



## GRADUATE PROGRAM IN THERAPEUTIC SCIENCES GUIDELINES

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## I. Overview

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.

To fulfill the requirements of the PhD, students must earn an A or B in required courses, pass a qualifying examination according to established schedules, produce at least one first-authored, peer-reviewed publication, complete and publicly defend a doctoral dissertation, and participate in the undergraduate and/or graduate teaching programs of the Division of Biology and Medicine. Additional information, including course descriptions and advice on research rotations, as well as a description of an optional research internship at Pfizer and other career development opportunities, is provided by another document, the "TSGP Graduate Student Handbook".

To fulfill the requirements of the AM and ScM degrees, students must complete 8 credits at the 1000/2000 level with a grade of A or B. ScM students also must perform research with a research mentor, participate in thesis modules, prepare a written thesis, and publicly defend the thesis.

Attainment of the PhD degree is expected to be completed in 4 to 5 years (3 to 4 years for MD/PhD students), while completion of a masters program is expected in one to two years.

## II. Governance and Faculty

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. A 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.

The Steering Committee is a guiding body involved in policy and resource decisions for the Biotechnology Masters Program. This committee consists of the Senior Associate Dean of Biology, the Senior Associate Dean of Biology for Curricular Affairs, the Associate Dean for Graduate and Postdoctoral Studies, the Associate Dean of Masters and Professional Programs, the Director of Academic Assessment and Evaluation, the Chair of PLM, the PhD and Masters Program DGSs, and three TSGP senior faculty trainers.

The Graduate Program Committee is composed of the DGSs of the PhD and Masters programs, the Principal Investigators of any PhD training grants, the PhD Curriculum Director (Masters curricular issues are handled by the Masters Program Director), and one to three other faculty, with broad representation, including at least one junior faculty trainer. The Program Directors are faculty members appointed by the Dean of Biology and Medicine, or designated, upon recommendation by the Steering Committee, for a term of one year, renewable. The Graduate Program Committee is responsible for decisions related to PhD resource allocations and policy, admissions recommendations to the Graduate School, graduate curriculum decisions, assignment of students to training grants, and designation of faculty as trainers or members within the Graduate Program. Input from Graduate Program faculty and students also is solicited by the Graduate Program Committee.

The Admissions Committee oversees recruitment and admission of students to the PhD and Masters programs. The committee will consist of the DGSs, the Curriculum Director and three (senior, mid-level, and junior) faculty. At least one faculty member of the committee will be charged with monitoring the diversity of the student cohorts being interviewed and given offers of admission to ensure a diverse, multi-talented pool of candidates are brought into the program. The committee will review all applications and determine the cohorts who will be interviewed. In consultation with the Graduate Program Committee and DGSs, the Admissions Committee will admit the predetermined number of PhD and Masters students. For the PhD program, admissions decisions will involve interviews of applicants by the Admissions Committee and by faculty trainers whose research interests match those of the applicants. Feedback from current students who host and interact with the invited applicants will also be considered in the admissions process.

The Faculty of the Graduate Program are divided, with respect to graduate training, into two categories, “members” and “trainers”. Members have an active research interest in the areas encompassed by the Program. They participate in the activities of the Program by involvement in an upper level course, or by attending program seminars or journal clubs, or by serving on ad hoc committees. They may serve as thesis advisors for ScM students. Trainers are those faculty who may serve as thesis advisors for PhD students. Trainers must conduct an active research program and must be prepared to commit the time and effort required to supervise the student’s research. They are also expected to have the financial resources to support a PhD student and to support the student’s research project. When accepting a graduate student into the lab, trainers must make a commitment to provide funding for stipend, tuition, health insurance and fees until the student’s thesis is completed. Trainers also must commit to provide timely feedback to the student and the Program Director about the student’s progress. In cases where progress is not satisfactory, this feedback must be documented and shared with the student and Program Director in writing. As described below, the Program has a mechanism for feedback twice a year once the student has a thesis committee.

