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Therapeutic Sciences PhD Program

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THERAPEUTIC SCIENCES GRADUATE PROGRAM (TSGP):

I. Overview, Governance and Faculty

The Therapeutic Sciences Graduate Program (TSGP) offers advanced training appropriate for academic and research careers in the fields of biology and medical sciences with a focus on determining disease mechanisms, drug actions, and developing novel therapies. The program has two degrees: a PhD in Therapeutic Sciences; and a Masters degree (ScM or AM) in Biotechnology. However, the PhD and Masters students share many activities and experiences and function as one community, TSGP. The program also includes MD/PhD students and 5th-year masters students. ***This document focuses on the PhD program, expanding on some areas presented briefly in the TSGP Guidelines, and providing advice and resources to help the PhD students succeed.***

To complete the PhD in Therapeutic Sciences, students must earn an A or B in required courses, pass a preliminary (qualifying) research examination according to established schedules, complete and publicly defend a doctoral dissertation, and participate in the undergraduate and/or graduate teaching programs of the Division of Biology and Medicine. Attainment of the PhD degree is expected to be completed in 4 to 5 years. Details of these requirements appear in other sections below.

The PhD program within TSGP is a small, intimate program in which there are typically 25-30 total students, with about 4 or 5 students admitted annually. As a result, the program is flexible and congenial, and students have extensive direct interactions with the faculty trainers, as well as with the Program Co-Directors, Curriculum Director and Program Coordinator. The program is funded in part by an ***NIH/NIGMS training grant (T32) in pharmacological sciences*** ("Interdisciplinary Training in Pharmacological Sciences"), and the Principal Investigators of that grant also are intimately involved in the program. TSGP is a very interdisciplinary and collaborative program, drawing trainers from many departments, as well as from several hospitals.

TSGP is jointly housed in the Department of Pathology and Laboratory Medicine (PLM) and the Office of Graduate and Postdoctoral Studies (OGPS) within the Division of Biology and Medicine. It is administered by the PhD and Masters Program Directors ("directors of graduate studies" or "DGSs"), a standing Steering Committee, a standing Graduate Program Committee, an Admissions Committee, and an *ad hoc* Thesis Committee for each graduate student. The Graduate Program Coordinator handles organizational and administrative issues such as managing events, keeping track of records, expense reimbursement, appointment assignments, website updates, interfacing with the graduate school and registrar, etc. Descriptions of each committee are provided in the TSGP Guidelines.

The Faculty who serve as PhD thesis advisors and as advisors for lab rotations are listed on the TSGP PhD website (<https://www.brown.edu/academics/tsgp/people/faculty-trainers>). They are based in many departments, both on campus and at the hospitals that are affiliated with Brown's Warren Alpert Medical School. Thus, our Faculty Trainers are in the departments of: Chemistry; Engineering; Medicine; Molecular Biology, Cell Biology & Biochemistry; Molecular Microbiology & Immunology; Neuroscience; Neurosurgery; Pathology & Laboratory Medicine; Pediatrics; and Surgery.

II. Admissions Process

Entering students are expected to have strong undergraduate qualifications in mathematics, physics, and chemistry as well as in biological sciences. The Admissions Committee selects applicants for interviews with input from the Faculty Trainers, who are given access to all applications. Admissions decisions are based on each applicant's research experience, letters of recommendation, personal statement, academic performance

and interviews. GRE scores are not required or considered, since they have been shown to be inadequate predictors of success in graduate school and in scientific careers. Each applicant selected for interview receives a phone call and follow-up email from the Program Director inviting them to the TSGP recruitment event at Brown. During the recruitment event, each invited applicant meets with members of the Admissions Committee, and additional interviews with specific faculty trainers are arranged according to the expressed interests of the applicants and trainers and a matching of research interests. Current students in the program also interact extensively with the applicants during recruitment and provide the Admissions Committee with feedback from their own perspectives. This student feedback has been extremely helpful in admissions decisions.

Our **admissions and recruitment process** now has two phases: 1) a virtual phase (usually via Zoom) in which the Program Director(s) provide some information about the program in a brief slide show, each applicant is interviewed remotely by faculty members whose research aligns with their interests and/or who are members of the admissions committee, and there are remote activities with the current students (involving Q&As and games); and 2) an in-person phase for accepted students to obtain a more direct view of the program and its people, the Brown campus and the surrounding area. Most, if not all, current TSGP students participate in the recruitment events, and each applicant is paired with a student host (hosting assignments determined by the current students). The in-person phase will begin with a dinner with current students, without faculty. The following day, there will be: an informational breakfast with the Graduate Program Directors and student hosts; individual meetings between applicants and faculty members of interest; lunch with the current students (without faculty); lab and campus tours; and a final dinner with faculty and students. The following day, the applicants may opt to stay for breakfast with some of the current students and then explore the campus and surrounding areas on their own before departing; however, this last day's events are optional. All recruiting expenses are covered by the Graduate Program. The application deadline and the dates for the recruitment events are posted on the TSGP website around the start of each fall semester. **NOTE: During the Covid-19 pandemic, our recruitment process may be partially or entirely virtual; a decision about this will be made close to the time of the recruitment events, as conditions are assessed.**

III. Advising and Resources for Student Support

Academic advising. Before each student enters a lab for their dissertation research, the Program Director and Graduate Program Committee provide customized advising on curricular matters, research rotations, choosing a Thesis Advisor, and just generally navigating life in graduate school. At the beginning of the first year, entering students receive early advising in an Orientation Session that includes their fellow first-year students, the Program Director, Curriculum Director and Program Coordinator, as well as the second-year students who have immediately relevant experience, having just gone through the same processes the previous year. One member of the Graduate Program Committee, the Curriculum Director, also advises the students as director of their core courses, and, like the Program Director, continues to closely mentor the students throughout their time in graduate school.

Once the students have entered their thesis labs, their Thesis Advisor and Thesis Committee play the largest role in their advising, especially in research matters, but the Program Director, Curriculum Director and other Graduate Program Committee members continue to advise them as needed, providing continuity throughout graduate school. There are scheduled meetings with the Graduate Program Committee or Program Director during key periods, such as when the students are choosing electives, rotation labs and Thesis Committee members, or preparing for their first Thesis Committee meeting or Qualifying Exam. In addition, there are frequent individual *ad hoc* meetings that occur throughout the student's time in the program, as a result of the

open door policy of the Program Director and Curriculum Director. Finally, peer advising is very strong in our program (see below) and is especially helpful in academic planning by the first- and second-year students.

Small group advisory meetings are also organized around specific topics, such as preparation for the Qualifying Exam and Thesis Defense, strategies for job searches, etc. These meetings are attended by the Program Director and students for whom the topics have immediate relevance, as well as by students or alumni(ae) who have recently gone through the particular key processes and can offer their own advice and perspectives. In addition, students often organize more informal social group meetings (e.g., dinners) to discuss these same issues.

Research advising. Once a student is involved in thesis research, research-related advising is handled first by the Thesis Advisor and Thesis Committee, who interact with the student as a group at least twice per year to review progress and provide advice (see below, "Dissertation research"). One of the two progress meetings each year can be via email exchanges, but the other must be in-person or via Zoom or equivalent online platform. General advising by the T32 PIs, Program Directors and Graduate Program Committee continues throughout the student's/trainee's time in the program. This advising occurs through regular meetings as well as ad hoc communications. The Program Directors may call special meetings if deemed necessary from information from the Thesis Committee, Thesis Advisor or student/trainee.

