

# Graduate Handbook in Applied Mathematics

Govind Menon, *Director of Graduate Studies*

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## 1 Introduction

The graduate program in the Division of Applied Mathematics at Brown provides training and research opportunities in a broad spectrum of applied mathematics. A variety of professional development opportunities are available including teaching, internships in industry and national labs, and round table discussions on professional issues.

The principal areas of research activities represented in the Division of Applied Mathematics are ordinary, functional, and partial differential equations; probability, statistics and stochastic systems theory; neuroscience, pattern theory, and computational biology; and, numerical analysis and scientific computation. Research in all of these areas range from fundamental theory through to applications and development of computational algorithms. Many of our faculty are engaged in interdisciplinary and collaborative research with researchers both at Brown and elsewhere. This breadth of activity is one of the great strengths of the program and is reflected in the teaching and courses we offer.

Several on-going research seminar series are hosted in the Division, and the [Institute for Computational and Experimental Research in Mathematics \(ICERM\)](#) hosts semester-long programs that are attended by many of our graduate students and faculty. The Division has a large attendance of faculty visitors along with a large number of postdoctoral fellows who actively contribute to our research programs and to graduate education.

This handbook is intended to give you an overview of the graduate program in the Division of Applied Mathematics at Brown University and to answer some of the commonly raised questions about policies and procedures. However, the definitive source for all matters is the [Brown Graduate School Handbook](#) which can be found, along with other useful information, on the [Graduate School](#) web pages<sup>1</sup>. In particular, students should take note that **every official step in a graduate student's career requires written notification from the Graduate School and/or Registrar.**

Further information and specific advice may be obtained from your Academic Advisor, the Student Affairs Manager, and the Director of Graduate Studies.

Another helpful resource is [Graduate Student Resources](#).

## 2 Basic Structure of the Program

The graduate program in Applied Mathematics is designed to enable graduates to develop a working knowledge of a broad area of applied mathematics along with a deep knowledge of a particular area in which the student generally writes their doctoral thesis. The doctoral program aims to provide the general training needed to undertake research in applied mathematics along with the associated intellectual and academic skills. Obtaining a PhD at Brown generally takes five years and broadly consists of two basic components: qualification for doctoral candidacy, and performing the research itself.

Your main objectives in the first component (Years 1-2) are to:

- identify the area in which you would like to carry out research for your doctoral thesis;

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<sup>1</sup> Graduate School website is located at [www.brown.edu/academics/gradschool](http://www.brown.edu/academics/gradschool)

- identify a faculty member who can advise and guide you in this research;
- qualify for doctoral candidacy by passing the preliminary examination (typically referred to by students as the Prelim); and
- come to a tentative conclusion about whether you are interested in pursuing an industry research/analysis career path, an academic career path focused on teaching, a traditional career path in academic research, or some other alternative of your choosing.

All of these objectives, together with the formal learning and teaching requirements *must be completed before the start of Year 3*.

Your objectives in the second component (Years 3-5) consists of:

- working on a specific research problem in your chosen area with guidance from your Thesis Advisor;
- further broadening your research interests and knowledge by attending seminars and special topics courses at Brown, and attending and presenting your research at conferences in your field;
- solidifying your chosen career path by engaging in teaching opportunities, summer internships, or other appointments relevant to your trajectory; and
- writing a dissertation and passing the defense of your thesis.

## 2.1 Formal Requirements for Granting of Doctoral Degree

The formal requirements for the PhD degree include the following:

1. Successful completion of twenty-four units for letter grade beyond the Bachelor's degree.<sup>2</sup>
2. Every candidate for the PhD degree is required to serve as a Teaching Assistant for two semester-long courses (unless exemptions apply).
3. Every candidate must write a dissertation that contains results of original research and gives evidence of high scholarship. The quality is assessed by the PhD Thesis Committee, which consists of the Thesis Advisor and two Readers, at least one of whom must be a regular faculty member in the Division.
4. Candidates must pass their thesis defense consisting of:
  - a. A public expository talk on the content of their dissertation.
  - b. At the conclusion of the expository talk, an oral final examination on the content and details of the dissertation by Thesis committee. This final examination is conducted by the PhD Thesis Committee and is open to the faculty and graduate students of the Division of Applied Mathematics.
5. Students must file their theses by May 1st in order to obtain the degree in a given academic year. There are 3 deadline dates for Ph.D. students to defend. The dates are in October, February and May.

## 2.2 Academic Standing

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<sup>2</sup> Courses APMA 2980 are included. A maximum of eight semester graduate courses may be transferred for students with course credit from other universities; interested students should consult their Academic Advisor, Thesis Advisor, or Director of Graduate Studies about the suitability of transferring credits.

Every semester, students will receive an academic standing from the DGS. Students must maintain an academic standing of either “good” or “satisfactory”. If a student receives a standing of “warning”, they are at risk of being withdrawn from the program following the subsequent semester. Being in good or satisfactory academic standing requires the following:

- Year 1: Completion of four courses per semester with satisfactory grades (all B’s or better and no more B’s than A’s);
- Year 2: Completion of three courses per semester with satisfactory grades (all B’s or better and no more B’s than A’s); completion of the teaching requirement;); Passing the Prelim examination by the end of Year 2; Selection of a Thesis Advisor within one month of Passing the Prelim examination. (Identification of a Thesis Advisor who has explicitly agreed to supervise the student’s thesis work is strongly recommended by the end of Semester 1, Year 2.)
- Dissertation: Completion of the dissertation within 6 years.

For more details on academic standing, please see the APMA Graduate Program, [Frequently Asked Questions document](#).