Potential trainers are proposed to the Graduate Program Committee by one of its members, often as a result of an expression of interest by one of the beginning students. If, after reviewing a Biosketch or CV and a website on researchers@brown, the Graduate Program Committee recognizes a potential fit with the Program, the prospective trainer meets with the Committee to discuss their research, the Program’s expectations and the Program in general. Each potential trainer also is requested to give a seminar about their research and is given a letter describing trainer responsibilities to the students and the Program. The trainer list is reviewed by the Committee at least every three years, or more often if issues arise (e.g., negative feedback from students). New trainers must provide to the Graduate Program Committee (via the Program Director) a summary of the academic and research guidance they provided to their student(s) at the end of their first year as a trainer for assessment of the training environment by the Graduate Program Committee.

### **III. Requirements for the PhD in Therapeutic Sciences**

The University requires 24 course credits for graduation at the PhD level, of which a maximum of 8 can be transferred from other institutions with permission of the Director of Graduate Studies. 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.

## A. PhD Coursework

- BIOL 2250, Survey of Modern Therapeutics (Year 1, Semester 1)
- BIOL 2170, Molecular Pharmacology & Physiology (Year 1, Semester 2)
- BIOL 2980, Graduate Independent Study, research (All years and semesters)
- Practical Statistics Module (2 weeks in January of Year 1, between Semesters 1 and 2)
- 3 Therapeutics-related Elective Courses (taken any year) from the following list:
  1. BIOL 2410 Current Topics in Signal Transduction
  2. BIOL 2300 Biomolecular Interactions: Health, Disease and Drug Design
  3. BIOL 2865, Toxicology
  4. BIOL 2160 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
- 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. More than one elective is allowed, but not required. Elective courses must have Program approval. Here are a few examples of the many possible elective courses that are not on the list above:
  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

## B. PhD Research

- **Lab Rotations:** Three rotations are required in the first year: one in the fall semester and two consecutive rotations in the spring semester. These are taken as BIOL 2980, in the labs of TSGP faculty trainers. Each student will need to match with a Thesis Advisor (in one of the rotation labs) for their thesis research by the end of the spring semester. Arrangements for the fall rotation are begun in the summer before the start of fall classes. The two spring rotations are arranged in the fall, with the help of scheduled breakfast meetings of interested faculty trainers with the entering students.
- **Thesis Committee:** Once in a thesis lab, the student will develop a project and select a Thesis Committee, with potential members and chair to be approved by the Director of Graduate Studies. The committee will consist of the Thesis Advisor, 3 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. The Thesis Committee will meet: once before the Qualifying Exam to provide feedback on areas to study and on the general research outline; once for the Qualifying Exam; twice a year for progress reports; in a Pre-defense meeting; and at the Thesis Defense. 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. The outside member of the committee often only attends the Thesis Defense, but involving them earlier is advantageous for the student. The TSGP website contains forms needed for

reporting results of Thesis Committee meetings, including the initial meeting, routine progress report meetings and the Pre-Defense meeting. Special forms are provided for the Qualifying Exam and Defense.

- **Thesis Proposal:** a 10-page, single-spaced proposal written in the style of an NIH fellowship proposal; the bibliography is not counted in the page limit. This must be written entirely by the student, with advice from the Thesis Advisor, and provided to the Thesis Committee at least 2 weeks prior to the Qualifying Exam.
- **Qualifying Exam:** must be passed by the end of the second academic year. Each student gives a 20-30 minute oral presentation about their proposed thesis research project to the Thesis Committee. The Committee then presents questions and suggestions, and also comments on the written Thesis Proposal. The student leaves the room before their talk and then after the question/discussion period, so that the Committee may discuss the student's general progress and their performance in the exam. The Committee decides whether the student passed the exam outright, passed with stipulations or failed the exam. If the student passed with stipulations, those stipulations are listed in the report along with dates for their completion to convert the status to a pass. The stipulations often include demonstrating proficiency in an area in which the student was weak or re-writing some part of the Thesis Proposal. Failure of the Qualifying Exam is automatic grounds for immediate dismissal from the program.
- **The Dissertation ("PhD Thesis")** consists of an Abstract, Introduction, Methods, Results and Discussion. The Results chapters can be intact published papers or submitted manuscripts, formatted for the thesis, with a first page of the chapter giving a complete citation and stating what contributions to the paper were made by the student and by other authors. Although such chapters will contain their own brief introductions, methods and discussions, this does not eliminate the need for more expanded, broader versions of the Introduction and Discussion in the thesis to present the contribution of the student's overall work to the research field. The methods sections of the papers can substitute for a general Methods chapter. University guidelines for Dissertations can be found at:  
<https://www.brown.edu/academics/gradschool/academics/rules-regulations/dissertation-guidelines#completion>
- **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 the Committee decides the student is ready to finish the Thesis and defend, the student will schedule the Defense in preparation for graduation. It is crucial that the student work with the Program Coordinator on scheduling, plus requirements for the Defense, Dissertation and graduation. The Thesis has the standard format and must meet the requirements of the Brown University Graduate School, posted online. The written thesis is delivered to the Thesis Committee members at least two weeks prior to the Defense. The 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"). Failure of the Defense is automatic grounds for immediate dismissal from the program.

