

## GRADUATE STUDENT HANDBOOK 2011

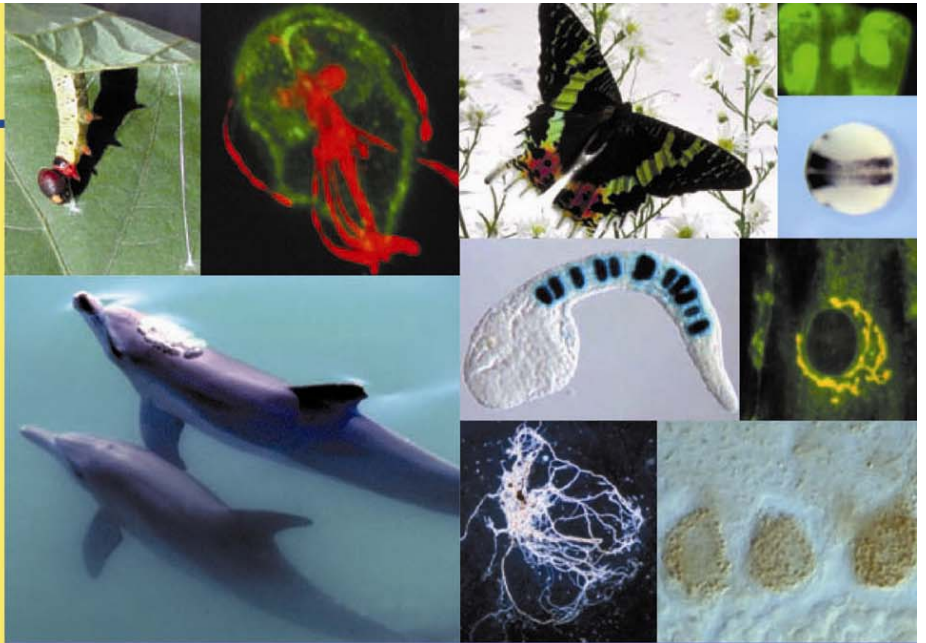
Department of Biology

Georgetown University

# BIOLOGY

Major areas of faculty research include:

- animal behavior
- ecology
- embryology
- evolutionary genetics
- immunology
- molecular and cellular biology
- neuroscience
- parasitology



## WELCOME TO THE DEPARTMENT OF BIOLOGY!

Welcome to the Graduate Program in the Department of Biology. The science of biology is exciting, challenging, and rapidly changing. To be competitive today, biology research scientists need both a solid understanding of basic biological principles and specialized training in one or more specific areas of study. Because our Biology Faculty believes that all students who earn graduate degrees must have a broad-based background in biology, our graduate students are required to take three courses: BIOL 501 (Graduate Foundations in Evolution, Ecology, & Behavior), BIOL 502 (Graduate Foundations in Biochemistry, Cell, & Molecular Biology), and BIOL 503 or equivalent (biostatistics). You also need to undertake state-of-the-art research in a specialized field of biology. Our Department, therefore, admits only a limited number of graduate students into its Program to insure a low student-to-faculty ratio. Members of your dissertation research committees are from both Department faculty and outside research laboratories (e.g., those at the Georgetown University Medical Center, National Institutes of Health, Smithsonian Institution, or the U.S. Department of Agriculture). Today, there are diverse career options available to biology graduates with a Masters of Science (M.S.), Doctorate of Philosophy (Ph.D.), or both. You will choose a set of formal courses with the aid of your Academic Advising Committee and Dissertation Committee. Most of our students choose careers in academics, government, or private industry after graduation. Whatever your career path, your ability to communicate both your ideas and research results are important for your professional success. There is no better way to learn those basic skills than teaching. Thus, all graduate students in our Department receive faculty-assisted education in the development of teaching skills, participate in at least two semesters of teaching biology, and participate in the Center for New Designs in Learning and Scholarship (CNDLS) Apprenticeship in Teaching Program.

Both our Department and the Graduate School have a number of requirements that you must meet before you successfully complete your degree. The Graduate Student Handbook is designed to familiarize you with graduate-student information specific to our Department. Requirements specified by the Graduate School are updated frequently online at <http://biology.georgetown.edu/graduate/handbook/> Unfortunately, no document such as this one can be 100% complete, entirely accurate, or always up-to-date. Therefore, if you are uncertain about a requirement, you should talk to your academic adviser, a member of the Committee of Graduate Students and Studies (CGSS), or the Chair of the Department of Biology. We welcome you to our Department and hope that your endeavors here will be highly productive and rewarding. New students please read this entire Handbook ASAP and retain it for your reference.

The Biology Faculty

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## GLOSSARY

Here are definitions of selected terms from this Handbook.

Adviser = Your research adviser and is synonymous with mentor.

Chair = The Chairperson of the Department of Biology, currently Professor Steve Singer

Teaching Fellow (TF) = Graduate Student Teaching Fellow. Undergraduate Teaching Assistants are TAs.

### Committees

Academic Advising Committee. Your initial graduate committee consisting of the Chair of CGSS, another CGSS member and your advisor that is replaced by your Dissertation Committee in your second year.

Committee of Graduate Students and Studies (CGSS) . The Biology Committee that is directly concerned with the Biology Graduate Program. The CGSS has a chair (Dr. Elena Casey) and 3 other members (Drs. Chris Elsik, Janet Mann, Peter Armbruster (spring 2012)). A student representative, the Biology Graduate Program Assistant, and the regular members attend meetings.

Ph.D. Qualifying Examination Committee. The committee of 3 regular faculty professors helps you set Ph.D. Qualifying Exam goals and deadlines, and grades your Qualifying Exam. One member is your advisor.

M.S. Dissertation Committee. The committee of professors, other scientists, or both that advises your M.S. research and dissertation.

Ph.D. Dissertation Committee. The committee of 4 professors, other scientists, or both that advises your Ph.D. research and dissertation.

Dean = The Dean of the Graduate School.

Department = Department of Biology. Note: Our official name is Department of Biology, not Biology Department.

Department of Biology official address

Department of Biology  
Reiss Building Suite 406  
Georgetown University  
Box 571229  
Washington, D.C. 20057-1229

Director of Graduate Studies (DGS) = The Chair of the CGSS, currently Professor Elena Casey.

Dissertation. A written, formal paper that a student prepares as part of earning a college degree and is synonymous with thesis.

Evolution, Ecology, and Behavior (EEB) . The main subjects of BIOL 501.

Molecular and Cellular Biology and Biochemistry (MCB). The main subjects of BIOL 502.

### Examinations

M.S. Comprehensive Exam. The exam that a M.S. graduate student usually takes during his (her) first year which is a written document in the form of a grant proposal that relates to the student's research focus and integrates concepts from both EEB and MCB subjects as explained in more detail below. Your M.S. Comprehensive Exam is the same exam as the Ph.D. Qualifying Exam given in a particular term. Your M.S. Dissertation Committee grades your Exam at the M.S. level.

Ph.D. Qualifying Exam. The exam that a Ph.D. graduate student takes during his (her) first year which is a written document in the form of a grant proposal that relates to the student's research focus and integrates concepts from both EEB and MCB subjects as explained in more detail below. Your Ph.D. Qualifying Committee grades your Exam.

Ph.D. Comprehensive Examination. An exam that a Ph.D. student takes before the end of his third year after he (she) passes his (her) Ph.D. Qualifying Exam. After passing this exam, the graduate student is a Ph.D. Candidate.

Graduate-student academic file. A file of your academic records, evaluations, etc. maintained by the Department of Biology.

Some Biology graduate courses

*BIOL 501 (Graduate Foundations in Evolution, Ecology & Behavior, 4 credits)*

*BIOL 502 (Graduate Foundations in Biochemistry, Cell & Molecular Biology, 4 credits)*

*BIOL 503 or equivalent (biostatistics, 3 credits)*

*BIOL 999 (Research, 0 credits per term).*

PLEASE NOTE: The GU Graduate School of Arts and Sciences Webpages

([http://grad.georgetown.edu/pages/current\\_students.cfm](http://grad.georgetown.edu/pages/current_students.cfm)) contain information related to many of the topics in this Handbook. In some cases the Webpages will have information that is more current than this Handbook, and the new Graduate School information should supersede that in this Handbook.

Please see, in particular, the summary of requirements for graduate degrees

([http://grad.georgetown.edu/image\\_pool/File/Grad\\_Bulletin\\_2011-12-jun28.pdf](http://grad.georgetown.edu/image_pool/File/Grad_Bulletin_2011-12-jun28.pdf)).

## A. THE ACADEMIC CALENDAR

Please see the academic calendar link at <http://registrar.georgetown.edu/calendars/>.

## B. FINANCIAL AID

The Department of Biology endeavors to provide full financial support for graduate students in its Ph.D. program. The basic stipend for 2011–2012 is \$27,000. \$20,000 covers the academic year, September – April and \$7,000 covers the summer, May-August. BUDGET ACCORDINGLY! The Department expects a graduate student to take an active role in funding his (her) education by applying for external grant support and by submitting Federal Financial Aid forms when possible. All US citizens are expected to apply for financial aid by completing the FAFSA annually. The best time to do it is when you fill out your tax returns because the information is identical. Applying is free and parental financial information is not included. Instructions and forms are available online at <http://www.georgetown.edu/students/student-aid/grmenu.htm> .