Brown now offers mentor training for our faculty trainers through workshops held by Advance-CTR (<https://www.brown.edu/initiatives/translational-research/mentoring-training-program>). This training, or equivalent training by other programs, is now required of all TSGP trainers. We are currently developing a system for refresher courses to be provided a few years apart. Training of faculty in issues around diversity, equity and inclusion is provided by the Graduate School and is also required of our TSGP trainers.

Individual Development Plan (IDP). The IDP is a document composed by the student, and later modified in collaboration with the Thesis Advisor, to describe the scientific and career interests and goals of the student, and also the expectations of the Thesis Advisor. The initial IDP is developed in the first semester by each student as part of the RCR ("responsible conduct in research") course offered by the Office of Graduate and Postdoctoral Studies. After the Qualifying Exam, during the second year of the program, each student revises the IDP in collaboration with their Thesis Advisor, making clear the expectations of both student and advisor. An additional revision is made during the fourth year of the program, as well as any other times the student feels are useful. Each version of the IDP is submitted to the Program Directors for review, with a copy to the Graduate Program Coordinator for the student's file.

Peer-to-peer advising. Our students have developed a program of peer-to-peer mentoring that is very effective. Aside from frequent informal discussions, they have established a system (usually involving getting together for lunch or dinner) in which 2nd year students advise 1st year students (especially about rotations), 3rd year students advise 2nd year students (especially about the Qualifying Exam), and local graduates (e.g., from MIT, Harvard, Yale, etc.) advise 3rd-5th year students about thesis writing, the defense and career development after graduation. These mentoring interactions are facilitated by our Curriculum Director, who often provides organized lunch sessions for the students and alumni(ae), as well as formal career panels. Trainees who have obtained external fellowships also meet with, and advise, those who are preparing applications; this interaction may take place as part of the monthly TSGP student meetings or as *ad hoc* meetings. In addition, extensive peer-to-peer advising takes place at other venues for student interactions (see below, **Additional Training and Scientific Interactions**).

Other advising and mentoring. Students often form very useful informal mentoring relationships with various faculty trainers (including T32 trainers). In addition, mentoring is also available from the Office of Graduate and Postdoctoral Studies, and through IMSD training modules and other activities. Brown's CareerLab also provides career advising, and the Sheridan Center provides advising about teaching.

Resources for student support, including diversity and wellness resources. The Therapeutic Sciences Graduate Program Director should be informed of any disability or other condition that might require accommodation or modification of any of course procedures or other graduate program requirements. Students with this concern should register with **Student and Employee Accessibility Services (SEAS)** and provide the Graduate Program Directors with an academic accommodation letter from them. For more information, contact SEAS at (401) 863-9588 or SEAS@brown.edu.

In addition, Brown's Graduate School offers a wealth of information on student support services. See their web page on **Graduate Student Resources**: <https://www.brown.edu/academics/gradschool/about/graduate-student-resources>

Especially useful is their link for **Student Support Services**: <https://www.brown.edu/offices/student-support/student-support-services>.

Such services cover issues as wide-ranging as academic problems, medical leaves, financial need, gender harassment (Title IX), and general student health and well-being.

Particularly relevant right now is the link to graduate student **FAQs regarding the Covid-19 crisis**: <https://www.brown.edu/academics/gradschool/covid-19-faqs-graduate-students>

Many diversity and inclusion resources also are provided by Brown's Office of Institutional Equity & Diversity: <https://www.brown.edu/about/administration/institutional-diversity/resources/resources-during-national-unrest-2020>

This office also provides useful links regarding racial injustice and the "Black Lives Matter" movement.

For general policy development regarding diversity and inclusion, TSGP is in the process of establishing its own Diversity and Inclusion Action Plan (DIAP) Committee.

Finally, Brown University, and its Division of Biology & Medicine, also support numerous on-campus organizations and programs that promote inclusion and support campus diversity. These include:

- **Biomed Initiative to Maximize Student Development (IMSD)**: The IMSD program, entitled "Advancing the Culture of PhD Learning and Scholarship in Biology and Health Sciences", provides extensive research training support for students from underrepresented groups to increase their participation in the fields of biomedical and behavioral research. IMSD support includes individual advising, and very popular training modules that are accessible to all students at Brown, covering such topics as scientific writing, data analysis and scientific presentations. The program funded by the National Institute of General Medical Sciences (NIGMS), within the National Institutes of Health (NIH). Some of our students have been supported by the IMSD program and many attend IMSD modules. In addition, some of our faculty trainers have taught, or are teaching, IMSD modules.
- **Office of Student and Employee Accessibility Services (SEAS)**: SEAS provides extensive support for students, staff, faculty and visitors with physical, psychological and learning disabilities. SEAS has provided advice during extensive improvements to our existing buildings, as well as construction of new buildings, to

enhance handicapped accessibility. Handicapped-accessible transportation between all campus facilities is coordinated by SEAS, which provides a shuttle service.

- **Brown Leadership Alliance:** Since 1993, Brown has belonged to a consortium of more than 30 schools that support a Leadership Alliance. The Leadership Alliance Summer Research Early Identification Program provides mentoring and promotes summer research for underrepresented students in the life and physical sciences, social sciences, engineering, computer science, and applied mathematics. A large percentage of students from the Leadership Alliance summer program apply to the Brown graduate school.
- **Society for the Advancement of Hispanics, Chicanos and Native Americans in Science (SACNAS), Brown Chapter:** This society is a community of scientists dedicated to fostering the success of students from these underrepresented groups at Brown.
- **Brown Center for Students of Color:** This center serves as a source of support for American and International students of color at Brown, including a mentoring program for African Americans, Latinos, Asian/Asian Americans and Native Americans (ALANA; links: <https://www.brown.edu/about/administration/institutional-diversity/resources/campus-resources-students-faculty-staff-and-alumni/mentoring-and-professional-development>).
- **Nabrit Black Graduate Student Association (BGSA):** Named for biologist Samuel Nabrit, Brown's first African-American PhD recipient, the BGSA promotes the intellectual and social environment, and professional success, of Brown's African American graduate students. Membership is open to all Brown graduate students.
- **Women in Science and Engineering (WiSE):** This group helps create a community of and for women in the sciences at Brown University and increases the number of resources women in the STEM fields at Brown have available to them. Originally founded for undergraduates, it now has a graduate student affinity group, **GWISE**.
- **Center for the Study of Race and Ethnicity:** The Center for the Study of Race and Ethnicity in America promotes research, art and scholarship in the areas of race and ethnicity.
- **The Office of Military-Affiliated Students** <https://www.brown.edu/campus-life/support/military-affiliated-students/> provides support for student veterans and current or prospective participants in officer commissioning programs at Brown.
- **LGBTQ Center:** This center, and the [Sarah Doyle Women's Center](#), work together to provide support, resources and advocacy to promote an open, safe and inclusive environment for lesbian, gay, bisexual, transgender, queer and questioning students, faculty and staff at Brown. This center also supports ["Trans" resources at Brown](#), as well as the [Brown Safe Zone](#) program. In addition, **oSTEM** addresses LGBTQ issues in the STEM fields (Science, Technology, Engineering and Medicine).