### C. Other Required PhD Activities

- Monthly TSGP meetings -- a combination of data club, journal club, and career development activities
- Attendance at weekly TSGP seminars

- Teaching assistantship -- one course in either the fall or spring semester of the second year; foreign students must obtain certification from the Center for Language Studies (English for International Teaching Assistants) before they can serve as teaching assistants.
- Presentation of thesis research in at least one scientific conference
- First-year talk -- approximately 10-15 minutes, describing a rotation, in an TSGP seminar slot in May
- 3rd-year talk -- a full seminar in the TSGP seminar series, usually Dec-Feb, about research progress
- Writing of scientific articles -- at least one first-authored, peer-reviewed paper accepted for publication by graduation
- Submission of a fellowship application
- Fall Welcome Dinner and new-student Orientation -- incoming students greeted by others and the graduate program committee, and receive information on their first-year processes
- Annual TSGP Retreat -- in May, with posters and talks by students, talks by faculty and a keynote speaker, breakout group of graduate program committee with students
- RCR/R&R/IDP/Lab safety trainings -- all trainings will be communicated to the students via email; these are ethics (responsible conduct of research), rigor & reproducibility, individual development plans, and various lab safety trainings
- Fall Breakfasts -- September-November, meetings of new students with individual faculty to help set up spring lab rotations
- Monthly Faculty-student gatherings -- spread throughout the year, one faculty trainer at each, along with several students, to get to know the faculty and discuss career paths and experiences

#### **D. PhD 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, TSGP provides each first-year student with a special stipend of \$1,200 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 in September of the first year. Furthermore, each student who obtains a competitive extramural individual fellowship (e.g., from NSF, NIH, Ford, etc.) is awarded an extra \$1,800 per year in Divisional stipend support, plus \$1,500 per year in TSGP 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 Director of Graduate Studies and Graduate Program Coordinator can provide more detailed procedural information.

#### **IV. Overview of the Masters Degrees in Biotechnology**

The Therapeutic Sciences Graduate Program offers Masters of Science (ScM) and Masters of Arts (AM) degrees in Biotechnology. Students may enter through the 5th Year Masters Program or the external degree program, which

may require 1 to 2 years of study depending on the student's background. In both pathways, students may elect to fulfill the requirements of a thesis (ScM) or a non-thesis degree (AM). Every student admitted into the Masters programs (ScM/AM) is considered for a partial scholarship to increase excellence and diversity. However, private funds (loans, outside scholarships, etc.) make up the majority of funding.

For the 5th Year Masters Program, a student must apply prior to the end of their last semester of undergraduate study at Brown. Admission for Brown students in good standing to the 5th Year Masters Program will ordinarily be a matter of course, as long as the student has applied by the required process and in the allowed time frame. For students fulfilling the requirements of research and a thesis, a letter of recommendation from a Brown faculty member willing to host the student in their lab is preferred. To be eligible for the 5th Year Masters Program, students must have successfully completed and fulfilled all requirements of an undergraduate concentration at Brown. As many as two graduate-level courses taken at Brown as part of the student's undergraduate degree may be applied towards the requirements of the graduate degree as long as they were not used towards fulfillment of the student's undergraduate concentration and are approved by the Program Director.

Non-Brown students must apply by completing the standard Graduate School application and indicate their interest in the Biotechnology Masters (ScM or AM) Transfer of credit towards the ScM and AM Program from other institutions is not allowed.

Masters students are invited to attend the TSGP monthly meetings and many other activities described above for the PhD students such as seminars, faculty-student meetings, journal and data clubs.