Students who have a disability or other condition that might require accommodation or modification of any of these requirements or course procedures should contact the Director of Graduate Studies and should speak with the instructors of the required courses for classes that are affected. Students in this category should also be registered with [Student Accessibility Services \(SAS\)](#) and provide the Director of Graduate Studies with an academic accommodation letter from them. For more information, contact SAS at (401) 863-9588 or [SAS@brown.edu](mailto:SAS@brown.edu).

During early January and late May, the Director of Graduate Studies will collect feedback on each graduate student to identify any issues which arose during the preceding semester. Graduate students are strongly encouraged to meet with their Academic or Thesis Advisor, and with the Director of Graduate Studies if they feel that they may fall out of good academic standing.

Students who fail to remain in good or satisfactory academic standing may be issued an official warning, communicated in writing together with a list of issues that need to be addressed in order to restore good academic standing.

**Financial support can be rescinded for students who are not in good or satisfactory academic standing or who fail to address the issues that led to the academic warning. Except in extraordinary circumstances, students are given a full term on warning status and a clear deadline before being withdrawn from the program.**

### 2.3 Years 1-2

During the first two years, you take courses and serve, usually during your second year, as a Teaching Assistant (TA) to satisfy our teaching requirements. During this time, you will also identify the research area and a Thesis Advisor with whom you want to work on your PhD thesis.

### 2.4 The Prelim

The Prelim is an oral examination on topics based on four two-semester course sequences, taken in Years 1-2, and serves as your formal admission to doctoral candidacy. The Prelim must be completed *before the start of Year 3*. Details of the Prelim are described in Section 5.

### 2.5 Years 3-5

After passing the Prelim, students should continue to enroll in three courses for credit in each semester, which may include Topics courses such as APMA 2810 or APMA 2820. However, your main effort will be research directed towards the PhD thesis with guidance from the Thesis Advisor. To conduct your research, you will enroll in APMA 2980 for up to three credits each semester you are conducting research full time; this enrollment counts as one course.

## **2.6 Leaves of Absence**

[Leaves of Absence](#) are granted for a variety of professional, educational, medical, psychological and personal reasons. They are granted for one semester or for one year, and may be extended to two years if necessary. The relevant procedures can be found in the [Graduate School Student Handbook](#).

# **3 Various Personnel and Their Roles**

## **3.1 Department Chair: Chi-Wang Shu**

The Department Chair has ultimate responsibility for the Division of Applied Math. The chair leads faculty meetings, oversees appointments, and has the final say on most of the business of the department. The chair works directly with the wider university on administrative items, and is closely involved with meeting the needs of faculty and staff as well as graduate and undergraduate students. Since the chair's duties are so widespread, graduate students are unlikely to interact with the chair in their formal capacity as Department Chair unless there is a serious issue. However, the chair is available as a resource to assist and support graduate students should the need arise.

## **3.2 Director of Graduate Studies: Govind Menon**

Every department or program offering a graduate-level degree at Brown has a director of graduate study (DGS). The DGS is responsible for all graduate related issues in their respective programs. *The DGS is the primary point of contact for students* on all issues related to admission, academic standing, funding and appointments, etc. The DGS is responsible for the regular evaluation of their program's students, and for notifying students in cases where there may be problems. All official changes to graduate students' academic or financial records require the signature of the DGS.

## **3.3 Student Affairs Manager: Candida Hall**

The Student Affairs Manager performs most of the administrative work of the graduate program. They can answer questions of an administrative or procedural nature.

## **3.4 Academic Advisor**

Each incoming graduate student is assigned an Academic Advisor who is a member of the Division's faculty. The Academic Advisor provides advice during Years 1-2 with all academic matters such as choosing courses, preparing for the prelims, thinking about possible future thesis research areas, and identifying potential Thesis Advisors. The Academic Advisor needs to approve your course selections and any changes to your course program.

## **3.5 Academic Buddy**

During Year 1, each incoming graduate student is assigned a more senior graduate student or Academic Buddy, who can provide you with informal advice and guidance from a student's perspective.

### **3.6 Graduate Student Representatives: Will Kwon**

The graduate student representatives are available for discussion of graduate student issues in the Division and will address any matters needed with the Director of Graduate Studies or the Department Chair as appropriate.

### **3.7 Thesis Advisor**

The Thesis Advisor provides the main guidance during Years 3-5 with regards to your research towards the PhD thesis. As such, the Thesis Advisor is one of the most important faculty members with whom a student interacts. Further details regarding Thesis Advisors are given in Section 8. Occasionally, a student may find that they need to switch their Thesis Advisor after having already started their research. Details regarding how to transition from one Thesis Advisor to another are given in the [Advisor Change Policy](#) on the department website.

### **3.8 Department Staff**

In addition to the Student Affairs Manager, many administrative issues are handled by the department staff. You can find a list of all APMA staff on the [department website](#) and further information on their roles [here](#), and the Student Affairs Manager will regularly direct you to speak with specific staff members about questions that fall under their jurisdictions.

## **4 Requirements and Planning in Years 1-2**

### **4.1 Courses**

PhD students in Years 1-2 are required to successfully complete either

- four courses for credit per semester (Year 1)

or

- three courses for credit per semester in which they are acting as an RA or as a TA (Year 2).

Students should note that:

- All courses should be taken for a letter grade.<sup>3</sup>
- Students are responsible for ensuring that their quota of courses remains at or above the basic requirements.
- Students may not drop courses if it brings their quota below the above levels.<sup>4</sup>
- In order to conduct research in Applied Mathematics you must register for APMA 2980. This may be counted for the Division's requirements, and are equivalent to 1-3 normal course credits. In registering for this class, you must choose a section number

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<sup>3</sup> Exceptions may be made for mandatory S/NC courses. The student should show a copy of the course description of the course to both the Academic Advisor and the DGS and obtain prior written approval from both.