IV. Course of Study

The University requires 24 course credits for graduation at the PhD level, of which a maximum of 8 can be transferred from other institutions. Courses must be taken for a grade rather than on a satisfactory/no credit (S/NC) basis (see next section re. mandatory S/NC courses). Additionally, students in the MD/PhD program can receive 8 credits for satisfactory completion of the first two years of the Program in Medicine. At Brown, each one-semester course is worth one credit, and the normal full-time load is 4 credits per semester; students must register for a total of 4 credits each semester to be considered full-time. However, graduate independent study (i.e., research, BIOL 2980) can be taken for up to 4 course credits per semester, depending on the number of other courses taken in the same semester. The success of students depends heavily on the consultation between the students and their advisory committees.

IV.A. TSGP Graded Coursework

The Therapeutics Graduate Program requires all entering graduate students to complete **six didactic courses and acquire proficiency in the areas of therapeutics, pharmacology and physiology**. These courses must be taken for a grade, and students must earn a B or better. If an elective course is only offered pass/fail (mandatory S/NC), the student must provide verification from the instructor that the grade would have been a B or better. Failure to obtain a B or better in any of these courses will place the student on academic warning. In consultation with the appropriate Graduate School deans, and, as appropriate, with the Thesis Advisor and/or Thesis Committee, the Graduate Program Committee will determine what steps are required to provide the student with the opportunity to improve performance and return to good standing. ***In addition, the students must pass a short, intensive Biostatistics module (see below) specifically designed to meet the needs of our students.***

During the first year, all students are required to take two specific didactic courses: Survey of Modern Therapeutics (BIOL 2250) in the fall semester, and Molecular Pharmacology & Physiology (BIOL 2170) in the spring semester. In addition, they will take the biostatistics module (Practical Statistics, taken pass/fail) in January between the first and second semesters, and multiple units of the graduate independent study (research) course, BIOL 2980, for their lab rotations in both semesters. To complete their didactic course requirements, the students will take 3 therapeutics-related courses chosen from the list below, and one other elective course, chosen with program director approval, based on its relevance to their thesis research or broader scientific career goals. The required courses are described below, followed by lists of therapeutics-related courses and a few elective courses.

- BIOL 2250, "Survey of Modern Therapeutics", examines the process of drug discovery, development, and approval from target selection to commercialization. The course provides students with an overview of central background concepts in drug development including cellular physiology, target-drug interactions, and pharmacokinetics/pharmacodynamics. The course then delves into the preclinical stages of the traditional small molecule drug discovery process, from initial target identification and validation, through assay development, high throughput screening, hit identification, lead optimization and the selection of a candidate drug. The course also goes through the process of bringing a therapeutic into clinical trials, through FDA approval, and to the market. Students will learn the modern approaches in therapeutics including small molecules, biologics, vaccines, anti-infectives, and cell therapies and their applications. Taken in the fall semester of the first year.

- BIOL 2170, "Molecular Pharmacology and Physiology", covers receptor families and signaling, receptor-ligand interactions and binding methodologies, pharmacodynamics, pharmacokinetics, and cellular and organ systems physiology. This course involves lecture-based instruction, as well as in-depth problem solving sessions, discussions of the literature in the relevant areas, and considerations of rigor and reproducibility. This course is taken in the spring semester of the first year.

- "Practical Statistics" (no course number), a short, intensive biostatistics module (class time 3 hours every weekday for two weeks). The goal of this course is for graduate students to gain practical knowledge on executing selected statistical analyses with validated statistical software that requires minimal programming and coding. The course focuses on teaching students the basics on how to use foundational statistical methods and the statistical software JMP to aid with experimental design, visualizing their data, and to learn to select and use the appropriate statistical methods (e.g., ANOVA, Mann-Whitney U, etc.). The course is taken by our beginning TSGP PhD students, along those from the Biomedical Engineering PhD program. Usually taken in January between the first and second semesters of the first year.

- Therapeutics-related Elective Courses (3 required any time during graduate school):

1. BIOL 2410 Current Topics in Signal Transduction
2. BIOL 2300 Biomolecular Interactions: Health, Disease and Drug Design
3. BIOL 2865, Toxicology
4. BIOL 2260 Physiological Pharmacology
5. BIOL 2110 Drug and Gene Delivery
6. BIOL 2010 Quantitative Approaches to Biology
7. BIOL 2860 Molecular Mechanisms of Disease
8. BIOL 1290 Cancer Biology
9. BIOL 2145 Molecular Targets of Drug Discovery
10. BIOL 2167 In Vitro Models of Disease
11. BIOL 1070 Biotechnology and Global Health

● Other Elective Courses. One additional elective course is to be selected by the student to match their research interests and/or career goals, and this elective is not required to be from the list of therapeutics-related courses, but may be if desired. If a student is already in a thesis lab, it is a good idea to discuss potential courses with their Thesis Advisor to determine if there is a particular course that is especially relevant and useful for their thesis research. Elective courses can be taken any time during graduate school, and more than one elective is allowed, but not required. However, in taking multiple electives, the student should keep in mind that each elective takes time away from their thesis research, thus delaying their PhD. Elective courses must have approval of the Graduate Program Directors. Here are a few examples of the numerous possible elective courses that are not on the therapeutics-related list:

1. BIOL 2270 Advanced Biochemistry
2. BIOL 2030/2040 Advanced Molecular and Cellular Neurobiology
3. BIOL 1150 Stem Cell Engineering
4. CHEM 1230 Chemical Biology
5. BIOL 1120 Biomaterials

● BIOL 2980, "Graduate Independent Study". Students also receive grades in this course, which includes research lab rotations and dissertation research (see below for descriptions of both), amounting to at least 18 credits, in addition to the 6 credits for the required courses described above, meeting the University's requirement of 24 minimum course credits for the PhD. This research course also requires an A or B to assure good academic standing, and not be placed on academic warning.

Course Credit Transfers: students who have taken graduate level courses (e.g., for a masters degree) before attending Brown, and would like to transfer some of those credits in lieu of one or two electives, should meet with one of the Graduate Program Directors to discuss the necessary procedure for transfer. The courses must be approved by the Director, based on syllabi, transcripts and course descriptions. After approval by the Director, a form must be submitted to the Registrar, along with an official transcript from the former institution. The form is available at the Registrar's web page, and the student and Graduate Program Director complete the form together.

IV.B. Research Rotations and Optional Industry Internships. In addition to fulfilling course requirements, students are required to complete three laboratory rotations during their first year of graduate study -- one rotation in the fall and two in the spring. Students are expected to spend essentially the entire first academic year involved in research rotations, along with their coursework. Although there may be some variation due to faculty trainers' schedules, the three rotation periods are approximately: 1) the second week of classes in September through December 20; 2) February 1 through March 31; and 3) April 1 through May 31.