#### **A. Masters of Science (ScM) Degree Requirements**

To satisfy the requirements of the ScM degree, students must complete an approved program of study consisting of a minimum of eight semester-long courses (eight tuition units). No more than three of the eight courses are to be for thesis research credit (Graduate Independent Study, BIOL 2980). Students must complete at least five structured, advanced-level (1000/2000 level) courses in biology or other sciences. These courses must be approved by the Program Director. All students (5th year and non-Brown) pursuing an ScM degree must select a thesis advisor by the end of their first month in the program and will perform research for the duration of their time in the program. Students are encouraged to have open conversations with their thesis advisor about the amount of time that should be dedicated to their thesis research and general expectations before joining a lab. It is expected that students are performing thesis research even if they are not signed up for graduate independent study. Thesis research progress will be evaluated each semester by the student's thesis advisor. If a student is not making satisfactory progress on their thesis, their advisor may recommend to the Program Director that the student be put on academic warning. In these cases, the Program Director, thesis advisor, and the student will work together on a plan for the student to return to good standing.

In their terminal semester, students, in consultation with their thesis advisor, must choose a thesis committee which will consist of two members of the faculty and the thesis advisor. The list of faculty serving on the committee should be communicated to the Program Director. Students must prepare a written thesis according to the Graduate School guidelines. The written thesis is due to the student's committee two weeks before the scheduled thesis defense. The final written thesis must follow all the guidelines specified by the Graduate School and be submitted to the Graduate School by the deadline corresponding to the date of their degree conferral. The thesis defense will be an open presentation with the requirement that the entire thesis committee is present. The thesis defense does not require a closed examination session.

All students must attain a grade designation of B or better on their courses /credits counting toward their degree requirements. Courses/credits may not be taken on an S/NC basis. If a student does not pass their courses with a grade designation of B or better they will be put on academic warning and must take another credit to ensure

they have passed eight credits. Students must also complete the Responsible Conduct in Research (RCR) course. Students who cannot attend the course will be required to complete a replacement online RCR course. If the RCR requirement is not fulfilled by the end of their first semester, the student will be placed on academic warning.

## **B. Masters of Arts (A.M) Degree Requirements**

Students who elect to fulfill the requirements of a non-thesis degree will receive the AM degree. The AM degree consists of a minimum of eight semester-long courses (eight tuition units). These courses must be 1000/2000 level structured courses in biology and the other sciences. These courses must be approved by the Program Director. All students must attain a grade designation of B or better on their courses /credits for the courses to count toward their degree requirements. Courses/credits may not be taken on an S/NC basis. If a student does not pass their credits with a grade designation of B or better they will be put on academic warning and must take another credit to ensure they have passed eight credits.

The Biotechnology Masters Program does not accept students into Brown's concurrent baccalaureate and Masters program.

## **C. Transitional Masters Degree**

The Therapeutic Sciences Graduate Program does not offer transitional masters degrees on the way to a PhD.

## **V. MD/PhD Degree**

Students in the MD/PhD Program may participate in the Therapeutic Sciences Graduate Program. These students must complete all of 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 the required didactic courses. MD/PhD candidates may complete their research lab rotations in the summers preceding their first year in TSGP.

## **VI. Student Support Resources**

The TSGP Graduate Program Directors 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 relevant Graduate Program Director with an academic accommodation letter from them. For more information, contact SEAS at (401) 863-9588 or [SEAS@brown.edu](mailto:SEAS@brown.edu).

Numerous other student support resources are listed in the TSGP Graduate Student Handbook.

## **VII. Leaves 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>

Applications for leaves of absence should be sent to the TSGP Graduate Program Director for approval using the forms provided by the Graduate School. The Program Director will consult with the Graduate Program Committee in evaluating the request. Students must use the standard form to request a leave and should attach a separate note explaining the reason for their request. The Graduate Program Director should sign the form to indicate approval and forward it to the Graduate School for approval by the Dean. 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.

## **VIII. 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 Director will review each case and place his/her recommendation before the Graduate Program Committee convened by the Program Director. Two thirds of the Graduate Program Committee will constitute a quorum and a decision to accept the Director's 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 PhDTSGP 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>