<sup>4</sup>Any exceptions must be approved in advance in writing by the Director of Graduate Studies.



that coincides with the name of your advisor. At least two courses per semester must be courses other than APMA 2980.

Students enroll in courses online through [Courses at Brown](#). The relevant deadlines for registration, adding/changing/dropping courses, and for changing grade options (letter grade, satisfactory/no credit, or auditing) are posted on the Registrar's calendar. Please keep in mind that letter grades are mandatory in our program.

In terms of the choice of particular courses, students can tailor their course plan to fit their own personal interests. The Academic Advisor, Thesis Advisor or Director of Graduate Studies can help and advise students in designing their own individual course program. In planning a course program, one should keep the Prelim requirements in mind (see Section 6).

A common and recommended program for Year 1 might include two or more of the two-semester course sequences from the list given below:

- Fluid Dynamics (APMA 2410-2420)
- Real Analysis & Hilbert Spaces and their Applications (APMA 2110-2120 or Math 2210-2220)
- Nonlinear Dynamical Systems (APMA 2190-2200)
- Theory of Probability (APMA 2630-2640 or Math 2630-2640)
- Numerical Solutions of Partial Differential Equations (APMA 2550-2560)
- Partial Differential Equations (APMA 2230-2240 or Math 2370-2380)

These standard course sequences are regularly offered. Detailed descriptions of these, and other courses, can be found on Courses at Brown. All courses can be taken at most once. Courses such as APMA 2570A and 2570B are distinct courses.

There are additional introductory courses offered by the department that are one-semester offerings rather than sequences, such as Recent Applications of Probability and Statistics (APMA 2610), Combinatorics (2822C), and Convex Analysis (2811W). Students can take these for their own interest or build their own sequence for the Prelim using multiple independent courses.

The department also offers many advanced topics courses which may be taken by students who have successfully completed the appropriate introductory courses.

Students typically choose the sequence which reflects their anticipated major area of research. Students do this along with another distinct sequence which might represent a possible area of research or a minor area for the preliminary examination. Sometimes it may be appropriate to take courses from other disciplines.

Students are permitted to take at most one lxxx (undergraduate) level course per semester. However, it should be noted that *lxxx courses are subject to several restrictions as regards to the Prelim.*<sup>5</sup>

## 4.2 Research

In addition to taking courses, students use Years 1-2 to decide on the area in which they wish to carry out research for their PhD thesis. There are many opportunities to find out about areas of

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<sup>5</sup> At most one lxxx course may be examined in the Prelim and, even then, only as a Minor topic and only when there is no graduate level course in the same area.

research including:

- Attending seminars and colloquia talks that are advertised on the Division's website. Even though you may not understand everything that speakers say, these talks can give you insight into current research trends and what research in individual mathematical areas look like.
- The Division of Applied Mathematics, the Department of Mathematics, and the Institute for Computational and Experimental Research in Mathematics (ICERM) regularly host workshops and conferences that you are encouraged to attend.
- The weekly departmental Tea Time on Thursday afternoon provides an opportunity to meet informally with faculty or other graduate students.
- The summer between Years 1 and 2 provides an ideal opportunity to get hands-on experience of what it is like to work on a research problem. Students may, for example, work on research projects, pursue internships in industry or at national labs, or work with various faculty over the summer on one or more research projects.

### 4.3 Teaching

The teaching component of the program takes place in Year 2. However, non-native English speakers should note that there is a formal English language evaluation process that takes place in early September before the beginning of Semester 1, Year 1. See Section 5.3 for more details about this.

## 5 Being a Teaching Assistant (TA)

Teaching is an important component of the training of our PhD students. Developing excellent communication skills and the ability to interact with undergraduate students and to communicate technical and nontechnical content efficiently and effectively is crucial for all careers, whether in industry or in academia. Serving as a Teaching Assistant (TA) enables PhD students to develop these skills, and is a prerequisite to teaching a course as a sole instructor.

All graduate students are required to serve as TAs for at least two semester-long courses,<sup>6</sup> and this typically takes place during Year 2. The Division takes graduate students' preferences into account when allocating TAs to courses.

The performance of students while acting as TA is evaluated by the course instructor and through student feedback, both of which are communicated to the TA.

### 5.1 TA Duties

A TA performs up to 20 hours per week of teaching duties for an undergraduate course or, occasionally, an introductory graduate course. The specific duties vary from course to course, but for most courses, the minimum involves a total of four hours per week of recitation sessions and office hours. A significant amount of time is spent in preparing for the course, either by attending the lectures or by reading the textbook and handouts, which are then used in recitation sessions. TAs might also be asked to grade homework assignments and exams, to prepare answer keys, etc. Please see [this document](#) for APMA GTA general guidelines and responsibilities.

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<sup>6</sup> Exceptions are made only for students on certain federal fellowships that do not permit teaching duties.

## 5.2 Training

Information sessions on being a TA are generally organized by the Division in late summer or at the start of Semester 1. Students are also encouraged to participate in workshops and Certificate programs organized by the [Sheridan Center](#).

## 5.3 Certification of Non-Native English Speakers

All non-native English speaking graduate students must be evaluated by the Center for Language Training (Contact: Barbara Gourlay) for competency in oral English, before being allowed to teach. If the evaluation reveals a need for supplementary training in oral English, the Center for Language Training will assist the student in choosing the most effective method to achieve competency.