Lab rotations expose the student to various research areas, and help the student choose a thesis lab that best suits them. The most important factor for choosing a laboratory is the professor's ability to teach and challenge the student to do rigorous, creative science in a stimulating atmosphere. The intellectual environment of the laboratory and the dynamics of the interaction between the mentor and student should be foremost in this decision. These considerations should be at least as important as the scientific area of choice. The student is advised to talk with each faculty trainer before requesting a rotation in their laboratory, to determine the amount of professor/student interaction, mentoring philosophies, placement of laboratory alumni(ae) in the research field after leaving the laboratory, and future scientific interests. It is also often possible to sit in on a professor's lab meeting before officially setting up a rotation; this will give the student a better feel for the dynamics of the lab and the relationships between the professor and the lab members, as well as the lab members with each other. Thus, a student involved in a rotation in the fall semester may be able to take a little time out here and there to sit in on lab meetings of prospective advisors for the two spring rotations. ***Each student is required to discuss potential rotations with a Graduate Program Director before approaching the faculty trainers.*** Students are not allowed to conduct thesis research in a lab without having completed a rotation in that lab. Furthermore, students are expected to perform their lab rotations with ***official TSGP faculty trainers***; if a student is interested in research with a professor who is not currently a TSGP trainer, they must discuss this issue with the Program Director -- prior to setting up a rotation -- to determine if it is feasible to add this professor to the TSGP trainer list. The list of official TSGP faculty trainers, along with a description of each faculty trainer's relevant research, appears on the Therapeutic Sciences PhD program website: <https://www.brown.edu/academics/mpp-graduate-program/people/faculty-trainers>. Additional information about each trainer also appears on their individual Brown web pages, linked to their entries on our web site.

Each student should discuss with a Program Director any developments or difficulties encountered in setting up or carrying out rotations, or in finding a thesis lab. Emailed notification of approved rotations should also be sent by the student to the Graduate Program Coordinator and Graduate Program Directors as soon as the rotation plans are finalized; this notification will be followed up with a Rotation Agreement Form, as described below. Students are required to satisfactorily complete 3 full rotations (with a grade of A or B) by the end of the second semester, and are expected to be accepted into a faculty trainer's laboratory by then as well.

Most students are able to enter a lab for their thesis work by the end of the second semester, after completing the 3 required rotations. If a student is not accepted into a lab by the end of the 3 rotations, they may obtain ***permission of the Graduate Program Committee*** to complete up to 3 additional one-month rotations in the summer after the second semester (one rotation each, for June, July and August). The student must be placed in a thesis lab by September 1 of the third semester. If a student is not accepted into a lab for their thesis work after 5 rotations, they will be placed on academic warning; if they are not accepted into a lab after 6 rotations, their status may move from warning to termination, and they may be dismissed from TSGP, based on deliberations of the Graduate Program Committee.

If a student has entered a particular lab for their thesis research, but then needs to leave that lab at any point, they must satisfactorily perform a one-month rotation in another lab before being allowed to join that lab. If the student's performance during that rotation is not satisfactory, they will be placed on academic warning, and must satisfactorily perform a one-month rotation in a second replacement lab. If this condition is not met, and the student has not been accepted into a new lab within 2 months of leaving the original lab, the student may be dismissed from TSGP, under consideration by the Graduate Program Committee.

To facilitate rotation choices, first-year students are introduced to TSGP trainers and potential projects through

Faculty/Student Breakfast meetings with individual trainers during the first few weeks of their first semester (see below). So that the incoming students can begin their first rotations early in the first semester, one of the Program Directors talks with each of them individually by phone, or by Zoom or other online meeting platform, during the late spring or early summer before they matriculate, to help them choose their first rotation labs. These discussions revolve around the students' research interests and the type of mentoring style they think might work best for them. Following the phone discussions, and often follow-up emails, the students contact their prospective rotation advisors for permission to begin a rotation in the fall.

When setting up a rotation, each student will complete a **Rotation Agreement Form** with the rotation advisor to ensure that there is agreement on expectations. At the end of each rotation, the rotation advisor will complete a **Rotation Evaluation Form** and discuss the evaluation with the student so that the assessment of the student's performance in the rotation is clear. The student is responsible for obtaining the forms from the TSGP web site and returning the completed and signed forms to the Program Directors and Program Coordinator. If, before the end of a rotation, the student and/or advisor determine that there is not a good fit, the rotation can be terminated early only with the approval of the Program Directors and the Graduate Program Committee. In this event, the student will discuss with the Program Directors the selection and timing of a replacement rotation.

The rotations are completed as graduate independent study (BIOL 2980), for which the students receive grades. During the first and second semesters, one of the Program Directors is selected as the instructor for BIOL 2980, and the Directors collect input from the respective research rotation advisors in assigning the course grade. This input is obtained via Rotation Evaluation Forms, or by email if the student has not completed the rotation by the time the grades are due. In subsequent semesters, BIOL 2980 encompasses thesis research; thus, beyond the first 2 semesters, each student's Thesis Advisor is indicated as the instructor for BIOL 2980, and assigns the grade directly. If the student receives a B in BIOL 2980, their academic standing may be reduced from good to satisfactory. If the student receives a C in BIOL 2980, they will be placed on academic warning.

Near the end of the second semester of the first year, each first-year student is required to give a **short oral presentation** (about 10-13 minutes) in May summarizing one of their rotation projects to the TSGP trainers and students and other interested members of the Brown community. Multiple first-year students present in one or two TSGP seminars; if there are more than 4 students in that class, two seminar sessions are required to allow all students to present.

Some advice for rotations: It is extremely important that students take the rotations very seriously, work very hard, and take ownership of their rotation projects. They should be thinking deeply about their projects and the "big picture", finding and reading the appropriate literature, asking questions as needed, and learning to troubleshoot their own research. Rotations are not just for students to judge the lab, project and mentor. Each student is also being judged regarding suitability as a potential new lab member. Just coming into a lab now and then and following a pre-determined protocol does not qualify as functioning as a graduate student. Neither does putting in a certain number of hours in the lab but not actually doing science when present. If the student takes the experience too lightly, they may end up with no invitations to join a lab for their thesis research, which is cause for placement on academic warning, with eventual dismissal from the program a distinct possibility. A successful career in science requires a huge, life-long commitment of time, effort and thought, and this all begins in graduate school. This kind of commitment requires a passion for scientific research. If this passion is not present, a student should give serious thought to whether this is the correct path for them. Choosing another path for which they have greater passion is not failure; it is a sign of maturity. Students should feel free to discuss these ideas with the Program Directors.

Optional Research Internships in Industry. These summer internships were initially planned in 2019, but are currently under redevelopment following a delay in activation during the pandemic. More news on this will be given to the students as soon as it is available. The internships are expected to be about 8 weeks in duration in the summer between the first and second years in the program, after students have completed their lab rotations and have chosen a Brown lab for their thesis research.

IV.C. Ethics and Research Safety Coursework. All TSGP students, including T32 trainees, must also participate in, and pass, training in the Ethics of Responsible Conduct in Research (RCR), as well as training in Lab Safety, and in Radiation Safety, Biohazard Safety, Hazardous Chemical Safety and Animal Care and Use, as applicable.