The Graduate School commits to two years of support for all admitted Ph.D. students that remain in good academic standing. Additional support for biology graduate students is provided by a combination of Departmental funds, faculty research funds and other special fellowships and grants. The source of funding will determine if the number of semesters (2-6) that you serve as a Teaching Fellow (see section

You should discuss the opportunities for external fellowship support with your adviser as soon as possible. The National Science Foundation Predoctoral Award (<http://www.nsfgrfp.org/>) and NIH F-32 Predoctoral Award and National Defense Science and Engineering Graduate Fellowships are among those that support graduate students. Your obtaining these awards is highly prestigious and brings you compensation beyond the value of any monetary reward.

MS Students are not generally provided with graduate school fellowships. They may occasionally receive limited financial support as teaching assistants.

The IRS may consider your graduate student fellowship to be taxable income, whether or not Georgetown University withholds taxes from your checks. You are encouraged to consult a tax attorney or accountant for advice about paying your taxes, including estimated taxes. Further information on taxes is available at [http://grad.georgetown.edu/pages/tax\\_information.cfm](http://grad.georgetown.edu/pages/tax_information.cfm) .

## C. REGISTRATION

Obtain your net ID (your email user name) and password. Check with the Biology Office (Reiss 406) for information about this.

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*Discuss course work via email with mentor and Director of Graduate studies*

*Register via the Web in “MyAccess+”*

*[https://myaccess.georgetown.edu/pls/bninbp/twbkwbis.P\\_WWWLogin](https://myaccess.georgetown.edu/pls/bninbp/twbkwbis.P_WWWLogin)*

*Meet with your Academic Advising Committee upon arrival to campus.*

*After approval by the Academic Advising Committee, give a copy of your course schedule to the Biology Graduate Administrative Assistant, currently Ms. Jackie Miller (406 Reiss).*

*Complete your I-9, W-4, and local tax forms. See the Graduate Administrative Assistant about those forms.*

*During registration, the Biology Office should have all the materials you need for registration, including your net ID and the Schedule of Courses. If the Biology Office does not have your net ID, please go to the Graduate School Office (302 ICC) to be cleared for registration.*

## 1. ACADEMIC ADVISING

As described above, biologists need a solid understanding of basic biological principles as well as specialized training in a biological sub-discipline. Accordingly, Biology requires you to take a core series of three (3) courses that are designed to provide you with a broad-based, multi-disciplinary biological background. These courses are BIOL 501 (Graduate Foundations in Evolution, Ecology & Behavior), BIOL 502 (Graduate Foundations in Biochemistry, Cell & Molecular Biology), and BIOL 503 or equivalent (biostatistics). You may also take specialized courses in your sub-discipline that your advisers help you select.

Prior to the beginning of the fall semester, each new graduate student meets with CGSS. You and committee members will discuss your interests and career plans, review your transcript(s), and identify courses that you should take. At the end of this meeting, you should have your “academic plan” for your first year. By the end of that year, you should have selected a research mentor and other members of your Dissertation Committee who will advise you academically.

## 2. FULL-TIME STUDENTS

Full-time students must take a minimum of 9 credit hours per semester. If you do not register for 9 course credits, you should register for additional credits of Thesis Research (Biology 999-01 or 999-03) in order to register for a total of 9 credits. 999-03 allows students, who have completed the required number of course credits, to register for additional courses and maintain full-time status without paying for additional credits of dissertation research. Please see the Graduate School Catalog for description of half-time and quarter-time status. Generally, full-time status is required to maintain student loan

deferment, student visas and to receive health insurance.

### 3. COURSE SELECTION

#### **Graduate Courses at Georgetown**

You may take graduate-level courses (courses numbered above 350) offered by the Department of Biology. Courses in other University departments numbered above 350 may also be taken with the consultation and approval of your advisers. Graduate fellowships do not pay for non-science courses.

#### **Survival Skills and Ethics for Emerging Scientists (NSCI 532)**

GU offers this 2-credit, interdisciplinary course in the spring semester. Our Department encourages graduate students to take this course. It is very practical and includes topics such as (1) publishing research findings: writing a scientific paper, (2) oral communication: presentation of seminars and poster presentations, (3) grant writing skills: writing and reviewing grants and fellowships, and (4) teaching. In addition, various topics in career development are considered.

#### **Undergraduate Courses**

In some cases, you may take an undergraduate course (Courses with numbers lower than 350) for graduate credit; however, you and your advisers should carefully consider that option. You may take up to eight (8) undergraduate course credits for graduate credit, but you must obtain approval from the course instructor(s) and the Dean of the Graduate School prior to taking such a course. To take an undergraduate course for graduate credit, you must fill out the request-for-approval form, which you obtain from the Biology Office. You should find out from a course's instructor what and how much extra work will be required of you in order to receive graduate credit for the course. For example, many instructors require a term paper in order to give graduate credit for an undergraduate course. You may not obtain approval for taking an undergraduate course retroactively.

Graduate students cannot register for undergraduate courses during the regular registration period. Instead, you must acquire an add-drop form, fill it out, obtain the instructor's signature, and take it to the Graduate School Office during add-drop week. You may not register for undergraduate Biology Tutorial.

#### **Courses outside Georgetown University**

You may take a course(s) taught at Consortium Universities, federal agencies (for example, the FDA, NIH, and USDA), and biological field stations. Please consult with your adviser before doing so. Also, read the specific information below regarding M.S.-Ph.D.-program requirements and restrictions for the number of allowable credits.

#### **Audit or Pass-Fail Options**

Some courses are offered on a pass-fail basis only. You may register for these courses directly. If you wish to take a regular credit course by audit or on a pass-fail basis, you must, (1) obtain your adviser's

permission, (2) inform the CGSS you are taking the course for audit or pass-fail, because this could influence your tuition, and (3) complete the registration process. You may not register for audit or pass-fail courses during registration. During registration, sign up for a course for credit. Then, obtain an add-drop form, fill it out, and hand it in to the Graduate School Registrar. Graduate School fellowships will not pay for audited courses.

#### 4. ADDITIONAL GRADUATE SCHOOL REGISTRATION REQUIREMENTS

The Graduate School has a number of registration requirements that must be met before your registration is complete. These include, but are not limited to, proof of immunization against select childhood diseases, IRS forms for foreign students (F-1 and J-1), and submission of an “I-am-here-payment” card. All graduate students are required to have medical insurance throughout each academic year. Thus, PLEASE read the Graduate School’s online catalog at [http://grad.georgetown.edu/pages/current\\_students.cfm](http://grad.georgetown.edu/pages/current_students.cfm) before starting the registration process. Graduate students are responsible for keeping abreast of Graduate School regulations and deadlines.

##### **Pre-registration**

At the end of an academic semester, continuing students pre-register for the next semester. The Department encourages each student to plan his (her) courses for an entire school year at the beginning of each fall semester. Discuss pertinent academic matters with your adviser, committee members, and CGSS members before registration. The steps for pre-registration are essentially the same as outlined above.

#### D. INFORMATION FOR FIRST-YEAR STUDENTS

Each semester, the Biology Seminar Committee invites scientists, who are addressing contemporary biological questions, to give research seminars. The informative seminars cover a variety of topics. All faculty members and graduate students are expected to attend those seminars, held on Thursdays, 11:45 - 1:05 p.m. The Department encourages graduate students to suggest names of speakers to be invited and host a speaker once per semester.

#### 1. DEPARTMENTAL SEMINARS

In addition to departmental seminars, a wide variety of seminars on the Main and Medical Campuses is of interest to members of the Department. Check the Dean’s events link at <http://gumc.georgetown.edu/> for Medical Center seminars.

## 2. DEPARTMENT RETREAT (WORK-IN-PROGRESS SEMINARS- WIPS)

After his (her) first year, each graduate student presents a research seminar annually to our Department. These short talks are organized into a department retreat where students, faculty and post-docs can devote full attention to each other's work. Students present a 45 minute talk to the department during their 4<sup>th</sup> and 5<sup>th</sup> years directly after the completion of the Comprehensive Exam and before the thesis defense, respectively.

## 3. RESEARCH-GROUP MEETINGS AND JOURNAL CLUBS

The Department believes that all new graduate students should be intellectually engaged in empirical research and interact often with colleagues early in their careers. Thus, each new graduate student is required to attend a group laboratory meeting (regular meeting of faculty and students working in a specific research laboratory) in addition to one of the journal clubs. You may ask your academic advising committee, other graduate students, or the CGSS for additional information because these activities may not be formally announced.

## 4. LABORATORY ROTATIONS

Graduate students are welcome to perform research rotations in Biology research groups to learn about and undertake research and decide which group to join for dissertation research. You should contact appropriate lab leaders (professors) to set up your lab rotations. Further, in advance of the rotation, you and the lab leader should discuss and write down the detailed expectations for your work in the lab rotation. You may wish to put these expectations in writing. A student should plan to complete rotation projects and select a dissertation lab by March in their first year. Students should be aware that laboratories in which multiple students are planning to rotate in a single year may not commit to accepting any students until all students have completed rotations. Each rotation lasts for 7 weeks and begins at the start of the academic year. *Note that some labs only accept students to the program in advance and do not have rotations.* Rotation 1 begins September 2 and ends October 23. Rotation 2 runs October 24 – December 19. Rotation 3 runs January 5 – March 6.