Accordingly, **all first-year non-native English speaking graduate students must take the language evaluation no later than the end of Semester 1, Year 1.** The result of the evaluation should be passed to the Student Affairs Manager and to the Director of Graduate Studies. Further information about the evaluation may be obtained from the Student Affairs Manager.

Any student who does not pass this evaluation will be required to take an English class in the first semester and retake the evaluation exam again at the end of Year 1, Semester 2. Students who do not pass the second evaluation jeopardise their financial support.

## 5.4 Being an Instructor

Graduate students who excel in their TA duties may be able to teach a course as the sole instructor. Two options are (i) to teach a course in the [Summer@Brown](#) program, (ii) to teach a regular undergraduate course in the Division in fall or spring (contingent on the teaching needs of the Division). If you are interested, please let the Department Chair know well in advance: Courses for [Summer@Brown](#) are finalized in early November, while the teaching schedule for the Division is finalized in January for the following academic year.

# 6 PhD Candidacy and The Prelim

To become a PhD candidate, it is necessary to pass a preliminary oral examination, known as the Prelim, and to find a Thesis Advisor.

## 6.1 Content

The Prelim covers a major area with two topics and a minor area, comprising another two topics. Each topic covers the equivalent of at least two semester long courses. Further requirements for the major and minor topics are discussed below. The major area is usually related to the students' intended research area; the minor topics are meant to demonstrate breadth of subject matter.

## 6.2 Format

The Prelim is an oral exam that is administered by an examination committee of four distinct faculty members, one for each topic. The preliminary examination committee is chaired by a faculty member, usually the students' anticipated Thesis Advisor, who may or may not be one of the four examiners. It is the students' responsibility to find examination committee members.

The examiners for the exam topics are typically the students' anticipated Thesis Advisor or the instructors of the corresponding course sequences the students have taken. There are also occasional cases when students ask faculty members who have taught the same courses in different years or are in related research fields to be the examiners instead of the course instructors. This usually happens in cases when there is scheduling difficulty.

The two major topics are examined during a two hour session, and the two minor topics in another two hour session. Each topic is examined for one hour. The two parts of the examination must take place within a two-week period.<sup>7</sup> Students should talk to their committee members about availability and settle on times for the examinations.

It is expected that students meet with the committee members in advance to discuss the expected format and content of the exams. Examiners may give the candidates written questions in addition to the oral examination. The material covered in the examination is normally taken from course work but the examiners may ask new questions on the basic material or which integrate topics from different course areas.

Each spring, the department holds an information event with pre- and post-prelim students and faculty advisors to discuss the format, role, and expectations for the prelim exam. Students are encouraged to attend this meeting already in their first year.

### 6.3 Timelines

Graduate students take the Prelim during Year 2. If the Chair of the preliminary exam committee is not the Thesis Advisor, then the student must find a Thesis Advisor within one month after passing the Prelim exam. Students who fail to pass the Prelim and/or who are without an Advisor before the end of Year 2 jeopardise their academic standing.

### 6.4 Prelim Proposals

The proposed topics and examiners for the preliminary examination are prepared in consultation with and approved by the anticipated Thesis Advisor or another faculty member who agrees to be the Chair of the examination committee. It is the responsibility of the student to:

- contact the four proposed examiners to get their approval
- complete the [Prelim proposal form](#) including (a) the dates and times for the two exams, (b) the names of proposed examiners, (c) the designated applied and theoretical topics, and (d) detailed syllabi for any topics that relate to courses not taken at Brown
- once completed, the [Prelim proposal form](#) is automatically sent to the Director of Graduate Studies, the Chair of the Prelim Committee, and the Department Chair, who all must approve the form. The Student Affairs Manager will inform you once the form has been approved or share any requests for revisions. Approval must be received at least two months in advance of the scheduled dates of the examination.

### 6.5 Eligible Topics

The major area should present a unified body of material that is viewed by the Director of Graduate Studies and the examiners as the main area needed for the student to conduct research in the chosen field. For instance, the two major topics may be based on two different aspects of

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<sup>7</sup>Exceptions to this timing are rare and written approval must be obtained from the Director of Graduate Studies.

the same subject area, such as theoretical and applied fluids or theoretical and computational numerical methods. In addition, the following aspects need to be considered:

- one of the four topics must be designated as an applied topic with the expectation that most of the questioning for the applied topic will concern the scientific or engineering aspects of the subject.
- one of the four topics must be designated as a theoretical topic with the expectation that the examination will concentrate on the mathematics of that topic.
- at least one of the minor topics must be in an area distinct from the major area.

Topics should be chosen from the following:

- Analysis (Real and Functional)
- Dynamical Systems
- Fluid Dynamics
- Numerical Analysis and Scientific Computation
- Pattern Theory and Statistics
- Partial Differential Equations
- Probability and Stochastic Processes
- Combinatorics
- Convex Analysis
- A minor from a department such as Biology, Computer Science, Economics, Engineering, Mathematics or Physics
- Alternative topics may also be proposed, subject to the approval of the Director of Graduate Studies.

## 6.6 Preparing for the Prelim

For many graduate students, the Prelim will be the first oral examination. As part of the preparation for the Prelim, some students find it useful to get together in small groups and simulate oral exams: have one student stand at the blackboard and respond to questions by others in the group. This will help students become acquainted with oral questioning. The process of preparing questions also helps students to assimilate the material and anticipate what questions might be asked. Some of the senior students may be willing to help by asking questions in an exam setup. The ability to respond to questions on the spot is a vital skill that will prove very useful when students start presenting talks at conferences and meeting with other researchers.