Training in Research Ethics -- In addition to the required TSGP courses, the ethics course offered by the Division of Biology and Medicine, entitled "Responsible Conduct in Research" (RCR), must be successfully passed in the 1st semester, and its refresher course passed in the 4th year. TSGP students will receive emails from the Division's Office of Graduate and Postdoctoral Studies regarding scheduling and sign-up procedures for the course. The IDP is also initiated in the RCR course (see above, "Advising"). The course now also introduces the important topic of rigor and reproducibility, which is reinforced in BIOL 2170 and the therapeutics-related elective course, especially in BIOL 2410 and BIOL 2300.

IV.D. Fellowship Applications. Each student is required to submit a predoctoral fellowship application, usually during their second year. The student works with their Thesis Advisor to construct a project for the fellowship application. Often the thesis proposal, also written during the second year, can be adapted fairly easily to be suitable for such applications. Students who are not eligible for US government-sponsored fellowships, such as NIH, NSF (e.g., international students) may request a meeting with staff in the Office of Graduate and Postdoctoral Studies (OGPS) for help in finding fellowships for which they are eligible. OGPS also offers very useful workshops on fellowship writing, and during some monthly TSGP meetings, advice is also provided by faculty who have served on fellowship review committees and by current and past students who have been successful at obtaining fellowships. In addition, students can take an IMSD module on scientific writing that includes advice on writing fellowships, as well as abstracts and papers. This module consists of three 2-hour sessions within one week, with the dates to be determined each year. Our students have had excellent success with NSF fellowships and with others (Ford, NIH/NRSA, AHA, APS, Hughes/Gilliam, NIH F99/K00). Students who are successful in obtaining their own individual fellowships not only have the advantage of listing them as honors/awards on their CVs, but also are generally eligible for additional financial compensation during their fellowship years (see section below on Financial Support).

IV.E. Academic Plan for the First Two Years and Beyond

This is an outline; more detailed information and advice on the various components appears below this section.

Semester I:

- BIOL 2250 -- Survey of Modern Therapeutics (1 credit)
- Therapeutics-related elective or other elective course(s), as desired (1 credit per course)
- 2 or 4 credits of BIOL 2980 to make 4 credits total -- Graduate Independent Study/Research, taken as a first research lab rotation. File Rotation Agreement Form and Rotation Evaluation Form.
- Responsible Conduct for Research (RCR), Lab Safety and other safety trainings as appropriate
- Write initial version of Individual Development Plan (IDP), within RCR course

- Fall Welcome Dinner and TSGP Orientation, in addition to University-run orientation sessions
- Fall breakfast meetings with prospective lab rotation faculty trainers
- Weekly TSGP seminars/lunches, monthly TSGP meetings, monthly faculty-student lunches

January between Semesters I and II: Two-week Biostatistics module (no course number)

Semester II:

- BIOL 2170 -- Molecular Pharmacology & Physiology (1 credit)
- Therapeutics-related elective or other elective course(s), as desired (1 credit per course)
- 2 to 4 credits of BIOL 2980, as needed to make a total of 4 credits -- taken as 2 consecutive research lab rotations; file Rotation forms for each, as above. Must match with a lab by the end of this semester.
- Present first-year talk on a rotation project in May (can be on any of the 3 rotations)
- Weekly TSGP seminars/lunches, monthly TSGP meetings, monthly faculty-student lunches
- TSGP Annual Retreat
- May submit an application for a fellowship for which there is eligibility
- Present at scientific meetings, and publish, as appropriate

Summer between years 1 and 2:

- Optional internship at a pharmaceutical or biotech company (plan currently in development)
- Perform experiments and background reading to develop thesis research project

Semester III:

- Therapeutics-related elective and/or other elective course(s), as desired (1 credit per course)
- 2 to 4 credits of BIOL 2980 for thesis research, to make a total of 4 credits/semester
- Finalize plans for thesis project and begin writing thesis proposal
- Teaching assistantship, one course in either semester III or IV (not both); each student will be notified of the specific course, and will need to contact the course director and/or manager for duties, take TA orientation, and sit in on every lecture
- Weekly TSGP seminars/lunches, monthly TSGP meetings, monthly faculty-student lunches
- May submit an application for a fellowship for which there is eligibility, if not already done
- Present at scientific meetings, and publish, as appropriate

Semester IV:

- Therapeutics-related elective and/or other elective course, as desired (1 credit per course)
- 2 to 4 credits of BIOL 2980 for thesis research, to make a total of 4 credits/semester
- Teaching assistantship in either semester III or IV (not both; see semester III instructions)
- Choose and invite Thesis Committee members and have an initial meeting once there is a thesis project outline. File Committee Report Form for this and all other meetings with the committee, which will generally occur twice per year as progress reports; the exceptions are special forms for the Qualifying Exam and Thesis Defense.
- Qualifying ("Preliminary") Exam, which includes writing a thesis proposal
- Weekly TSGP seminars/lunches, monthly TSGP meetings, monthly faculty-student lunches
- May submit an application for any fellowship for which there is eligibility, if not already done
- Present at scientific meetings, and publish, as appropriate (one accepted first-authored, peer-reviewed is required by graduation, but more papers are even better for the student's career)

After the first 2 years, students focus intensively on their thesis research, presenting at scientific meetings, and writing publications and a PhD thesis. If they have not yet completed their 3 therapeutics-related electives and/or a fourth elective, students also may do this after the first two years. Although they may apply for more than one external fellowship, they are not required to do so, and should not sacrifice their research progress and/or course performance to do so. Also after the first 2 years, the student will be required to present their research progress in a 3rd-year talk at Brown (a full-length seminar in the TSGP weekly seminar series), in at least one external scientific conference, and at the annual TSGP retreat (usually as a poster).

V. Dissertation Research

V.A. *Qualifying Examination, Thesis Committee and Thesis Proposal.* Upon completion of the first year of graduate study, students commit to a lab for their thesis work. Each student works closely with their Thesis Advisor to develop a research proposal that will culminate in the ***Qualifying Examination ("Preliminary Exam")*** by the end of the student's 4th semester of graduate study. At that point, the student and advisor will have selected a ***Thesis Committee***, which consists of the Thesis Advisor, three other members of the Brown Faculty (which may include hospital-based faculty with a Brown affiliation), and an authority in the area of the thesis research from another institution. Often the outside member of the thesis committee is not brought in until after the preliminary exam. However, even if the external member does not attend meetings except for the defense, it is prudent to at least obtain their input on the thesis proposal, and to provide progress reports and notices of any proposed changes in the research plan as the student proceeds with thesis research. If the outside member is not included until just before the defense, as has often occurred, the student and advisor risk being surprised by major criticisms that delay the student's completion of the PhD. A member of the Thesis Committee will serve as Chair; this person cannot be the Thesis Advisor or the external member, and must be someone who has prior experience training TSGP PhD students (or students from the parent program, MPP) and/or serving on Thesis Committees of such students. Students are required to discuss the proposed Thesis Committee composition with a Program Director before finalization.

