________________________

Title of Thesis Proposal: ________________________________

This form certifies that the student above, after writing a thesis proposal that was approved by the Advisory Committee, has presented the proposed research in a public seminar.

☐ The oral presentation has been completed to the satisfaction of the student's Advisory Committee.

☐ The student's Advisory Committee finds that the oral presentation was deficient. Explanation of the Committee's feedback and recommendations for remedying the student's status will be provided to the student in writing, either on the back of this form or on a separate piece of paper. In signing this form, the student indicates his/her understanding of the action taken by the Advisory Committee. The student will be allowed to repeat the oral presentation; unsatisfactory performance in the second presentation will result in the student being dropped from the M.S. program. In this event, the student may petition the Biology Graduate Committee to transfer into the M.A. program; the extent to which research credits accumulated as an M.S. student will count toward the M.A. degree will be determined by the Graduate Committee.

Advisory Committee Signatures:

__________________________________________, Thesis Mentor     Date signed ________________

__________________________________________     Date signed ________________

__________________________________________     Date signed ________________

Student Signature (required only in the event of an unsatisfactory evaluation):

__________________________________________     Date signed ________________

The Thesis Mentor should submit the completed form to the Director of the Biology Graduate Program who will place the form in the student’s permanent file.
APPROVAL OF WRITTEN THESIS PROPOSAL

Student Name:  

Title of Thesis Proposal:  

In signing this form, the Advisory Committee for the student above certifies that they have read and reviewed the written thesis and find it acceptable. Relatively minor corrections that could be made in the "page proof" stage of the publication process may be made; however, no further substantive revisions of the thesis are required.

Advisory Committee Signatures:

________________________________________, Thesis Mentor    Date signed _____________  

________________________________________    Date signed _____________  

________________________________________    Date signed _____________

Date Submitted to the Director of the Biology Graduate Program: ________________

The student should submit the completed form to the Director of the Biology Graduate Program who will place the form in the student’s permanent file.

After submitting this form, the student will post an announcement of the upcoming thesis defense, giving at least one week’s notification between posting and the date of the presentation. The announcement will include: the title of the thesis; the date, place, and time of the defense; and an abstract of the proposed thesis research, directed toward a general biology audience. (Typically, this abstract will be different from the Abstract contained in the written thesis) The announcement should be distributed to all faculty and graduate student mailboxes, and should be posted on the graduate student bulletin board and the Department of Biology seminar bulletin board.
UNSUCCESSFUL DEFENSE OF THESIS

Student Name:__________________________________________

This form certifies that, _________________________________
a candidate for the M.S. degree in Biology, after having submitted a written thesis
that was judged acceptable by the student's Advisory Committee, presented and
defended the findings from his/her thesis research in a public seminar in the
presence of his/her Advisory Committee, a Moderator, and interested members of
the Biology Graduate Faculty and the general public. It is the decision of the
student's Advisory Committee that the student's defense of the thesis research was
deficient. Explanation of the Committee's decision and recommendations for
remedying the student's status are given below. The student will be afforded a
second opportunity to defend the thesis; the second defense must be passed for
the student to receive the M.S. degree. In signing this form, the student indicates
his/her understanding of the action taken by the Advisory Committee, and that
failure to meet the recommendations of the Committee within the specified period
of time may preclude the student from obtaining the M.S. degree.

Advisory Committee Signatures:

__________________________________________ , Thesis Mentor Date signed ______________

__________________________________________ Date signed ______________

__________________________________________ Date signed ______________

Student Signature:

Date signed ______________

The Thesis Mentor should submit the completed form to the Director of the Biology Graduate Program who
will place the form in the student's permanent file.
APPROVAL FORM
(submit to Graduate Studies Office)

Student’s Full Name: ________________________________

Department: ________________________________

Full Title of Thesis: ________________________________

Date Submitted: ________________________________

Thesis Advisor

Date

Committee Member

Date

Committee Member

Date

Department Chairperson

Date

Dean of Graduate Studies

Date

Student’s Signature

Date

September 25, 2009
The following student [print name] has successfully completed the requirements for (please check one box):