## 6.7 Outcomes

The outcome of the Prelim may be a Pass, in which case a student with a Thesis Advisor becomes a PhD Candidate (admission to candidacy), or a requirement for further study of one or more components of the Prelim, in which case the Prelim is retaken within one month. The Prelim examination may be taken at most twice.

# 7 Graduate Advising

The graduate advisor and advisee relationship is one of the most important ones in a student's early professional life. While the Academic Advisors, who advise students before their prelims, are assigned by the DGS, students are advised to select the Thesis Advisor with great care,

realizing that the relationship extends beyond intellectual interests into professional persona, conduct, and care. Every graduate student needs a graduate advisor (or co-advisors), either an Academic Advisor before prelims or a Thesis Advisor after prelims. Students will usually have selected a Thesis Advisor during their second year, before taking the prelims. Although rare, changing graduate advisors is possible through conversation with and by petition to the DGS, please see the [Advisor Change Policy](#) for more details. The graduate advisor-student relationship is governed by mutual expectations and responsibilities. No two mentoring relationships will look the same due to personality differences in both faculty and students. Nonetheless, a baseline of professional and collegial conduct should be observed, as follows.

### **7.1 Student Expectations**

The student is expected to:

- Respect and abide by the Brown Academic Code;
- Adhere to the Division Ph.D. program guidelines as outlined in this Handbook;
- Embrace and facilitate an environment of inclusion, respect, and generosity in the Division and University;
- Solicit and be responsive to the graduate advisor's input on course selection, intellectual directions, knowledge of the field, Preliminary Exam preparation, and Dissertation writing and research;
- Make sufficient annual progress in the program, whether regarding coursework, teaching, Preliminary Exam preparation, research and writing, and producing the Dissertation in a timely manner;
- Take the lead in establishing an understanding with their advisor about their progress in the program each year, and, after prelim, the timing and nature of thesis research and writing;
- Make requests for letters of support well in advance of the deadline, and include accompanying materials as early as possible (four weeks is ideal).

### **7.2 Graduate Advisor Expectations**

Graduate Advisors should endeavor to:

- Demonstrate care and support for their graduate advisee for the duration of the program;
- Remain in regular and continual contact throughout the student's program, including regular meetings when on campus, and regular email contact while off campus. The frequency of such meetings will fluctuate throughout the program, but check-ins at least twice per semester are ideal for Academic Advisors before prelims, and more frequent meetings and discussions about thesis research for Thesis Advisors after prelims.
- Remain informed as to the program's structure, requirements, and deadlines, and be in conversation with the student about such dates;
- Consider the full range of professional development for their advisees and help identify opportunities that contribute to their professional development;
- Write letters of recommendation and support in a timely manner;
- Conduct themselves with the highest level of integrity and according to the best practices of the profession;
- Embrace and facilitate an environment of inclusion, respect, and generosity in the

- Division and University;
- Continue their responsibilities to their advisees even while on leave and during the summers;
- Clearly inform the advisee and DGS if they are no longer able to discharge any of these duties.

### **7.3 Check-In Meetings**

In addition to regular meetings with advisors, students also have regularly scheduled check-in meetings with the Student Affairs Manager and the staff representative to the DEI Committee. At these meetings, the staff members hear from students about how they are doing personally, academically, and professionally. The staff are also available to answer questions and provide resources. Individual meetings are confidential, but overall trends are reported to department leadership and the DEI committee.

## **8 More About the Thesis Advisor**

### **8.1 Who?**

The Thesis Advisor can be any faculty member from the Division, or even from another department at Brown University. Students who are considering working with a Thesis Advisor from another department should consult both their Academic Advisor and the Director of Graduate Studies.

### **8.2 What?**

The role of the Thesis Advisor has many facets including:

- advises on the course selection for the Prelim and usually serves as the Chair of the Prelim committee.
- provides advice and input on all aspects of the student's research during the crucial Years 3-5 during which research is being carried out. Most standards regarding research efforts should be agreed upon between students and their advisor.

### **8.3 When?**

The choice of Thesis Advisor should be determined by the end of the Semester 1 of Year 2, but students are encouraged to take longer if they cannot make a fully informed decision at this time. Students must determine a Thesis Advisor no later than one month after completion of preliminary exams.

### **8.4 Finding a Thesis Advisor**

Identifying a Thesis Advisor is a two-way process between the student and the prospective advisor and is generally initiated by the student. Some of the factors to consider when identifying a potential Thesis Advisor include:

- in what area do you wish to carry out research?
- is the research area one in which the potential advisor has research interests?
- is the potential advisor someone with whom you wish to work closely during your research?

In answering these questions, it often helps to take some independent study courses with a variety of professors, to work with faculty members over the summer on research projects, or to talk with other students to get a better sense of specific research areas or advisors.

It is quite common for students to be interested in the research of several different faculty members. Students should feel free to talk to as many faculty members as possible in their search to identify a potential Thesis Advisor.

Students should not feel reticent about approaching faculty as potential Thesis Advisors!

Faculty are *expecting* students to approach them with questions about research topics, possible research projects in the faculty member's area of interest, whether they are currently taking on new graduate research students, etc. Faculty will:

- **not** assume that a student who approaches them is making a commitment to work with them;
- **not** be offended if a student decides to work in a different area or with someone else.

Finding a compatible Thesis Advisor is extremely important. The main thing to bear in mind is that this process requires effort, time and thought on the part of the student. It is important to find a Thesis Advisor in a timely manner. However, students should not rush into a Thesis Advisor selection without taking the time to evaluate compatibility. For example, a student should not select a Thesis Advisor based on conditions such as visa status or admission to the program, as these are unrelated to a student's research interests and have no bearing on a student's compatibility with a potential Thesis Advisor.