## 5. DESKS, TELEPHONE ACCESS, COMPUTER AND OTHER SUPPORT SERVICES

Upon arrival, each graduate student will be assigned a desk within one of the research laboratories. By having space within a laboratory, a new graduate student has an opportunity to interact daily with other graduate students, research technicians, and staff. Graduate students will have access to a telephone, a secure place to leave valuables, a computer and printer, etc., and have a quiet place to hold office hours with other students. Once a graduate student selects a research mentor, he (she) will transfer to that

mentor's laboratory.

**Mail Box** - Each graduate student has a mailbox in the Biology Office. Please check it often for outside, Georgetown University, and departmental mail.

#### **Graduate Student e-mail and Bulletin Board**

Information that is important for graduate students is sent via group e-mail. Please inform the Graduate Administrative Assistant if you discover your name is not on the e-mail list.

#### **Access to Reiss Science Center on Weekends and after Hours**

Reiss is locked after hours for safety, but we encourage you to keep working here nights and weekends. In order to obtain access to the Reiss Science Center after hours, please ask the Biology Office Manager, currently Ms. Ellen Bateman, to submit your name to the Security Office so that you can use your GoCard in the card readers at Reiss entrances at the first and second floors.

#### **The "Lunch" Room (436 Reiss)**

436 Reiss is a place where faculty, staff, and graduate students can relax, chat, and eat. It contains a table, refrigerator and a microwave oven. You may store your food in the refrigerator, but it is a good idea to put your name on your food to make sure no one else eats it. Do not put food in refrigerators, or freezers, in research or teaching laboratories! The Department may occasionally close 436 for special meetings.

#### **Telephone Calls**

You should use Department telephones for making business and emergency calls. You should keep personal calls to a minimum on those phones. If it is necessary to make personal long-distance phone calls on a Department phone, please inform the Biology Accounts Analyst, currently Ms. Margaret Chung, who will provide you with the bill at the end of the month.

#### **Photocopying in the Biology Office**

The photocopy machines in Room 406 are available to graduate students for copying material related to your research and graduate studies. However, if you photocopy material for personal use, please pay the Office Accounts Analyst \$0.05 per page. If you have big jobs to print, please print these late in the day or evening so the printers/copiers are not tied up during peak hours.

#### **Security**

Unfortunately theft occurs in the Reiss Science Center and elsewhere at GU throughout the year. Many thefts have occurred especially during the winter holiday season. You should be especially careful to protect your property (backpacks, computers, books, Ipods, etc.), the equipment and supplies in the laboratories, and supplies and information in departmental offices. Keep your valuables in a safe place, and lock doors and desks when no one is around. Emergencies and thefts should be reported

immediately to Campus Security (687-4343) and the Biology Office (687-6247). Campus Security can mark your laptop, etc., for security purposes. Also, be sure to keep valuables with you when you use GU libraries. Laptop thefts are frequent at GU.

## 6. STUDENT-FACULTY SOCIAL FUNCTIONS

Various informal receptions are held throughout the year to allow graduate students, faculty, and staff to interact in a relaxed setting and to develop departmental rapport. Those socials usually include a reception at the beginning of the school year to welcome new students, a holiday party, and a refreshment period prior to departmental seminars. Graduate students also often have refreshments with seminar speakers after seminars, usually in the Leavey Center or at Epicurious.

## 7. SAFETY TRAINING FOR SCIENTISTS

Because graduate students are involved in research in departmental labs, teaching labs, or both, they must receive basic training in general lab safety. Basic chemical and biological safety training sessions are offered monthly by the Environmental Health & Safety Office in the Medical Center. You may contact Ms. Susan Martin ( [martinsf@georgetown.edu](mailto:martinsf@georgetown.edu) ) to determine class times and to register for a class that fits in your schedule.

*We strongly recommend that you complete the training class in August of your first year. You must complete one of these training classes by the end of your first semester. To satisfy this requirement you must provide a copy of the class completion certificate to the Biology Graduate Administrative Assistant.*

The United States Government has a number of regulations regarding the conduct of research. Georgetown University must comply with all of the regulations in order to receive grant support. Thus, it is imperative that all graduate students are aware of, and comply with, the regulations. Some of the required training is listed below. Graduate students should discuss the regulations with their research mentors before beginning research in the laboratory. In addition, teaching assistants for certain courses may also require specialized training.

### **Animal Research**

Before you may use laboratory animals in either teaching or research, you must address several requirements. First, all work (even just observation of behavior) involving vertebrates (fish, frogs, rats, etc.) requires submission of an animal-use protocol to the Georgetown University Animal Care and Use Committee (GUACUC) and its approval by that Committee. Such approval is a prerequisite for the purchase of animals. Ordinarily, the protocol is submitted by the faculty member in charge of a course or of the research, and it must be signed by the faculty member and by the Biology Chair. Second, your name must appear on the protocol as one of the persons responsible for doing the work. Third, the GUACUC will require that you complete a training course on the use of laboratory animals given by the veterinarians at the GU Research Resources Facility (RRF) as a condition of approval of the protocol.

It is extremely important that you adhere to these requirements. An accreditation committee visits Georgetown periodically, the USDA makes unannounced inspections of our facilities and labs twice each year, and both will ask to see records of animal use. Violations can jeopardize GU's accreditation for animal use. Please consult the big red vinyl-covered "Manual for the Care and Use of Laboratory Animals at Georgetown University," which is kept on the Office Manager's desk in the Biology Office (406 Reiss), or see Professor Singer (406 Reiss) if you have any questions.

### **Safety in Laboratories: The Chemical Hygiene Plan, Disposal of Hazardous Substances, and MSDSs**

You should be aware of any hazardous materials (radioactive, toxic, etc.) in laboratories where you work and know the proper way to handle any hazardous materials you use in your research. All laboratories should have a printed *Chemical Hygiene Plan* and a binder containing *Material Safety Data Sheets (MSDS)*. Learn where these are kept within your research laboratory and become familiar with their contents. After consulting the appropriate manuals, make sure you ask the professor in charge for additional instructions if you have questions. Never store food or eat or drink in a laboratory.

### **The Office of Radiation Safety**

All students, who have desks in laboratories where radioactive material is used, must become familiar with the nature of the isotopes being used and sign the laboratory "non-user" form. All students who work with radioactive material must receive training by the authorized user prior to conducting experiments and take the Radiation Training Course as soon as possible. The Course is not optional; it is required by federal law.

### **The Office of Biosafety, Human Blood-Borne Substances**

A few Department laboratories work with human pathogens. If you are conducting research in those laboratories or are TF for courses using human pathogens, you must take a special training course provided by the GU Medical School. This course must be taken annually.

## **E. YOUR TEACHING EXPERIENCE AND TEACHING FELLOWSHIPS (TFS)**

As noted above in the introduction, the Department not only seeks to provide you with a solid education in research, but also to train you in how to become a good teacher. Some graduates will enter academia, whereas others will find careers in government, private industry, public policy, or elsewhere. Whatever career path you take, your ability to communicate both ideas and research results is key to your professional success. There is no better way to practice these skills than by teaching.

### **1. CNDLS AT PROGRAM - TEACHING BIOLOGY: PEDAGOGY AND PRACTICE**

Excellence in teaching requires thought and preparation and is made easier by having a conceptual framework on which to build your actual teaching experiences. No matter how much experience you have had with teaching, there is always more to be learned. In order to facilitate your transition from teaching fellow to course instructor, you are required to participate in 5 workshops of the apprentice in

teaching program offered by CNDLS. <http://cndls.georgetown.edu/atprogram/workshops.html>. In your first year before you serve as a TF, you must take “Introduction to Teaching Resources” (offered at the beginning of each semester by CNDLS) and “Effective Classroom Interaction” (offered each semester). This should be followed by “Assessment and Grading” (offered each semester) and two of the workshops below:

- Syllabus Design (offered each semester)
- The Teaching Portfolio
- Bringing Curricula to Life and Life to Curricula
- "Did you say what I think you said!?" Facilitating Discussion on Challenging Topics
- Learning Styles
- What Does “diversity in the classroom” mean?
- Online Writing
- Teaching science labs

You have the option of completing the AT program and receiving a teaching certificate and a notation on your transcript. This requires completion of the following requirements:

*Attend an introduction to teaching resources at Georgetown, held at the beginning of each semester*

*Attend an additional six workshops (4 core; 2 elective)*

*Complete four authentic teaching tasks by submission deadlines*

*Submit a Program Registration Form to the Graduate School*

If you are interested in doing this please see the CNDLS website.