- [ ] Certificate of Graduate Study in Cell, Molecular and Developmental Biology *(Students are required to complete a minimum of 16 credits, including a minimum of three lab courses from the list of courses below)*
- [ ] Certificate of Advanced Graduate Study in Cell, Molecular and Developmental Biology *(Students are required to complete a minimum of 24 credits, including a minimum of four lab courses from the list of courses below)*

**Biology Certificate** awarded upon completion of courses as checked (√) below:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>7321</td>
<td>Immunology</td>
<td>2 cr.</td>
</tr>
<tr>
<td>7322</td>
<td>Immunology Laboratory</td>
<td>2 cr.</td>
</tr>
<tr>
<td>7940</td>
<td>Special Topics in Biology*</td>
<td>2 cr.</td>
</tr>
<tr>
<td>7950</td>
<td>Special Topics in CMDB Biology*</td>
<td>2 cr.</td>
</tr>
<tr>
<td>7960</td>
<td>Advanced Topics in CMDB Biology*</td>
<td>3 cr.</td>
</tr>
<tr>
<td>8051</td>
<td>Advanced Bacteriology</td>
<td>2 cr.</td>
</tr>
<tr>
<td>8052</td>
<td>Advanced Bacteriology Laboratory</td>
<td>2 cr.</td>
</tr>
<tr>
<td>8101</td>
<td>Molecular Genetics</td>
<td>3 cr.</td>
</tr>
<tr>
<td>8151</td>
<td>Molecular Cell Biology</td>
<td>4 cr.</td>
</tr>
<tr>
<td>8171</td>
<td>Molecular Developmental Biology</td>
<td>2 cr.</td>
</tr>
<tr>
<td>8172</td>
<td>Molecular Developmental Laboratory</td>
<td>2 cr.</td>
</tr>
<tr>
<td>8251</td>
<td>Endocrinology</td>
<td>2 cr.</td>
</tr>
<tr>
<td>8252</td>
<td>Endocrinology Laboratory</td>
<td>2 cr.</td>
</tr>
<tr>
<td>8295</td>
<td>Experimental Methods in Cell and Molecular Biol.</td>
<td>4 cr.</td>
</tr>
<tr>
<td>8455</td>
<td>Molecular Evolutionary Genetics**</td>
<td>3 cr.</td>
</tr>
<tr>
<td>8555</td>
<td>Neurophysiology</td>
<td>4 cr.</td>
</tr>
<tr>
<td>8601</td>
<td>Pharmacology</td>
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<tr>
<td>8602</td>
<td>Pharmacology Laboratory</td>
<td>2 cr.</td>
</tr>
<tr>
<td>8655</td>
<td>Recombinant DNA Technology</td>
<td>4 cr.</td>
</tr>
<tr>
<td>8705</td>
<td>Virology</td>
<td>4 cr.</td>
</tr>
</tbody>
</table>

* These courses vary in their focus; when the course topic is appropriate to the certificate program (as determined by the Biology Graduate Committee) BIO 7940, 7950, 7960, and 8940 and other pre-approved courses may be used to count towards completion of the certificate.

** Course can be counted towards Certificate of Graduate Study in Cell, Molecular and Developmental Biology or Certificate of Graduate Study in Ecology, Evolution and Organismal Biology

The student’s GPA in the above courses is above the 3.0 minimum

Signature: ___________________________ Date: ______________

Department Chair

Signature: ___________________________ Date: ______________

Graduate Dean, College of Liberal Arts and Sciences

September 25, 2009
The following student __________________________ SS# _____________

(print name)

has successfully completed the requirements for (please check one box):

☐ Certificate of Graduate Study in Ecology, Evolution and Organismal Biology
   *(Students are required to complete a minimum of 16 credits, including a minimum of three lab courses from the list of courses below)*

☐ Certificate of Advanced Graduate Study in Ecology, Evolution and Organismal Biology *(Students are required to complete a minimum of 24 credits, including a minimum of four lab courses from the list of courses below)*