Thesis Proposal. In preparation for the Qualifying Exam, the student will develop and write a formal Thesis Proposal in close collaboration with the Thesis Advisor. The thesis proposal should be approximately 10 single-spaced pages in length, including figures and tables (bibliography is not included in the 10 page limit). This document will be written in the style of an NIH predoctoral research grant proposal, including an abstract and sections on specific aims, background and significance, proposed methods and experimental approaches, interpretation of expected results, pitfalls and alternative approaches, preliminary data, and bibliography. A final draft of the thesis proposal shall be provided to all Thesis Committee members at least two weeks prior to the date of the oral examination. ***The proposal is to be developed and written by the student, with only minimal involvement of the Thesis Advisor or others in the laboratory.*** It is strongly recommended that the student, when possible, revise the written document for submission as a predoctoral fellowship application to a funding agency such as the NIH after completion of the Qualifying Examination. Note that as the research progresses over the years, the proposal can be modified or refined in consultation with the Thesis Advisor and Thesis Committee if new data, new literature or newly developed techniques suggest an advantage to such changes.

It is important that the proposed thesis project be one that is technically feasible and can reasonably be accomplished during the normal timespan of a PhD, i.e., between the end of the 1st year, when the student enters the thesis lab, and the end of the 4th or 5th year, when they should be graduating. Built into this timespan is the writing of publications and the other program commitments. Furthermore, it is important that the aims of the project (typically 3) should not be interdependent. For example, Aim 2 should not depend on the success of Aim 1.

It is advisable that the student and Thesis Advisor meet with the Thesis Committee a few months before the student writes the formal thesis proposal. At this meeting (often called the "pre-prelim"), the student will present an outline of the general research plan, and obtain informal feedback from the committee prior to the official Qualifying Exam. This meeting is **not** meant to be a practice Qualifying Exam. At this point, the writing of the proposal is not expected to be completed. The student should just present an outline of the proposed project, and obtain some general feedback and perhaps some suggested topics or papers for the student to use as background. It is also a good time for the student to become familiar with the expertise and style of the Thesis Committee members. The student is not expected to be tested with questions, as will be the case in the Qualifying Exam.

The Qualifying Examination (or "Prelim") consists of a brief (20-30 minute) oral presentation of the research proposal by the student to the Thesis Committee, followed by questioning of the student and discussion of the proposal by the Committee, and finally completion of a **Qualifying Examination Report** by the Thesis Committee Chair in consultation with the rest of the committee, to be sent to the Program Directors and Program Coordinator. The student shall obtain the blank form from the TSGP website and provide it to the Thesis Committee Chair in hardcopy form as well as in pdf. The hardcopy version can be used to save time for the Thesis Committee Chair, who may enter handwritten comments on the form during the discussion of the Thesis Committee at the end of the Exam, rather than having to type the comments into the pdf after the exam.

The general **format of the exam** includes the following steps: 1) the student meets with the Thesis Committee in the absence of the Thesis Advisor to describe their experience in getting to this point, including any obstacles they may have encountered; 2) the Thesis Advisor meets with the Thesis Committee in the absence of the student to present their assessment of the student's progress and any barriers to that progress (e.g., technical difficulties); 3) the student re-enters the room and gives the oral presentation of the research plan; the Thesis Committee members ask questions and provide some feedback and discussion during the presentation (the Thesis Advisor does not participate in the questioning, and does not answer the questions for the student, although they may help clarify a question if the student does not seem to understand it); 4) after the presentation, the Thesis Committee provides suggestions for improvement of the research plan (e.g., alternate experimental approaches) and feedback on the written Thesis Proposal; 5) the student leaves the room while the Thesis Committee (with Thesis Advisor present) discusses the student's performance and decides whether the student passes or fails the exam, or whether they pass with stipulations (a "conditional pass"). In the latter case, the Thesis Committee will decide and communicate what the student must do to pass, and when that extra effort must be completed. For example, the student may be required to re-write sections of the proposal, take a course to fill a gap in background knowledge, or read some background literature and write an analysis based on that. Once the student has satisfactorily completed these tasks (by the specified dates), the stipulations will be removed, and the Exam result will be changed to a Pass.

Major goals for the Qualifying Examination are to evaluate the student's comprehension of the scientific literature in the area of the thesis research as well as in related areas, and to evaluate the student's ability to define scientific questions, to develop experimental strategies, and to actually do experiments. However, this examination also is an opportunity to obtain input from the Thesis Committee on the feasibility of the project and possible improvements to the research plan. The student is not expected to have obtained extensive preliminary data, but they should have enough data to illustrate that they are capable of collecting and understanding data, and understanding the methods they are using, why such methods were picked, and what limitations those methods may have. Also, some preliminary data may be necessary to test feasibility if a technique being used is new to the Thesis Advisor's laboratory or is particularly novel.

Once the student passes the Qualifying Exam, they are officially considered a candidate for the PhD. A student may fail the Qualifying Exam based on an unsatisfactory written thesis proposal and/or oral portion of the exam. Failure to take and pass the Qualifying Exam by June 1 in Semester 4 is grounds for placement on academic warning. Under special circumstances, permission may be granted by the Graduate Program Committee, via the Graduate Program Directors, for an extension of the deadline for scheduling a Qualifying Exam. If a student receives a "conditional" pass on the Qualifying Exam, as mentioned above, the Thesis Committee will specify the requirements to pass the Exam, and will set appropriate deadlines for completion of those requirements. In the interim, the student will be placed on academic warning. Failure to pass the Qualifying Exam, or to meet the requirements of a conditional pass by the deadline, is grounds for dismissal from the program.

V.B. Progress Reports between the Qualifying Exam and the Defense. After completion of the Qualifying Examination, the student discusses their progress with the Thesis Committee at least twice per year, and progress reports will be submitted to the Graduate Program Directors (with cc to the Program Coordinator), who may request meetings with the student and/or Advisor or Thesis Committee on an as-needed basis. One of the two progress discussions each year can be via email exchanges, but the other must be in-person or via Zoom or equivalent online platform. These progress reports and meetings are for the benefit of the student -- so that the student completes the PhD in a timely manner without getting lost down "blind alleys" or side-tracked on projects that do not fit within the purview of the Thesis Proposal. Before each Thesis Committee meeting, the student will discuss recent progress and future goals with the Thesis Advisor and then complete a **Committee Meeting Report Form** to present to the Thesis Committee. Sufficient space should be left in each box of the form for the Committee to modify or supplement the progress and goals statements. The revised form will be signed by all Committee members in attendance (usually not including the outside reader, although it is a good idea for this member to receive a copy) and submitted to the Program Directors and Program Coordinator. For electronic meetings, the Thesis Committee's approval of the report may be communicated via email. The blank form is accessible on the TSGP website. It is the student's responsibility to make sure the progress meetings occur twice a year, on schedule (approximately every 6 months).

V.C. Dissertation (Thesis) and Doctoral Defense. Typically, the **Final Defense** of the PhD occurs in the fourth or fifth year of graduate study. **Each student is required to have a Pre-defense Meeting with the Thesis Committee 1-3 months before the defense.** The thesis should be in near final form by this point and the student will make an oral presentation to the committee and be questioned about the project, thesis and relevant background. After approval of the planned thesis following this meeting, the student will schedule the Final Defense in preparation for graduation. The Thesis has the standard format and must meet the requirements posted on the website of the Brown University Graduate School. The written thesis is delivered to the Thesis Committee members at least two weeks prior to the Defense. The Thesis Defense is held as a public lecture, followed by a closed-door examination open to all Brown faculty members, with required attendance by the Thesis Committee, including its external member ("outside reader"). Although the outside reader is not required to attend the Qualifying Exam or Pre-defense Meeting, early involvement of this committee member is in the best interest of the student; if the outside reader gives feedback on the Thesis Proposal around the time of the Qualifying Exam, and on the Thesis prior to the Defense, there will be a much lower chance of surprise criticisms for the student. Failure of the Defense is grounds for dismissal from the program.