Students should take the time when talking to faculty to determine what a potential Thesis Advisor's expectations would be regarding a student's priorities, time management, and work-life balance. It is the responsibility of faculty to communicate their expectations clearly and transparently to any students in the process of finding a Thesis Advisor. Ideally, faculty should have written documents available that explain the policies and practices of their research group, and their expectations should be understood to apply equally to all students in their research group.<sup>8</sup> These expectations will have a large impact on whether a student is compatible with a potential Thesis Advisor; for both students and faculty, it is very important that a student selects a Thesis Advisor whose expectations are compatible with the student's goals and ideas. Miscommunications, changes, or incompatibilities surrounding these expectations that become apparent after a student selects their Thesis Advisor may indicate that a student should consider changing their Thesis Advisor.

## 8.5 Common Complications when Choosing a Thesis Advisor

*Identifying a Research Area:* Students may struggle to determine what research area they wish to work in, which is a necessary component of finding an advisor. One way to remedy this is to allocate time for attending seminars and reading papers throughout the semester. In addition, students can diversify their exposure to research through events organized by other departments. Brown is a highly interconnected research environment, and students can leverage this to ensure they find an area that is appealing to them and plays to their strengths.

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<sup>8</sup> This suggestion is inspired by the second principle listed on the University of Michigan site: <https://cse.engin.umich.edu/academics/for-current-students/current-graduate-students/current-phd-students/changing-advisors-in-cse/>



*Finding a Suitable Faculty Member:* Students may find that there are no faculty members in the department with expertise in the area the student wishes to research, or that those with that expertise maintain research environments that are not a good fit for the student. Students should not ignore such a mismatch in the interest of securing a Thesis Advisor, as this is detrimental to both students and faculty in the long run. If a student is having trouble finding an advisor within the department, they should begin by looking for an advisor in another department with the expertise and research environment that fits them. There have been many cases in the Division in which students have had faculty members from other departments as their Thesis Advisors; the Mathematics Department is especially common, but faculty members in engineering, computer science, and public health have also been selected.

*Securing Outside Mentoring:* A student who wishes to choose a faculty member from another department as their Thesis Advisor must inform the DGS of their plans as soon as possible, especially if the student has not yet taken the Prelim Exam. Faculty from outside the Division are eligible to act as Thesis Advisors for students in the Division, but are sometimes unfamiliar with the format of the Prelim Exam for the Division; an independent faculty member from the Division may need to serve as chair of the examination committee. It is still the responsibility of the student to organize their examination committee as detailed in Section 6. Moreover, the student may need a co-advisor in the Division - the student would then primarily work with their Thesis Advisor but would periodically check in with this designated faculty member in the Division.

### **8.6 Change of Thesis Advisor**

Students have the right to change their Thesis Advisor at any point during their graduate studies; however, they should be aware that doing so may delay their progress towards their doctorate. Continued eligibility for enrollment and a stipend requires that students have a Thesis Advisor at all times, and so students should not cease working with a Thesis Advisor until they have finalized arrangements to begin research with a new Thesis Advisor. The stipend comes from the Division, not the Thesis Advisor so that financial considerations need not influence a student's decision to change their Thesis Advisor. For more information, see the [Advisor Change Policy](#) or speak to the Director of Graduate Studies.

## **9 Financial Support**

All Ph.D. students are accepted with a guarantee of financial support for 5 years, including summer support, health fee, health insurance, and tuition.

In the case of an emergency or hardship, the Graduate School and the Office of Student Life each have a small pool of short-term loans available to help students (apply in [UFunds](#) under Graduate Student E-Gap Funds).

More information can be found on the Graduate School webpage about [Graduate Student Stipends](#) or at [the University Human Resources Employee & Labor Relations](#) page, which includes links to the Collective Bargaining Agreement for Graduate Students Employees.

Questions about financial support can also be directed to the Applied Math Grants and Contracts Specialist ([Rosanna Wertheimer](#)).

### 9.1 Research and Start-Up Accounts

A start-up fund of \$1750 will be credited to each incoming student in the fall, and can be used for research related expenses such as textbooks, travel, and laptops (which remain University property upon departure and must be procured through the <https://policy.brown.edu/policy/computer>).

**Purchases which do not abide by this policy will not be reimbursed.** It is strongly encouraged to speak to an office employee before purchasing a laptop. **Receipts dated before the start of the entering academic year will not be reimbursed.**

Proof of purchase is required for reimbursements and must be processed within 60 days of purchase according to Brown policy. Reimbursements typically take a week to be deposited into bank accounts.

Students who wish to purchase items from the Brown Bookstore should visit the main office where they will be issued an IPR allowing for direct billing to their start-up account.

For information regarding balance available, contact the staff in the main office at 182 George St.

### 9.2 External Fellowships

The Division strongly encourages students to independently seek external funding. Receiving a fellowship award is a sign of distinction and writing grant applications is an important part of a student's professional development. In view of the importance attached to pursuing External Fellowships:

The Division will contribute \$500 to the Research Account of any student who submits a bona fide application for an External Fellowship regardless of whether the application is successful or otherwise. Additionally, \$250 will be given for a second application, with a capped amount of \$750 in research account funds, per student.

The Director of Graduate Studies will provide information on what constitutes a *bona fide application*. An *external fellowship* is considered to be those awarded to graduate students via competitive external funding agencies based on the student's initiative and application. Competitive internal fellowship awards and external fellowship grants based on faculty applications do not qualify for incentive funding under this policy.