## 2. TEACHING FELLOWSHIPS (TFS)

Teaching fellowships are an important part of your graduate training. All students are awarded at least two Teaching Fellow (TF) assignments, usually in the second year, as an opportunity to teach in different environments and to hone their skills. Usually, an assignment consists of responsibility for leading a major course activity (for example, leading a discussion group, teaching a laboratory section, etc.), attending all lectures, holding office hours for a limited number of students and grading exams, papers, or both. Each teaching assignment is expected to take approximately 10–12 hours per week. Students should meet with relevant faculty before the semester begins to discuss specific goals and expectations for that semester. The CGSS attempts to assign equivalent teaching loads to all Teaching Fellows across their graduate careers. Thus, while some semesters may have a more demanding teaching load than

others, the CGSS attempts to balance this variation over your four required assignments. Students should inform the course instructor or Department Chair if their teaching assignments require more than 15 hours per week on the average. Time spent on intellectual preparation for the course is not included in those 15 hours. Students will also teach in years 3 and 4 if their fellowships are provided by the graduate school or biology department.

### 3. TF EVALUATIONS

Both the graduate students and faculty have expressed an interest in having a formalized mechanism for student evaluation of their performance. To this end, our Department employs a uniform TF evaluation form that is distributed to students at the end of a course along with faculty evaluation forms. This evaluation is intended to be helpful and provide students with a mechanism to offer constructive comments to TFs. The current TF evaluation form was developed by graduate students and CGSS faculty. Like any standardized form, it is not ideal for all courses but rather attempts to cover a broad range of general questions. The CGSS welcomes any comments from graduate students regarding possible changes to the TF form to make it more useful and appropriate.

Completed TF evaluations will be held by the professor until final grades are submitted (in the same way faculty evaluations are held by the GU Registrar until grades are submitted). The evaluations should be discussed with the professor responsible for the course and should become part of your academic file (meaning that graduate students should provide the Graduate Program Administrative Assistant with copies of the evaluations for their academic files). TF evaluations may be used by faculty when writing recommendation letters and as part of your application package for a position when you are nearing graduation and thereafter.

### END OF THE YEAR REVIEW

At the end of years 1-3, there will be a formal review of graduate students by all faculty members of the Department of Biology. In this review, the faculty will determine if the student should continue in the Biology graduate program or if he/she should be dismissed. If the student remains in the program, courses and teaching assignments may be recommended. To determine this, the faculty will consider the student's course work and grades, presentations, research accomplishments, and success as a teaching fellow.

### F. SAMPLE SCHEDULE FOR EARNING A PH.D.

This table is only one possible route for completion of your Ph.D. There are, however, many ways to reach that goal. This table indicates "benchmarks" students need to meet in order to complete the degree in the specified time.

Year	Fall semester	Spring semester	End of academic year & summer
1	<ul style="list-style-type: none"> <li>- Take BIOL 501, BIOL 999 if doing rotations, 1–2 additional courses*</li> <li>– Attend departmental seminars</li> <li>– Attend laboratory meetings and journal club</li> <li>– Select a mentor or lab rotation</li> <li>- Apply for external support</li> </ul>	<ul style="list-style-type: none"> <li>– Take BIOL 502, BIOL 999, 1–2 additional courses*</li> <li>– Attend departmental seminars</li> <li>– Attend lab meetings and journal club</li> <li>– Select a mentor or lab rotation</li> <li>- Perform research</li> </ul>	<ul style="list-style-type: none"> <li>- enroll in BIOL 999</li> <li>– <u>Take Ph.D. Qualifying Exam</u></li> <li>– Perform research</li> <li>– Establish initial Ph.D. Dissertation Committee</li> <li>– Have first committee meeting</li> </ul>
2	<ul style="list-style-type: none"> <li>– Take additional courses, statistics, BIOL 999</li> <li>– Present/attend WIPS†</li> <li>– Attend departmental seminars</li> <li>- Attend lab meetings and journal club</li> <li>- teaching assignment 1</li> <li>- Apply for external support</li> <li>- Perform research</li> </ul>	<ul style="list-style-type: none"> <li>– Take BIOL 999, complete courses</li> <li>– Attend departmental seminars</li> <li>– Attend lab meetings and journal club</li> <li>–Teaching assignment 2</li> <li>-Perform research</li> </ul>	<ul style="list-style-type: none"> <li>– Perform research</li> <li>– Have committee meeting</li> <li>– Take Comprehensive Exam by end of 3<sup>rd</sup> yr</li> <li>– Submit Dissertation Proposal Form</li> </ul>
3	<ul style="list-style-type: none"> <li>– Take BIOL 999 (zero credits)</li> <li>– Present/attend WIPS†</li> <li>– Attend departmental seminars</li> <li>- Perform research</li> <li>- Present 1-hr seminar to Department</li> </ul>	<ul style="list-style-type: none"> <li>–Attend lab meetings and journal club</li> <li>– Take BIOL 999 (zero credits)</li> <li>– Attend departmental seminars</li> <li>- Perform research</li> </ul>	
4–5	<ul style="list-style-type: none"> <li>– Take BIOL 999 (zero credits)</li> <li>– Attend departmental seminars</li> <li>- Perform research (plan to have 1-2 papers in press by your 4<sup>th</sup> year)</li> <li>-Present 1-hr seminar to Department</li> </ul>	<ul style="list-style-type: none"> <li>– Attend lab meetings and journal club</li> <li>– Take BIOL 999 (zero credits)</li> <li>– Attend lab meetings and journal club</li> <li>– Present/attend WIPS†</li> <li>- Perform research</li> <li>– Begin to contemplate future options.</li> <li>– Apply for future positions.</li> </ul>	<ul style="list-style-type: none"> <li>departmental seminar on the dissertation; defend dissertation; publish dissertation results</li> </ul>

\*Including BIOL 503 or equivalent (biostatistics). †Present WIPS (work in progress seminar) each year at the department retreat. In year 5, the dissertation seminar and defense replaces the WIPS.

## G. GENERAL PROCEDURES FOR OBTAINING A PH.D.

### 1. SUMMARY OF REQUIREMENTS

For students with Bachelor or M.S. degrees, satisfactory completion of:

*A minimum of 3 years in residence. (GU allows you a maximum of 7 years to complete your degree.)*

*A minimum of 16 graduate-course credits exclusive of research credit (e.g., BIOL 999)*

*Completion of BIOL 501, 502, and statistics (which all count toward your 16-credit requirement)*

*Completion of CNDLS AT requirements*

*Teaching experience as a TF for at least two (2) semesters*

*A passing grade on your Ph.D. Qualifying Exam (completed at the end of your first year)*

*Successful completion of your Ph.D. Comprehensive Examination (taken no later than end of your third year)*

*Satisfactory progress towards Your Ph. D. as determined by formal reviews by all faculty members in May after the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> years in the program.*

*Ph.D. Dissertation with defense*

*Departmental Dissertation Seminar*

*Submission of at least one empirical first authored manuscripts for publication in a scientific peer-reviewed journal*

### 2. MINIMUM REQUIREMENTS

The minimum time requirement for obtaining a Ph.D. is six (6) regular semesters in residence. A part time student must spend at least one academic year in residence in the Department as a full-time student.

### 3. CREDIT AND COURSE REQUIREMENTS

Ph.D. students may take no more than 8 credits with numbers below 350 for graduate credit, and the proper paperwork must be completed to obtain graduate credit. (Please see “Registration” above). Because only 16 course credits are required for the Ph.D., you should only occasionally use undergraduate courses for graduate credit.

In the first year, a Ph.D. student may register for Thesis Research (Biol 999) for 0 credits. Biol 999 serves as a top off course and thus will top off your credits to provide full time status. Incoming students may participate in Biology Research with different research laboratories, preferably during the first two semesters of enrollment. You should choose your dissertation lab no later than the end of your first summer at GU.

Once you have completed your 16 credits you should enroll only in Biol 999-01 for 0 credits or if you take a course then also register for 999-03 for 0 credits.

### 4. TEACHING REQUIREMENTS

Each Ph.D. student is expected to attend teaching workshops and serve as a TF for at least two (2) semesters and a maximum of 6 semesters.

### 5. PH.D. QUALIFYING EXAM

The purpose of the qualifying exam is to identify areas in which a student is deficient and to teach the scientific method through the preparation and defense of a grant proposal. The Ph.D Qualifying Exam is taken by all Ph.D. candidates, including those entering our Department with advanced degrees, and is taken during the first year of residence in the Biology graduate program. You must pass both the Exam and Ph.D. Comprehensive Exam within 3 years of your entry into our Biology Program or else you will be dismissed.

#### **Exam Goals**

Goals of the exam process are the following:

*a. Students will become experts on a topic, integrating information from diverse fields, through reviewing scientific literature.*

- b. Students will learn how to develop testable hypotheses.*
- c. Students will investigate research techniques and experimental approaches, learning about the strengths and weaknesses of each technique.*
- d. Students will create a unique, synthetic study of a particular scientific area.*
- e. Students will write and present their ideas, concisely, clearly and effectively such that an expert or novice can understand the basics of the field, what you propose to do, and why it is important.*

### **Format of the Exam**

The exam consists of two parts: a written proposal and an oral defense.