The Thesis must include an Abstract, a general Introduction chapter, Results chapters, and a general Discussion chapter, in addition to other appropriate sections (bibliography; table of contents; and if desired, definitions of abbreviations and a list of figures, etc.). Most theses also include a general Methods chapter, but some describe the methods within each Results chapter. Some or all of the Results chapters can be simply the published or

submitted manuscripts reformatted for the Thesis (double-spaced, correct margins, etc.). If so, they may contain all the usual components of a published paper, including their own brief introductions, methods, results and discussions. However, these short sections within each Results chapter do not obviate the need for the general chapters mentioned above, which focus on the entire body of work (*all* results) and its relation to the existing literature, as well as progress and remaining questions in the research field. In addition, since publications often have multiple authors, the first page of each such Results chapter must include a proper citation (authors in their published order, journal, volume, page numbers and year, or "under review"), as well as an explicit statement saying which parts of the paper were provided by the student, and which parts by each other author. ***Detailed instructions on preparation and format of the PhD dissertation should be obtained from the Graduate School. Here is a useful link that supplies most information about completion of the PhD, from publishing the dissertation to various surveys and questionnaires, as well as actions needed to make sure the student doesn't owe any money to Brown:***

<http://www.brown.edu/academics/gradschool/academics/rules-regulations/dissertation-guidelines#completion>

Students should communicate early and frequently with the Graduate Program Coordinator as they make their plans for a Defense, especially since rooms for the Defense must be scheduled far in advance. Examples of successful theses by graduates from our parent program, MPP, are available from the Graduate Program Coordinator, as well as through the Brown University Library.

As mentioned above, in addition to a completed Thesis, ***each student must have at least one first-authored publication accepted in a peer-reviewed journal before graduation.*** Publications, especially first-authored ones, are critically important for a student's future success.

VI. Additional Training Activities and Scientific Interactions. *NOTE that since the beginning of the Covid-19 pandemic, some of these activities have become virtual, generally through Zoom meetings.*

The Fall Welcome Dinner/TSGP Orientation at the beginning of each academic year introduces students in the entering class to the other current students, most of whom they met at least briefly during the recruitment events. The dinner part of this meeting will be preceded by a TSGP-specific orientation, discussing key features like coursework, lab rotations, etc. The discussion will also include what is expected of doctoral students in general (in contrast with what was expected of them in college). The orientation will be attended by the Graduate Program Directors, the Graduate Program Coordinator and some of the students who just completed their first year, since they will have recently gone through what the incoming students are about to experience. Faculty trainers will *not* attend the Fall Welcome dinner/orientation meeting, but instead will be involved in individual breakfast and lunch meetings (see below), as well as in the annual spring TSGP retreat. The exception to this is the attendance at the Welcome Dinner by the Graduate Program Committee, which includes some faculty trainers as well as the Principal Investigators of our NIH NIGMS T32 training grant.

Faculty-student breakfasts for first-year TSGP students to learn about each faculty trainer's research and to assist in selecting appropriate research rotations for the spring. These are one-hour sessions that occur about 3 to 5 per week at the beginning of the fall semester, with one trainer and all beginning students at each breakfast session. Each faculty trainer discusses their research (with or without powerpoint slides), and the trainer and students use this opportunity to get to know each other and to discuss various possible rotation projects as well as general lab environments and mentoring styles.

The Annual TSGP Retreat is held in mid- to late May each year, partially sponsored by our training grant ("T32"). The retreat is centered around student posters and scientific talks by students and faculty trainers. A typical retreat schedule includes: 1) breakfast and a student poster session; 2) morning research talks by students (including T32 trainees); 3) lunch; 4) a breakout session of the students with the Graduate Program Committee; 5) T32 faculty trainer research talks; 6) a coffee break and a breakout session of the faculty trainers with the Graduate Program Committee; and 7) the keynote lecture by a T32-sponsored distinguished speaker from outside Brown. At the breakout sessions of students and faculty with the Graduate Program Committee, there are discussions of training grant issues, new developments and ideas for improving the program. The retreat format was developed by the graduate students. Our most recent retreat was at the Audubon Society Nature Center and Aquarium in Bristol, Rhode Island, which provided relaxing activities to complement our scientific discussions.

Monthly TSGP meetings are attended by all TSGP students, and occasionally by alumni(ae) or special guest speakers. These meetings function as data clubs (including practice talk sessions for the students, and development of collaborations between labs), journal clubs and career development sessions covering a variety of topics of interest to the students, such as comparisons of various careers, and advice for writing fellowships and papers.

Monthly TSGP seminars occur throughout the academic year, and feature respected scientists from around the country. TSGP students are required to attend these seminars, and are encouraged to attend other weekly seminars that may be of interest that are presented by Neuroscience, MCB and other programs, as well as monthly *Bench to Bedside* seminars (Neuroscience), and various PhD defenses and journal clubs. These provide a huge variety of scientific interactions outside our specific graduate program. The seminar speaker selection committee includes TSGP students and faculty.

Student-organized peer-mentoring lunches and dinners were initiated by students to advise those entering the program after them. See the **Peer-to-peer Advising** description above, under **Advising and Resources for Student Support**.

Initiative to Maximize Student Development (IMSD) training modules are optional and provide interactions with graduate students from the entire university, as well as more exposure to faculty trainers and very useful tools for excelling in graduate school and in a scientific career. There are about a dozen of these modules, each of which is typically 6 hours in length, presented in three two-hour blocks within a week, and offered at various times of year, including during the academic year, and in the summer and winter breaks between regular classes. The modules are taught by Brown faculty, including many TSGP T32 trainers. Some examples of modules are "De-mystifying the PhD" and "Scientific Writing"; more examples are included on the Brown IMSD website.

VII. Student Seminars

In May of the first year, each student will present a brief seminar (typically about 10-13 minutes plus questions for a 15 minute block of time) to the TSGP faculty and students, as well as any other interested members of the Brown community. The topic of the talk will be one of the student's 3 research rotation projects; it is not restricted to a project in the lab the student will join for their thesis research, but instead can describe any one of the rotation projects, since some are easier than others to describe in a short talk. The first-year talks are grouped into a one-hour seminar slot, so that typically a seminar session consists of 3 to 4 brief student talks.

In addition, each student must present one full-length seminar in our TSGP weekly seminar series within one year after passing the Qualifying Exam. This "3rd-year seminar" must be based on the student's original research, and should also review relevant background research to show familiarity with the literature. Finally, a few students also present talks at our TSGP Annual Retreat in the spring, while essentially all students present posters of their work there. Of course, the students also present talks and/or posters at national and international scientific conferences.