It is worth noting that the Graduate School operates an [Incentive Program for Doctoral Students](#) created to reward students who secure funding from sources outside the University (see Appendix of the Graduate School Handbook for more details) which will continue to apply in addition to the Division's incentive scheme.

Information on fellowships can be found on the Graduate School website<sup>9</sup> along with a series of videos which provide guidance on how to compete for and win external awards.

### 9.3 Travel Support

Presenting papers at professional conferences is important to graduate students' academic careers and growth as professionals, and is relevant experience for careers both inside and outside of academia. The knowledge gained from attending a conference, when shared with

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<sup>9</sup> <https://graduateschool.brown.edu/financing-support/phd-funding/external-funding>

peers at Brown, contributes to the scholarly development of the entire campus. If you wish to participate in a conference or travel to collaborate with others, please consult with your Academic or Thesis Advisor for funding opportunities.

The Graduate School provides several funding opportunities for both Graduate and PhD Students during Year 1-5:

- [Conference Travel Fund](#)
- [International Travel Fund](#)
- [Doctoral Research Travel Grant](#)
- [Joukowsky Summer Research Travel Award](#)

Students who are studying abroad or who will be abroad for an extended period of time as part of their studies are strongly encouraged to register the trip with the [Brown University Global Assistance Program](#). This program provides 24-hour worldwide medical, security, and travel assistance, including emergency evacuation. Please visit the website for more information and the access code to Brown's International SOS portal<sup>10</sup>.

## 10 Research Assistant Appointments

Funding for research assistants comes to the department from a variety of sources. Most research assistant appointments are grant funded, but some may be supported by individual faculty funds.

### 10.1 Effort Certification

Per the [Brown Effort Reporting policy](#), graduate student salary that is directly charged to federally-funded sponsored projects must be certified. All student effort is certified by the faculty member who serves as Principal Investigator on the assigned project(s) where the student's effort is allocated. Advisors should inform students about the source of the students' funding and any associated expectations.

### 10.2 Responsible Conduct of Research (RCR) Training

Projects funded by the National Institutes of Health (NIH), National Science Foundation (NSF), and National Institute of Food and Agriculture (NIFA) have specific requirements regarding training in RCR. Students funded by grants from the NIH, NSF, or NIFA must complete RCR training per the requirements of the particular agency. For more information, about these requirements, see [resources provided by Research at Brown](#).

Brown offers several opportunities for [RCR training](#). ICERM also offers two ethics training sessions that count as replacement for the Brown [BEARCORE](#) program.

### 10.3 Training grants

Students supported by training grants receive Traineeship appointments instead of Research Assistant appointments. They may have requirements for RCR training, but effort certification is not required. Students can talk to the Grants and Contracts Specialist about the details of their

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<sup>10</sup> <https://www.brown.edu/about/administration/insurance/international-travel-information>

funding and requirements.

## 11 Professional Conduct

Graduate students are expected to be aware of, and to conduct themselves in accordance with the principles of the Brown community as set forth in the [Code of Student Conduct](#) and the [Academic Code](#).

Students are also responsible for rules and regulations set forth in the University-wide version of the Academic and Student Conduct Codes, found on the above website. For issues of student conduct, the University-wide Code takes precedence. Ignorance of the Code is not accepted as a defense for violation of any of the rules and regulations specified in the Code. Procedures for identifying and treating violations of the Code are described in the above mentioned documents.

### 11.1 Diversity and Inclusion

The Division strives to foster a diverse and inclusive [community](#) and to increase the number of students from historically underrepresented groups. The Applied Math Diversity, Equity, and Inclusion Committee meets regularly to develop plans and initiatives for improving climate, building community, and increasing diversity and inclusion in the Division. You can view our 2024 departmental diversity and inclusion action plan [here](#), as part of the [University Diversity and Inclusion Action Plan](#) (DIAP).

The [Brown Graduate School](#) and [Brown Office of Institutional Equity and Diversity](#) (OIED) also provide many initiatives and programs to support diversity and inclusion on campus.

### 11.2 Grievance Procedure

Students should usually bring concerns or grievances directly to the attention of their Academic or Thesis Advisor, or the instructor of the course if the issue is coursework related. If the outcome of this informal process is unsatisfactory, or if a student does not want to approach the advisor or instructor directly, they may bring the matter to the Director of Graduate Studies or the Department Chair who will work with the student and faculty member toward a resolution. Beyond this, the University provides formal [grievance procedures](#), details of which can be found in the [Graduate School Student Handbook](#).

### 11.3 Sexual Harassment

Graduate students in their roles as students, research assistants, teaching assistants, and teaching fellows are expected to refrain from behaviour that constitute sexual harassment as specified by [Brown University's Title IX Policy Statement](#). This policy can be found on the Graduate School website. Graduate teaching assistants and fellows are especially advised against having an amorous relationship with a student who is enrolled in a course taught or staffed by the graduate student. Additional information on what constitutes sexual harassment and what a student should do if they feel they are the victim of sexual harassment by another student or a faculty member can be found at the website of [Campus Life](#), the [Brown Human Resources Department](#), and at the [Brown Health Services](#) website.

## 12 Graduate Labor Organization (GLO)

[Graduate Labor Organization](#) (GLO), a local of the American Federation of Teachers (AFT), is the union of graduate student employees at Brown University. Every graduate student at Brown can join GLO (including international students). While appointed as TAs, RAs or Proctors, graduate student employees are part of the Collective Bargaining Unit, and the terms of the Collective Bargaining Agreement (also called [the Contract](#)) apply.