**Written proposal:** The written exam is a mock grant proposal that consists of background information including the identification of gaps in knowledge, specific aims (hypotheses or questions) designed to fill the gaps, proposed experiments to address those aims, expected results and potential research problems. The proposal should be 15–20 single space pages with 1-inch-wide margins; figures and tables are included within that page limit. Additionally, a one page Proposal Summary will be written that summarizes the background information, explains the significance of the problem, provides the specific aims and rationales for experimental approaches.

Much of modern Biology research occurs from interdisciplinary perspectives thus, it is very important to learn how to approach scientific problems from a variety of perspectives. Your proposal should incorporate concepts and techniques from both MCB (biochemical, molecular, and cellular) and EEB (evolutionary, ecological and behavioral) and/or computational biology perspectives. The balance between the MCB and EEB portions should be between 50-75% in one of these areas and 25-50% in the other area.

When choosing a topic, it is important to recognize that it is difficult to write a proposal on a system of which little prior work has been done, whereas it is likely to be easier and more educational to write a proposal on a system that is at least a little more developed.

**Oral Defense:** The oral defense will take place in front of the Ph.D. Qualifying Examination Committee. Students will pick their committee members, generally choosing faculty with expertise in the topic or experimental approaches used. This committee will be composed of three Biology faculty professors, at least one of which will be an EEB faculty member (Armbruster, Barrows, Elsik, Hamilton, Mann, Sze, Weiss, Wimp) and one of which will be an MCB faculty member (Bansal, Casey, Donoghue, Elmendorf, Elsik, Neale, Rolfes, Rosenwald, Singer). Your research advisor, if you have chosen one during your first year, will be the third member; if a research mentor hasn't been selected, then students should select one of the faculty members whose labs they rotated through.

### **Support and help in the preparation and defense of the proposal**

All students should feel free to discuss the content, format, and scientific approaches of their proposals with Biology faculty, their advisors, lab members, and examiners. However, the ideas (aims,

approaches, questions) should be developed by the examinee not the advisor, and the first draft should be submitted to all committee members at the same time.

**Grant examples.** Students should solicit sample grant proposals from students to serve as exam models.

**Progress meetings with exam committee.** Students will meet with the exam committee at least once prior to the defense (see time line below). Note that it is the student's responsibility to organize Ph.D. Qualifying Committee meetings; this includes contacting the Committee members to find a time when your entire committee can meet.

**Mock defense.** The Biology faculty recommends that each student organizes a practice exam defense. This would entail the recruitment of graduate students or other lab members to read and critique the proposal and then serve as examiners in a mock exam setting. Faculty and exam committee members should not be involved in this mock defense.

**If English is not your first language.** Any student for whom English is not his/her first language will need to write and speak sufficiently clearly to convey the ideas in the proposal. These students should visit the Writing Center and/or ask another graduate student or lab member to review and edit the English of the proposal.

#### **Time table**

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**Fall semester.** Start to investigate topics for the exam and identify gaps in knowledge. Rephrase the gaps to potential questions that you'll want to answer.

**December.** (1) Chose your Qualifying Committee Members and arrange for a time to meet to discuss your ideas for the proposal. (2) Inform CGSS of the composition of your committee and submit the one-page first draft of the proposal summary page.

**January – April.** Meet with your Qualifying Committee at least two times to discuss your progress; your committee may also call for a meeting in the event that concerns are raised about your progress. The Qualifying Committee will comment on your preliminary drafts.

**March 1:** Last date for changes to the composition of the Qualifying Committee.

Two weeks before your final exam, give your Qualifying Committee the final draft of your exam.

**May 31.** On or before this date, take your oral exam on your proposal.

#### **Standards for Evaluation**

**Criteria.** This exam should be rigorous at both the theoretical level (concepts, proposed experiments, etc.) as well as at the presentation level (written material and oral defense). Students who are not able to write well, defend their proposal adequately, or both should fail. Criteria for passing your exam include:

- a. Understanding of your proposal area from factual (content) and conceptual perspectives.*
- b. Application of relevant concepts to your grant proposal.*
- c. Logical synthesis of relevant concepts and facts.*
- d. Oral explanation of your proposal.*
- e. Excellent scientific writing.*

**Grading.** You can earn a pass, pass with distinction, pass with remediation, or failure.

“Pass” and “Pass with Distinction” are noted in your file, and allow you to continue to pursue your PhD.

“Pass with remediation” indicates that you have an academic deficiency that your Qualifying committee believes can be remedied with a specific action (for example, completion of a specific course) and your Qualifying Committee will specify that action.

“Failure” indicates that you have failed the exam. Your Ph.D. Qualifying Committee may decide (a) that you have passed it at the M.S. level and that you may retake it at the Ph.D. level within 2 months. If you retake it at the Ph.D. level and pass, you can continue in the program however, if you fail it a second time, you will be dismissed from our Graduate Program; (b) you passed the exam at the M.S. level and your Qualifying Committee allows you to continue on to pursue a M.S. degree. Unfortunately, the Department of Biology cannot provide a fellowship for completion of a terminal M.S. degree and you will be charged tuition and, (c) your performance was insufficient for passing at the M.S. level and you will be dismissed from the program.

**Non-compliance.** The graduate student’s stipend will be suspended if the exam is not completed within 12 months after the start of the student’s graduate career at GU. Upon completion of the exam the stipend will be reinstated. A request to extend the deadline of your Ph.D. Qualifying Exam must be submitted in writing to the CGSS prior to April 15 of the year of the Exam; the reasons must be compelling to receive an extension.

## 6. PH.D. DISSERTATION COMMITTEE AND RESEARCH

By the end of your first year, you should select a research area and a mentor, who will help you select the other members of your Dissertation Committee. It must have at least four (4) faculty members at the time of your dissertation defense, including at least two (2) members from the Department and at least one (1) member from outside the Department. As soon as you establish your Dissertation Committee or if you change members, please notify the CGSS in writing. The composition of your Dissertation Committee is subject to approval by CGSS and the Chair. Your initial Dissertation Committee must be established no later than the end of your first year in the Department (including the

summer term). The composition of your Dissertation Committee is fluid, especially in your first few years, and can be changed as your research develops. Students normally have three Dissertation Committee members by the end of their first year and add a fourth later in the program.

Your Dissertation Committee is responsible for your academic program, training, and research, as well as conducting your Ph.D. comprehensive examination and dissertation defense.

Your committee **must meet at least once each year** to evaluate your overall progress towards your degree. Students should schedule committee meetings and ensure committee members can attend. All members should be present. At least three members of the Dissertation must be present to constitute a Dissertation meeting. An affirmative vote by a majority of the committee is required to designate a dissertation as acceptable for defense and that a student passed his (her) defense. Immediately after the meeting, minutes from the meeting should be provided by the mentor to the student and a copy placed in the student's record in the Biology Office. The minutes should include: date, names of Dissertation members present, and a list of the important decisions and recommendations made. Please provide this information to the Graduate Administrative Assistant so that it can be included in your file.

A student is required to conduct at least 50% of his (her) dissertation research in the Department, which may include time spent doing field work under the direction of a faculty member in the Department. Collaborative research or training experience may be arranged with scientists outside of the Department (including off-campus research labs), subject to approval by your dissertation committee and the Director of Graduate Studies.

Research accomplished by a student as a paid employee (either on or off campus) may not be used for a dissertation.

## 7. PH.D. COMPREHENSIVE EXAMINATION

You shall take your Comprehensive Exam after your successful completion of your Qualifying Exam. The Ph.D. Comprehensive Exam is intended to assess your analytic and synthetic abilities in areas of biology pertinent to your goals as a scientist. The comprehensive examination may take different forms, such as a written grant proposal, written dissertation proposal, written subject exams, or a combination of such exams. Your committee may give you an oral exam related to the written material.

For maximum benefit to the student, the CGSS strongly recommends that this exam be taken within one year of completion of all course work, for example at the end of the second year. The Comprehensive Exam, however, must be completed by the end of a student's third year. If a student does not pass the

exam or obtain a waiver from CGSS by the beginning of the fourth academic year, he (she) may not be eligible for a fellowship. A student who fails the exam on the first attempt will be allowed to revise and retake the exam within 2 months. A second failure will result in dismissal from the program.

## 8. PH.D. DISSERTATION PROPOSAL FORM

Note Well: You must submit this form to the Graduate School at least 1 week before you defend your dissertation. However, you are encouraged to submit this form during the first semester of your dissertation research. The form is available online:

[http://grad.georgetown.edu/pages/forms\\_landing\\_page.cfm](http://grad.georgetown.edu/pages/forms_landing_page.cfm) .

## 9. PUBLICATION OF PH.D. DISSERTATION RESULTS

You are required to prepare and submit at least one scientific paper based on your dissertation to a scientific journal before your Defense. Learning to write such a paper is an important part of your education. Clearly, it is also highly beneficial for a new Ph.D. to have several papers published, in press, or both, in refereed journals before graduating. Most students opt for their dissertation to be a series of papers rather than traditional chapters. In this case, there is typically a short introduction, a review chapter, and a short conclusion/summary chapter, with at least two data-driven papers/chapters in between.