**Biology Certificate** awarded upon completion of courses as checked (√) below:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>7105</td>
<td>Vertebrate Ecology</td>
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<tr>
<td>7151</td>
<td>Biogeochmistry</td>
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<tr>
<td>7152</td>
<td>Biogeochmistry Laboratory</td>
<td>2 cr.</td>
</tr>
<tr>
<td>7205</td>
<td>Comparative Physiology</td>
<td>4 cr.</td>
</tr>
<tr>
<td>7601</td>
<td>Paleobiology</td>
<td>4 cr.</td>
</tr>
<tr>
<td>7705</td>
<td>Plant Ecology</td>
<td>4 cr.</td>
</tr>
<tr>
<td>7755</td>
<td>Plant Ecophysiology</td>
<td>4 cr.</td>
</tr>
<tr>
<td>7905</td>
<td>Eukaryotic Microbiology</td>
<td>4 cr.</td>
</tr>
<tr>
<td>7921</td>
<td>Sensory Biology</td>
<td>3 cr.</td>
</tr>
<tr>
<td>7940</td>
<td>Special Topics in Biology*</td>
<td>2 cr.</td>
</tr>
<tr>
<td>7970</td>
<td>Special Topics in EEOB*</td>
<td>2 cr.</td>
</tr>
<tr>
<td>7980</td>
<td>Advanced Topics in EEOB*</td>
<td>3 cr.</td>
</tr>
<tr>
<td>7955</td>
<td>Biodiversity and Systematics</td>
<td>4 cr.</td>
</tr>
<tr>
<td>8455</td>
<td>Molecular Evolutionary Genetics**</td>
<td>3 cr.</td>
</tr>
</tbody>
</table>

* These courses vary in their focus; when the course topic is appropriate to the certificate program (as determined by the Biology Graduate Committee) BIO 7940, 7970, 7980, and 8940 may be used to count towards completion of the certificate.

** Course can be counted towards Certificate of Graduate Study in Cell, Molecular and Developmental Biology or Certificate of Graduate Study in Ecology, Evolution and Organismal Biology

The student’s GPA in the above courses is above the 3.0 minimum

Signature: __________________________ Date: _____________

Department Chair

Signature: __________________________ Date: _____________

Graduate Dean, College of Liberal Arts and Sciences

September 25, 2009
Sample only
see Graduate Studies website
(http://www.villanova.edu/artsci/college/academics/graduate/policies/)
for form that you can submit

APPLICATION FOR GRANTING OF MASTER’S DEGREE

PLEASE COMPLETE THIS FORM AND SUBMIT ORIGINAL TO
GRADUATE STUDIES, KENNEDY HALL, 2ND FLOOR
AND A COPY TO YOUR DEPARTMENTAL CHAIRPERSON
Submission Date is listed in Villanova University Catalog
Graduate Studies, Liberal Arts and Sciences
(see Academic Calendar)

*1. I should be awarded the degree dated: September _____ December _____ May _____ year

2. Which degree: Master of Arts in

Master of Science in

3. PLEASE COMPLETE THE FOLLOWING INFORMATION FOR THE COMMENCEMENT PROGRAM

A. Undergraduate degree received (for example, B.A., B.S., etc.) ____________________________

B. Undergraduate major ____________________________

C. Year degree received ____________________________

D. Undergraduate college attended (indicate country if not USA)

__________________________________________

Please print your name EXACTLY as it is to appear on the diploma and supply your mailing address

First name ____________________________
Middle Initial or Name ____________________________
Family Name ____________________________
Initials of Religious Order (if applicable) ____________________________

Please Sign: ____________________________

Street ____________________________
City ____________________________
State ____________________________
Zip Code ____________________________

Student ID ____________________________
Telephone # ____________________________

* IF YOUR DEGREE IS NOT AWARDED ON THE DATE STATED ON THIS FORM (ITEM #1), YOU MUST RE-APPLY. Please check the Graduate Studies Academic Calendar regarding this form’s submission deadline for your expected graduation date.

Revised June 4, 2004

September 25, 2009