Every department on campus may have a GLO steward. A GLO steward is a graduate student employee in a department who volunteers as a resource for contract questions and a general support for all other graduate student employees in the department. You can reach out to GLO to connect with your steward, or to find out more about becoming a steward.

## 13 Career Preparation

### 13.1 Personal Webpage

If you are interested in setting up a personal website, please contact MariamHan, who can provide advice and suggestions. Once a website is set up, it can be linked to your name on our Division's website.

### 13.2 Curriculum Vita Submission

The Graduate School requests that you maintain a [Graduate School Digital CV](#) (GSDCV) to record your research and academic achievements. The GSDCV has areas for noting conferences and presentation participation, fellowships and awards (both those applied for and those won), teaching, publications (submissions and those that have been accepted), any professional development participation, and service. Activities before matriculating to Brown do not need to be added. The GSDCV can be updated at any time, and you will be asked to certify that your GSDCV is up-to-date each academic year.

### 13.3 ICERM Professional Development Sessions

[ICERM](#) holds informal roundtable discussions six times per semester and cover issues ranging from job applications, the hiring process, paper writing, grant proposal writing to ethical conduct, and misconduct, in research. More information can be found at <http://icerm.brown.edu/pds>. We strongly recommend that fourth-year graduate students attend some or all of these sessions to start preparing for life after the PhD. Participation in the two ethics sessions count as [Responsible Conduct of Research](#) training.

### 13.4 Brown Executive Scholars Training Program

The Graduate School offers the [Executive Scholars Training \(BEST\) Program](#) which is designed to expose doctoral and Master's students to careers in higher-education administration.

### 13.5 Sheridan Center

The [Sheridan Center for Teaching and Learning](#) provides many professional development workshops on teaching and other topics. It also provides various certificate programs for teaching assistants.

### 13.6 Teaching Fellowships

Students who are interested in further pedagogical training and independent teaching experiences can participate in opportunities for teaching or co-teaching courses:

- Brown Graduate School [Dean's Faculty Fellows Program](#)
- [Brown/Wheaton Faculty Fellows Program](#) - open to all doctoral students.
- [Brown/Tougaloo Graduate Teaching Exchange Program](#) - open to all doctoral students.

Participation in any of these programs is strongly encouraged. In particular, students in Applied Mathematics have in recent years been highly successful in obtaining Deans' Faculty Fellowships.

### 13.6 Center for Career Exploration

The [Center for Career Exploration](#) provides individual confidential counseling sessions on job searches in industry (including feedback on resumes and CVs). Its website also provides a Doctoral Student Packet with useful and comprehensive information about all aspects of graduate-student life.

## 14 Office Space

Every full-time PhD student is assigned a desk in a shared office for graduate students. If a student wishes to change their office location, please speak with the Administrative Coordinator in the main office. However, bear in mind that priority is based on seniority.

## 15 Additional Resources

### 15.1 The Graduate School Handbook

The [Graduate School Handbook](#) can be found on the Graduate School webpages which contains a wealth of information and additional resources beyond what is contained here.

### 15.2 Graduate School Resources

The [Graduate School Deans and Staff](#) provide numerous [resources](#) and [contacts](#) to students.

The [Associate Dean of Student Support](#), Maria Suarez, is dedicated to consulting with PhD students about medical and personal leave, parental relief, accessibility or disability accommodations, emergency financial assistance, complaints about another student, or other personal situations that interfere with academic progress ([Maria\\_Suarez@brown.edu](mailto:Maria_Suarez@brown.edu), 401-863-1802).

The [Senior Associate Dean for Academic Affairs](#), Sarah Delaney, is the primary contact for academic concerns. She is available to review degree requirements or to discuss other issues with your academic program ([Sarah\\_Delaney@brown.edu](mailto:Sarah_Delaney@brown.edu)).

The [Associate Dean of Diversity and Inclusion](#), Alycia Mosley Austin, serves as a liaison to programs to support positive student experience and retention ([Alycia\\_Mosley\\_Austin@brown.edu](mailto:Alycia_Mosley_Austin@brown.edu)).

### 15.3 Student Accessibility Services (SAS)

The office of [Student Accessibility Services](#) (SAS) coordinates and facilitates services for students with physical, psychological, and learning disabilities, and temporary injuries (69 Brown Street, Suite 512, Page-Robinson Hall, 401-863-9588.)

### 15.4 Counseling and Psychological Services (CAPS)

[Counseling and Psychological Services](#) (CAPS) provides free confidential counseling (Health & Wellness Building, 450 Brook St, 401-863-3476). CAPS offers Saturday appointments for graduate students from 9 am to 4 pm during the academic year at Health Services, 13 Brown Street.

### 15.5 Recording a Name Change

Students who need to record a lived or chosen name change can find instructions at the [Brown Office of Information Technology](#) or the [LGBTQ Center](#). [Student Support Services](#) can also provide support and guidance.

### 15.6 Student Groups

Students groups include the following:

- The [Rose Whelan Society](#) provides informal support for women and gender minorities who are graduate students, postdoctorates, and faculty in the applied mathematics and mathematics departments at Brown.
- Brown student chapter of the [Association for Women in Mathematics](#)
- Brown [SIAM Chapter](#)

### 15.7 Useful Links

The following links might be useful:

- Graduate School Webpages: <https://graduateschool.brown.edu/>
- Brown A-Z: <http://brown.edu/a-to-z/>
- Courses at Brown (CAB) (course registration): <https://cab.brown.edu/>
- Calendar: <https://www.brown.edu/about/administration/registrar/academic-calendar>
- For international students (OISSS): <https://oiss.brown.edu>
- Course webpages: <https://coursetools.brown.edu>