## 10. PREPARATION OF YOUR PH.D. DISSERTATION

### **Format Requirements from the Graduate School**

Your dissertation MUST be in accordance with the directions in Georgetown's *Guidelines for Dissertation and Thesis Writers*. This document is available at

[http://grad.georgetown.edu/image\\_pool/File/Thesis\\_guidelines\\_9.9.10.pdf](http://grad.georgetown.edu/image_pool/File/Thesis_guidelines_9.9.10.pdf). One of the Associate Deans in the Graduate School will examine your dissertation (usually page by page) to verify that it conforms to the rules; therefore, it is extremely important that you follow the directions provided by the Graduate School carefully. It provides a checklist for submitting your dissertation.

### **Writing Your Dissertation**

Warning: Writing your dissertation is very time-consuming. Before you begin to write your dissertation, you would be wise to (1) determine with your Dissertation Committee if you have enough data, (2) determine how to present your data, (3) discuss the format and contents of your dissertation with your adviser, (4) review the format regulations of the Graduate School, and (5) consult an excellent manual of scientific writing approved by your adviser. You should allow ample time for writing your dissertation, because it will take longer than you expect. It is important to get as much feedback as possible from your adviser as you are writing. Other members of your Dissertation will choose which drafts they wish

to read as you progress. Some may wish to see many drafts in progress, others may wish to see only later drafts that you and your adviser have edited well. You should keep your Dissertation Committee members well informed of your progress. The Department of Biology requires that at least two of your dissertation chapters are empirical (data-driven).

## 11. APPLICATION FOR THE PH.D. DEGREE

GU awards M.S. and Ph.D. degrees at the end of each month (except June). To be awarded a degree, you must file an Application for Graduate Degree by the first business day of the month in which you intend to graduate. (May is an exception, and other deadlines apply.) The application form is available at [http://grad.georgetown.edu/pages/forms\\_landing\\_page.cfm](http://grad.georgetown.edu/pages/forms_landing_page.cfm).

## 12. ANNOUNCEMENT OF THE DEPARTMENTAL SEMINAR AND DISSERTATION DEFENSE

You must notify The Graduate School of your departmental seminar and dissertation defense times and date(s). Because the degree is certified by the Department of Biology, it is important that all members of the Department are also aware of your accomplishments. You may not defend your dissertation, unless it is properly announced. Please give the Graduate Administrative Assistant at least 2-weeks advance notice, and she will assist you in announcing your defense. Additional advance notice will facilitate scheduling seminar and conference rooms for the defense.

### Department Notification

At least 7 days prior to defense of your dissertation, you and your adviser are responsible for announcing your departmental seminar and defense of dissertation. Please place these four (4) items in the Biology Office mailbox reserved for dissertations:

- a. An announcement of your defense including date, time, and location. This item should be placed in all faculty mailboxes and on Department bulletin boards*
- b. Abstract of your dissertation.*
- c. Your curriculum vitae.*
- d. A complete copy of your dissertation.*

### University Notification

At least 7 days prior to your defense, you and your adviser must announce the defense to the Graduate School by:

- a. *Listing your defense on the Doctoral Defense Schedule at*  
[http://grad.georgetown.edu/pages/doc\\_dissert\\_defense-sche.cfm](http://grad.georgetown.edu/pages/doc_dissert_defense-sche.cfm)
- b. *Online form (Doctoral Dissertation Reviewers Report)*  
[http://grad.georgetown.edu/image\\_pool/File/Diss\\_Rev\\_Rpt-2009.pdf](http://grad.georgetown.edu/image_pool/File/Diss_Rev_Rpt-2009.pdf)

A majority of the members of the dissertation committee must sign this form indicating the dissertation is ready for defense. This does not guarantee that the dissertation is acceptable in its submitted form.

### 13. DEFENSE OF THE DISSERTATION

The defense of the Ph.D. dissertation is an opportunity for the entire University community to examine the candidate. Thus, the defense is a public presentation of the thesis with open questioning to follow. In the Department of Biology, the candidate is also examined in private by the dissertation committee. The public portion of the defense is part of the examination and should not be trivialized. The private defense should take place immediately following the public examination. Exceptions to this must be approved by petition of the committee on graduate students and studies AND the Department chair. In either event, the ballot cannot be signed until after both the public and private portions of the defense.

### 14. SUBMITTAL OF THE FINAL DRAFT OF YOUR DISSERTATION

After the defense, the dissertation will often require revision. It must then be approved by the following:

- a. *the dissertation committee,*
- b. *the adviser, and*
- c. *the Director of Graduate Studies*

It is strongly recommended that you allow, at the VERY LEAST, 2 weeks after your defense to make revisions and corrections as recommended by your Ph.D. Dissertation Committee, and to obtain final signatures approving your dissertation. Signatures from committee members from outside institutions may be obtained at the time of the defense

After the appropriate forms are signed, call the Graduate School for an appointment. It will examine the dissertation to make sure you have followed all of the directions. YOU MAY NEED TO MAKE MORE CHANGES. After your dissertation is completed, hand-carry it and its cover sheet to the Graduate School and obtain a receipt. DO NOT send your dissertation to the Graduate School by regular mail.

Dissertations are also submitted electronically and this enhances their accessibility.

#### H. A SAMPLE SCHEDULE FOR EARNING AN M.S.

This table provides only one possible route for completion of your M.S. there are, however, many ways to reach that goal. The table indicates "benchmarks" a student needs to meet in order to complete the degree in the specified time.

Year	Fall semester	Spring semester	End of academic year
1	<ul style="list-style-type: none"> <li>- Take BIOL 501, BIOL 999, plus one additional course*</li> <li>- Attend work-in-progress seminars (WIPS)</li> <li>- Attend departmental seminars</li> </ul>	<ul style="list-style-type: none"> <li>- Attend laboratory meetings and journal club</li> <li>- Take BIOL 502, BIOL 999, plus 1-2 additional courses*</li> <li>- Attend departmental seminars</li> <li>- Attend laboratory meetings and journal club</li> <li>- Perform research</li> </ul>	<ul style="list-style-type: none"> <li>- Select mentor</li> <li>- Take M.S. Comprehensive Examination</li> <li>- Perform research</li> <li>- Form M.S. Dissertation Committee.</li> </ul>
2	<ul style="list-style-type: none"> <li>- Take course work as needed*</li> <li>- Take thesis research 999</li> <li>- Present/Attend WIPS</li> <li>- Attend departmental seminars</li> <li>- Attend laboratory meetings and journal club</li> <li>- Have committee meeting to evaluate progress.</li> <li>- Perform Research</li> </ul>	<ul style="list-style-type: none"> <li>- Submit thesis proposal to Graduate School</li> <li>- Complete course credits*</li> <li>- Thesis research 999</li> <li>- Attend departmental seminars</li> <li>- Attend laboratory meetings and journal club</li> <li>- Perform research</li> </ul>	<ul style="list-style-type: none"> <li>- Perform research</li> <li>- Write thesis</li> <li>- Present thesis seminar</li> </ul>
			<ul style="list-style-type: none"> <li>- Have final Committee meeting; defend thesis; present thesis seminar.</li> <li>- Obtain approval of dissertation proposal from Committee</li> </ul>

\* Including BIOL 503 (biostatistics) taken in either year 1 or year 2.

## I. GENERAL PROCEDURES FOR OBTAINING AN M.S.

### Credit Requirements:

- a. a minimum of 24 graduate course credits*
- b. a minimum of 2 semesters and 1 summer in residence.*
- c. 1 TF assignment per semester while a full-time student*
- d. M.S. Comprehensive Examination*
- e. M.S. Thesis with defense and seminar*

### Minimum Time Requirement

The minimum time requirement for obtaining an M.S. degree is two regular semesters plus one summer session.

A total of 24 course credits is required. At least 16 of these credits should be obtained in our Department. No more than 8 credits with numbers below 350 may be taken for graduate credit, and the proper forms must be filled out to obtain graduate credit for undergraduate courses. (Please see the "Registration" section above.) A full-time graduate student is expected to take at least 9 credits of course work each semester during the first year of residence. These are minimum requirements. Additional ones may be established at the discretion of your M.S. Dissertation Committee, the CGSS, or both.

## 2. M.S. COMPREHENSIVE EXAMINATION (MCE)

The purpose of your Comprehensive Exam is to prepare a specific document and defend it to your MCE Committee. Your document will be a grant proposal. Your document should be relevant to your research focus, and it should include biological information related to both BIOL 501 and 502. The Department of Biology gives the MCE in accordance with Graduate School policy. (Please see the Graduate School catalogue information.)

The main steps of your Comprehensive Exam are: (1) chose members of your Comprehensive Exam committee; (2) organize meeting with your committee as needed to review your progress; (3) prepare your proposal; (4) present a written copy of your proposal to your committee; and (5) orally defend your proposal. The CGSS recommends that you form your Comprehensive Exam Committee in October of your first year at GU. You should take your Comprehensive Exam in May of your first year. More

information about proposal writing is above (under Ph.D. Qualifying Exam).

Note: It is your responsibility to organize Comprehensive Exam Committee meetings. This includes contacting your Committee members to find out when your entire Committee can meet with you at particular meetings.

Your Comprehensive Exam Committee should comprise 2–3 regular-faculty professors, including your research advisor (if you have chosen one in your first year). Further your MCE committee should include one EEB and one MCB Regular Faculty Professor.