VIII. Teaching

Each TSGP student is required to serve as a teaching assistant for one semester-long undergraduate course (typically BIOL 0800, 1260 or 1300). The teaching requirement may be fulfilled only by teaching in courses in which graduate students conduct a discussion or laboratory section, or present a small number of lectures. The Program Directors match the students with specific courses based on the student's strengths and interests and on instructor input. The teaching requirement is normally filled in either the fall or spring semester of the student's second year in the program. Students are strongly encouraged to take the Sheridan Center's workshop entitled "New TA Orientation to Teaching at Brown". This is a 3-hour hands-on workshop taught at the beginning of each semester, which provides the opportunity for interactive discussions of teaching roles and responsibilities with experienced TAs and faculty, and which also offers teaching resources. A teaching assistant is expected to attend all lectures, perform whatever work is necessary to be proficient in the course material, be on time and reliable, provide office hours and review sessions as required by the faculty member directing the course, and perform grading functions as requested. Review sessions may be held weekly, as well as shortly before exams. The TA is also expected to respond to emails and other *ad hoc* communications from the students in the course as they request help with the course material; in some cases the response may just be to assure the student that the issues will be covered in office hours or review sessions, rather than responding in detail to long emails. Feedback to the TA on their performance will be provided personally by the faculty member directing the course, and also by the course manager in the case of BIOL 0800. This feedback will be provided occasionally during the course, and also at the end of the course. The faculty member will also provide feedback regarding the TA's performance to the Program Directors.

Foreign students must obtain certification from the Center for Language Studies (English for International Teaching Assistants) before they can serve as teaching assistants. Students will have until the end of the fall semester of their second year to demonstrate proficiency in English and obtain certification from the Center for Language Studies (Brown University requirement). Each student must be certified at level 2 or better to meet the Program requirements. It is the responsibility of each international student to schedule an evaluation with the Center for Language Studies upon arrival at Brown and to accomplish the required proficiency within the first year of graduate studies. If the student's command of spoken English does not meet this proficiency, the student must enroll in the appropriate ESL course(s) recommended by the office of English for International Teaching Assistants. For further information, contact the coordinator for the English for International Teaching Assistants program, Center for Language Studies, Brown University. Failing to meet the English proficiency requirement is grounds for dismissal from TSGP.

Students who are interested in additional teaching experience may attend various workshops and also obtain **teaching certificates** by completing certificate-granting courses provided by the Sheridan Center: <http://www.brown.edu/about/administration/sheridan-center/>

In addition, some TSGP students design and teach summer courses for high school students at Brown, either alone or jointly with other graduate students. These Summer@Brown teaching opportunities are available

through the School of Professional Studies. This activity is not recommended for beginning students, who need to focus on establishing themselves in a thesis lab and passing their Qualifying Exam.

The unique structure of the Division of Biology and Medicine at Brown means that all basic science departments are responsible for a large part of undergraduate Biology teaching, and most of the labs within the Division attract outstanding undergraduate student researchers. Therefore, nearly every graduate student in the program interacts with, or formally mentors, at least one **undergraduate student in the lab**, in addition to his or her teaching assistantship responsibilities. This opportunity provides invaluable hands-on experience with day-to-day teaching in the lab.

IX. Financial Support

All students offered admission into the Division of Biology and Medicine graduate programs are guaranteed five years of financial support including stipend, health insurance, and tuition and fees, contingent on making satisfactory progress toward the PhD degree. This support comes from a combination of resources including teaching assistantships, Division fellowships, predoctoral training grants, research grants, and individual fellowships awarded both extramurally and/or through Brown. In addition, in September of the first year, TSGP provides each first-year student with a special stipend of \$1,500 to use towards a new computer and computer-related software or hardware or for other items needed for graduate school, and the Division of Biology & Medicine provides a transitional stipend of \$1,200 to aid in relocation expenses. Furthermore, each student who obtains a competitive extramural individual fellowship (e.g., from NSF, NIH, Ford, etc.) is awarded an extra \$3,000 per year in Divisional stipend support as a reward for obtaining the external funding. In addition, the Division supports \$650 per year to cover travel expenses for scientific meetings beginning in a student's second year (applications due a month before the conference), and TSGP supports an additional \$500 per year in travel support for any student who is presenting their work in a poster or talk at a scientific conference (regardless of their year in the program). The Graduate School also provides up to \$1,000 per year for students presenting at international conferences. The Graduate Program Coordinator can provide more detailed procedural information.

X. MD/PhD Degree

Students in Brown's MD/PhD Program may participate in the Therapeutic Sciences Graduate Program. These students must complete all the TSGP requirements specified for the PhD degree, except that they are not required to serve as teaching assistants, and may receive course credit for the first 2 years of medical school, in lieu of some of our required didactic courses. MD/PhD candidates may complete their research lab rotations in the summers preceding their first year in TSGP.

XI. Leave of Absence

For leaves of absence, the Therapeutic Sciences Graduate Program follows the guidelines of the Brown University Graduate School: <https://www.brown.edu/academics/gradschool/leaves-absence>

The guidelines and timelines of leaves of absence, and returns from those leaves, are provided at the above Graduate School website. If the student fails to appropriately inform the Graduate School of an intention to take a leave of absence, they will be considered still active and will be billed for tuition.

XII. Academic Warning and Dismissal

Failure to fulfill any Program requirements in a timely fashion will result in a student being placed on warning. A student on warning may be dismissed from the Graduate Program. This dismissal may be for academic or non-academic reasons. The Program Directors will review each case and place his/her recommendation before the Graduate Program Committee convened by the Program Directors. Two thirds of the Graduate Program Committee will constitute a quorum and a decision to accept the Directors' recommendation will require a favorable majority vote. Appeal of such decisions is to the Dean of the Graduate School. Procedures relating to dismissal for academic misconduct are addressed separately in the Graduate School Handbook.

Reasons for being placed on warning status by the Program include, but are not limited to:

- Earning a grade that is lower than a B in any credits (PhD and Masters).
- Failing the PhD TSGP Biostatistics course twice.
- Failure to take the PhD Qualifying Exam by June 1 in the 4th semester, unless an extension has been approved by the Graduate Program Committee.
- Failure of a PhD student to be accepted into a thesis lab after 5 rotations.
- Failure of a PhD student to complete 3 full lab rotations during the first academic year.
- Unsatisfactory progress in the thesis research, as determined by the Thesis Committee (PhD), and thesis advisor (Masters)
- Failure to submit final undergraduate transcript(s) to the Graduate School (PhD and Masters)

Each warning letter will describe the problems and specify requirements for return to good academic standing, as well as deadlines for meeting those requirements. If the designated requirements are not met by the specified deadlines, the student will be dismissed from the program.

In addition, the following specific circumstances, among others, can lead to dismissal:

- Failure to meet the requirements of a warning letter within the deadlines provided (PhD and Masters).
- Failure to be accepted into a PhD thesis lab after 6 rotations.
- Failing the PhD Qualifying Exam, or failing to meet the requirements and deadlines to pass the Qualifying Exam after receiving a pass with stipulations.
- Failure to find a new lab within 2 months after leaving one's original thesis lab (PhD and Masters).

Grievance Procedures:

If a student believes a warning or dismissal is unjust, they may appeal the process according to the Graduate School grievance procedures:

<https://www.brown.edu/academics/gradschool/graduate-student-grievance-procedures>