Your Comprehensive Exam Committee will decide on the format and style of your proposal, guide your proposal writing, set deadlines with you, and grade your final proposal.

A student can pass his (her) Comprehensive Exam with distinction, pass, or pass with remediation, or fail. "Pass with remediation" indicates that you have an academic deficiency that your Comprehensive Exam Committee believes can be remedied with a specific action, for example, completion of a specific course. Your Comprehensive Exam Committee specifies that action. Failure indicates a more serious deficiency. If a student fails his (her), his (her) Comprehensive Exam Committee decides what the student should do with regard to the Comprehensive Exam to remain in our M.S. Program. A second failure of the Comprehensive Exam will result in a student's dismissal from the Biology M.S. Program.

Your possible request to extend the deadline of your Comprehensive Exam must be submitted in writing to the CGSS prior to 15 April of the year of the Comprehensive Exam. The CGSS will allow your extension for only compelling reasons. You must pass your Comprehensive Exam within 2 years of your entry into our Biology Program or else you may be dismissed from it. The Comprehensive Exam is taken by all M.S. candidates, including those entering our Department with advanced degrees.

### 3. M.S. DISSERTATION COMMITTEE AND RESEARCH

Your M.S. Dissertation Committee must consist of at least three (3) members, with two (2) members from our Department and one (1) member from outside of our Department. By the end of your first academic year, you should choose a research area and a thesis mentor. After you accomplish this, you and your mentor will select your M.S. Dissertation Committee. As soon as you set up your M.S. Dissertation Committee, or if you change any part of it, please notify the CGSS. Your M.S. Dissertation Committee usually meets 3–4 times. For example, in meeting 1, your M.S. Dissertation Committee is "officially" established and you and your M.S. Dissertation Committee discuss your thesis proposal. In meeting 2, you all assess your progress. In meeting 3, your M.S. Dissertation Committee decides if you have obtained sufficient data to answer your research question(s), test your hypothesis(es), or both.

Meeting 4 is your defense of thesis.

Research accomplished by a student as a paid employee (either on or off campus) may not be used for a thesis.

#### 4. THESIS PROPOSAL

All research M.S. students must have a written thesis proposal that is approved by their M.S. Dissertation Committee. The format of your proposal is up to your M.S. Dissertation Committee. Once it approves your proposal, you must submit a copy to the Graduate School. Please, do not forget! This is your responsibility. Also, give a copy to the CGSS Assistant in the Biology Office for your file.

#### 5. PREPARATION OF YOUR M.S. THESIS

Obtain Format Requirements from the Graduate School

Your thesis must be in accordance with the directions in GU's Guidelines for Dissertation and Thesis Writers. A copy of this document is available at

[http://grad.georgetown.edu/pages/current\\_student\\_forms.cfm](http://grad.georgetown.edu/pages/current_student_forms.cfm). One of the Associate Deans in the Graduate School will examine your dissertation (usually page by page) to verify that it conforms to the rules; therefore, it is extremely important that you follow the directions provided by the Graduate School carefully. It provides a checklist for submitting your thesis.

#### 6. WRITING YOUR THESIS

Warning: Writing your thesis is very time-consuming. Before you begin to write your thesis, you would be wise to (1) determine with your M.S. Dissertation Committee if you have enough data, (2) determine how to present your data, (3) discuss the format and contents of your thesis with your adviser, (4) review the format regulations of the Graduate School, and (5) consult an excellent manual of scientific writing approved by your adviser. You should allow ample time for writing your thesis, because it will take longer than you expect. It is important to get as much feedback as possible from your adviser as you are writing. Other members of your M.S. Dissertation Committee will choose which drafts they wish to read as you progress. Some may wish to see many drafts in progress, others may wish to see only later drafts that you and your adviser have edited well. You should keep your M.S. Dissertation Committee members well informed of your progress.

#### 7. APPLICATION FOR YOUR M.S. DEGREE

Master's and doctoral degrees are awarded at the end of each month (except June). To be awarded a

degree, you must file an Application for Graduate Degree by the first business day of the month in which you intend to defend. (May is an exception, and other deadlines apply.) The application form is available at [http://grad.georgetown.edu/pages/current\\_student\\_forms.cfm](http://grad.georgetown.edu/pages/current_student_forms.cfm).

## 8. ANNOUNCEMENT OF YOUR DEPARTMENTAL SEMINAR AND THESIS DEFENSE

At least 7 days prior to defense of your thesis, the student and his (her) mentor are responsible for announcing the student's departmental seminar and the defense of thesis. These four (4) items are placed in the Biology Office mailbox reserved for dissertations:

- a. An announcement of your defense including date, time, and location. This item should also be placed in all faculty mailboxes and on Department bulletin boards.*
- b. Abstract of your thesis.*
- c. Your curriculum vitae.*
- d. A complete copy of your thesis.*

### **University Notification**

At least 7 days prior to your defense

- a. you and your adviser must announce the defense to the Graduate School by filling out an online form called Thesis Reviewers Report ([http://grad.georgetown.edu/pages/current\\_student\\_forms.cfm](http://grad.georgetown.edu/pages/current_student_forms.cfm)). All members of your thesis committee must sign this form indicating your thesis is ready for defense. This does not guarantee that your thesis is acceptable in final form.*
- b. you must place a complete copy of your thesis in the Biology Office mailbox reserved for dissertations and theses*

## 9. SUBMITTAL OF THE FINAL DRAFT OF YOUR THESIS

After your defense, revise your thesis. It must then be approved by the following:

- a. your M.S. Dissertation Committee,*
- b. your adviser, and*
- c. your Department Chair*

Warning: The CGSS strongly recommends that you allow, at the very least, 2 weeks after your defense to make revisions and corrections as recommended by your committee, and to obtain final signatures approving your dissertation. After the appropriate forms are signed, please call the Graduate School for an appointment. It will examine your thesis to make sure you have followed all of the directions. You may need to make more changes. After your thesis is completed, hand-carry it and its cover sheet to the Graduate School and obtain a receipt. Do not send the thesis to the Graduate School by regular mail.

## J. ADDITIONAL INFORMATION FOR M.S. AND PH.D. STUDENTS

### **Transferring of Graduate Credits to Georgetown University**

You may transfer to GU a maximum of 25% of the total number of required credits for your degree from another university. Only graduate courses, taken at another university, that were not used for credit toward an awarded degree, can be transferred. The credits are not automatically transferred or accepted. Therefore, if you wish to have credits from another university transferred to GU, you should do the following: Obtain the guidelines from the Graduate School and write a letter to the CGSS requesting approval to transfer graduate credits. In that letter, you must provide your official transcript, indicate which credits you wish to transfer, and include a description of the courses taken at the other institution (for example, give the CGSS a course's description in the university's course catalogue) you wish to transfer. The CGSS will consult with your research committee. If your request is approved, the CGSS will send a letter requesting approval for the transfer of credits to the Dean of the Graduate School. You will be notified of the Dean's decision by letter.

### **Academic Standing**

You are expected to maintain at least a B (3.00) average. The Graduate School, CGSS, and Department will review your performance at the end of each semester. If your performance is poor, the CGSS may recommend to the Chair that you be dismissed. If the Chair concurs, dismissal will be recommended to the Dean. In an exceptional circumstance, the Chair may independently recommend dismissal. An "F" in two courses will ordinarily result in a dismissal recommendation. Dismissal is usually for academic reasons; however, a dismissal may be recommended to the Dean whenever it appears to be the best

interest of the focal student, the Department, or the University, including poor performance as a TF. You must have a 3.00 average to take the MCE and the PCE. It is your responsibility to verify that you have met this requirement prior to taking these exams.

### **Change of Status**

"Change of graduate-student status" means a change from an M.S. status to a Ph.D. status or vice versa; a change from special-student status to graduate-student status; or dismissal from our program. A request for a change may come from you. A recommendation may come from an individual professor, members of your committees, or the CGSS. The CGSS reviews all such recommendations and either approves or disapproves them. The CGSS sends a notification of its action to the Chair who sends approval or disapproval to the Dean. Changes in status may relate to things such as quality of your performance in a formal course, research progress or lack thereof, teaching, or your general attitude. In each case of "change of status" action, the best interests of the student, Department, and University are carefully considered. You have the right to request to appear before the CGSS to discuss a pending action or to appeal a decision to the CGSS, Chair, or Dean.

### **Leave-of-absence**

If external events threaten to interfere with normal progress in your graduate program, you may seek a leave-of-absence. You should consult with your adviser and the CGSS in advance, because your absence may have ramifications for fellowship and TF scheduling. The procedures for application for a leave-of-absence are described in the Graduate School online catalog. Your application should be approved by your adviser and the Chair before it goes to the Graduate School.

### **Appeals**

If you wish to appeal any academic decision that is made about you, such as a grade in a course or on an exam, you should first discuss the situation with the professor involved. Appeals may be made first to the Chair and then to the Dean.

### **Predoctoral Grants**

Graduate students are encouraged to seek external fellowship support. Writing research proposals helps in the process of developing and articulating research ideas. Further, developing a record of successfully funding your research (the dollar amount is essentially irrelevant) is an important part of your career progress. There are several online services that list available funding opportunities. Please consult your adviser or one of the co-chairs of the CGSS for advice in writing a grant for pre-doctoral support.

### **Funds for Scientific Meetings**

The Department has limited funds to cover travel expenses so that students can present at scientific meetings. If you wish to apply for such funds, please discuss the situation with your adviser and then write an email to the Director of CGSS requesting funds. Include

*the name, location, date and URL of meeting website;*

*your abstract and the title and type of presentation (Exceptions are made for educational workshops that will contribute markedly to your professional and/or intellectual development);*

*information on previous travel funds received from the dept-- year and quantity;*

*Evidence that you applied for a travel grant offered by the association, or the meeting sponsors (e.g. SDB, ASCB, ASM);*

*an itemized estimate of the cost of the meeting;*

*a brief email from your advisor supporting your request.*

If approved, the CGSS will forward the request to the Biology Accounts Analyst.

### **Outside Jobs and Graduate Student Fellowships**

The GU Graduate School allows full-time graduate students on fellowships to have outside jobs; however the Biology Department allows only 6 hours/ week of employment outside of your graduate research. Such jobs can help to "make ends meet;" however, they can also significantly slow students' progress. Failure to maintain adequate progress toward the degree can result in loss of fellowship support. It is imperative to discuss your outside job(s) and work hours with your adviser.

### **GU Graduate Biology Student of the Year**

**Requirement:** (1) One-page letter of support from mentor.

(2) Student's CV or Resume

**Optional:** (1) Additional letter of support from faculty member who has worked with or taught with the student.

#### **Criteria (in rank order of importance):**

*(1) Demonstrated scholarship in the form of refereed publications, other publications (e.g., book chapters), conference presentations; quality is given weight over quantity*

*(2) Other recognition in the field: awards, scholarships, fellowships, grants (further evidence of scholarship)*

*(3) Teaching innovations or unusual contributions*

*(4) Outstanding service*

Teaching and Service are given primary consideration only if there is no graduate student that shows excellence in scholarship. Status in the program is considered only if there are two equally outstanding candidates and one is more senior than the other. Awards are not necessarily given every year.

Each fall, the Faculty votes on the Graduate Biology Student of the Year. Graduate students and faculty can nominate students for the award.

### **Biology Graduate Information Online**

More information about our Graduate Program is at <http://biology.georgetown.edu/graduate/>.

### **Change of Address or Telephone**

Please notify the Department Office and the Registrar's Office (in White-Gravenor) as soon as possible if you change your address or telephone number. The Registrar's Office mails your grades to you at the end of each semester and informs you if there had been a change in the registration schedule. Foreign students must also notify the Office of International Programs regarding all address changes.

## **K. GRADUATE STUDENT ORGANIZATIONS**

### **Georgetown University Graduate Student Organization (GSO)**

The purpose of the GSO is to promote communication among all graduate students from different departments. The GSO sponsors seminars, socials, and other special events. The biology graduate students elect one representative each year. Please see <http://media.georgetown.edu/gso/>.

### **Biology Organization of Graduate Students (BOGS)**

BOGS is organization of graduate students within our Department. Students established it to make program recommendations and to represent their views. BOGS is composed of one elected representative from each class year. Graduate students should address their concerns and problems to the members of BOGS.

### **Representatives to Faculty and Graduate Student Meetings**

Graduate students elect one or two graduate students representatives to monthly faculty and GSO meetings.

### **Representatives to the CGSS**

Graduate students elect one or two graduate students representatives to CGSS meetings.

## **L. GRADUATE STUDENT BILL OF RIGHTS**

(Originally Prepared by the Graduate Students and accepted by the Faculty, circa 1990, updated by the CGSS in 2005 and 2006)

## I. Student-Mentor Interactions

A. Good communication between a mentor and a student is absolutely critical in order to perform quality science and maximize the education experience. It is the student's right to expect that the mentor be actively [intellectually] involved in each student's project. The participation of the mentor in the student's project enables the pair to anticipate and resolve problems in a timely fashion.

B. It is critical that a mentor and graduate student schedule frequent meeting times to discuss the student's progress and problems and current literature, and to provide encouragement and support. Although flexibility is essential in order to accommodate individual schedules, students have the right to expect such meetings.

C. The expectations that the mentor has of the student should be made clear from the time when the student joins the mentor's lab. It is realized that expectations may change somewhat as a research project evolves, and that these changes should be discussed. The student must ask questions concerning the parameters of any potential dissertation projects, comprehensive exam formats typically followed in the mentor's lab, responsibilities as a member of that lab group, career options, etc. It is recognized that the student has the right to initiate discussions pertaining to both the mentor's and the student's expectations of each other and the project, the student's career goals, and how the student's training can prepare for these goals. The student is also responsible for conveying any concerns and changes in personal career goals to his, or her, mentor.

D. The student should exercise his, or her, right to be involved in the development of his, or her, dissertation from start to finish. During the process of choosing a dissertation, a student is encouraged to discuss with his, or her, committee, or with other scientists the degree of risk associated with any dissertation projects that are considered. A time limit should be established in order to provide a reasonable point at which the project can be reevaluated and when other approaches must be considered. In order to avoid delays due to project failure, it is recommended that alternative strategies, or options, be discussed early in a student's project. At a minimum, dissertation progress and expectations must be reviewed annually by the committee.

## II. Qualifying and Comprehensive Exams

A. A formal statement as to the purpose of the M.S. Comprehensive Exam and Ph.D. Qualifying Exam is in this Graduate Student Handbook. You should be aware of the format, grading, and of

the consequences of exam failure.

B. A formal statement as to the purpose of the Ph.D. Comprehensive exam is in this Graduate Student Handbook. Students are encouraged to ask their mentors about the formats used in their labs and those used in other labs. The student has the right to know the format of the comprehensive exam that is given in the lab that the student has chosen to enter.

### III. Student responsibilities and rights as a member of the Georgetown University Department of Biology.

A. Teaching fellowships are recognized as an essential part of our Graduate Program, and it is the responsibility of the student to devote the appropriate amount of time needed for both physical and mental preparations for each lab session. It is recognized that it will take different students different amounts of time to become prepared. In a semester in which a student is serving as a teaching fellow, that student is expected to spend up to 15 hours, excluding intellectual preparation, over the course of the semester. If a particular TF assignment requires significantly more time than this, it is the responsibility of the student to bring this to the attention of the course instructor, or, if need be, to the CGSS or Chair.

B. It is the student's right and responsibility to ask his, or her, mentor, other faculty members, or both, about the availability of outside grants or scholarships for which he, or she, may apply. To be awarded such a grant has recognizable financial benefits to the student, lab, and Department, as well as the provision of valuable experience in abstract and proposal writing and field exposure for the student. It is also a helpful addition to a resume.

C. It is the student's right and responsibility to attend and participate in departmental functions such as our Friday-afternoon seminar series.

## M. GRADUATE LEARNING GOALS

The goals of the program and for the students to be able to:

### **1. Display diversified knowledge of biological concepts, theories and research techniques covered by the core courses and in each student's area of specialization**

- a. Integrate knowledge across biological sub-disciplines
- b. Demonstrate knowledge of form, function, mechanism, organization, scale, hierarchy, diversity and evolution
- c. Show mastery of subject area- demonstrated by course work, qualifying and comprehensive exams and thesis defense

### **2. Integrate new knowledge into existing scientific frameworks**

- a. Ability to interpret and critique scientific text, primary literature and seminars

- b. Ability to structure and contextualize understanding with proper references to literature
- c. Ability to speculate on significance of scientific data and possible future directions
- d. Ability to employ a multidisciplinary approach to biological research

**3. Engage in and conduct original research**

- a. Ability to use texts, primary literature, presentations and mathematical models to develop scientific hypotheses
- b. Ability to appropriately design and perform original experiments in order to test hypotheses
- c. Ability to organize and interpret data to evaluate hypotheses and place findings into an intellectual framework to plan further experiments

**4. Represent and interpret data in quantitative and statistically meaningful forms**

- a. Ability to construct and interpret visual representations of quantitative data
- b. Ability to use probability and statistical analyses to evaluate and interpret data

**5. Communicate scientific understanding in oral and written forms**

Ability to effectively communicate scientific information and the results of their work to both scientific, student and general audiences in oral and written forms in ways that contribute to scientific knowledge

**5. Propose ways to advance knowledge in biology.**

- Fellow ships
- Courses
- Meeting

**6. Appreciate ethical conduct in science ( Manifest leadership and social responsibility)**

**7. Develop a skill set and research record** such that they can secure employment in universities, federal agencies, private companies or non-governmental organizations where they can apply the skills and knowledge acquired during the program

## N. BIOLOGY PERSONNEL

Departmental Chair- Professor Steve Singer

Committee of Graduate Students and Studies

For 2012, the Committee is

- Professor Elena Casey, Chair
- Professor Janet Mann
- Professor Chris Elsik

Biology Office (406 Reiss)

- Office Manager: Ellen Bateman
- Accounts Analysis: Margaret Chung
- Graduate Student administrator: Jackie Miller

The Biology Office can give you a current list of personnel and their room numbers, phone numbers, and e-mail addresses.