

# Department of Mathematics Graduate Student Handbook

2015/2016

# Welcome!

This handbook serves as a guide through the mathematics graduate program of Indiana University, Bloomington. This is a big campus, and as such there are a lot of rules everybody must follow, with few exceptions that are rarely granted.

The typical student will not need to know all the rules. The following pages give you the essentials and provide links to the more detailed rules, if needed.

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# Essentials

## Arrival

Please plan to arrive in Bloomington 4 weeks before classes start, see the official [IU calendar](#) for the exact dates. Make your way to the [Math Department](#) (Rawles Hall), and find the Graduate Secretary in RH 129. You will get an appointment with the DGS and be guided through the [First Steps](#). In particular, you will be assigned an interim advisor.

International Students have a mandatory [Orientation](#).

In the third and second week before classes, we offer a Jumpstart Program, which includes refresher mini-courses in Algebra and Analysis and the opportunity to meet faculty during lunch breaks.

In the week before classes, we conduct the [Tier I exams](#).

## First Steps

This section contains essentials you will need to know when you arrive.

### Student Identification (ID) Cards

Student identification cards (IDs) are necessary to use university recreational facilities, to check out library books, and to do photocopying in the university libraries.

To obtain a student ID card see [Card Services](#). You will not be able to get your Student ID card until either you register for classes or until the week before classes begin.

### Offices

You will be assigned an office. You will share this office with other graduate students. Your office is to be used for activities related to studying, research, and AI duties. Office assignments are reviewed and all changes are made during the summer, based on seniority, the dates that students passed various Tier exams, and coursework progress.

Every office has a telephone and local calls can be made at no cost.

### Keys

The Graduate Secretary in RH 129 will provide you with a key to your office, a key to your mailbox in Rawles Hall, and a key to the graduate student lounge in Swain East 020.

You will need to pay a one-time deposit of \$5.00 for your keys. The replacement cost for lost keys is \$10.00.

You and your office mates should keep your office locked when it is not in use. Rawles Hall and Swain East are unlocked from approximately 6:00AM-10:00PM every day. (This schedule may change during vacations and holidays.)

## **Computer Accounts**

To get a computer account, please read [this Knowledge Base article](#). During the process of setting up your first computer account you will receive a *network id*, and you will choose a *network passphrase*. The *network id* is the username that you will use for all of your IU computer accounts and the *network passphrase* is the password for all of these accounts.

After you set up your first account, please give your *network id* to the Mathematics Graduate Secretary. Do not give your *network passphrase* to anyone!

Each graduate student office comes equipped with a computer. You may also use the [Student Technology Centers](#) found throughout campus.

You may print out documents on the printers in the Student Technology Centers. For example, a printer is located in the Student Technology Center on the bottom floor of Swain East.

Mr. Jeff Taylor provides support for the department's computers. He can provide help with hardware, software, and printer problems. To contact him, please send an e-mail message to [jeffhelp@indiana.edu](mailto:jeffhelp@indiana.edu).

## **Mail Boxes**

You will be assigned a mailbox in Rawles Hall by the end of August. You will likely share your mailbox with another graduate student. Your mailbox is located **under** your name. It can be accessed through the mailroom or from the outside with your mailbox key. The mailroom is open weekdays 8:00AM-4:30PM (until 4:00PM in the summer).

U.S. mail is delivered to the department around mid-morning every weekday. Campus mail is delivered every morning and late afternoon.

If students need to deliver homework to your mailbox, you can let them know your mailbox number. Remind them to add your name to everything they drop off. There is also a sheet with names and mailbox numbers outside the mail room.

## **Parking**

Parking permits are available from [Parking Operations](#) in the Henderson Parking Garage (310 S. Fess Ave.), Monday-Friday, 8:00AM-5:00PM (855-9849). You will need to take a copy of your contract to obtain your parking permit.

Either an A or C permit is available, depending on your type of IU funding. Students who are not financially supported by the University are not eligible for a parking permit.

## **Photocopying in Rawles Hall**

Graduate students may use the copier in the mailroom in Rawles Hall. The purpose of

this copier is to be able to make few copies quickly. Each time you use the copier, please make no more than 10 copies of each page of the document to be copied, and no more than 100 copies in total.

To make copies, you will need a code which is located on the clipboard in the mailroom or in the main math office. Follow the directions on the sheet to operate the copy machine. Each copy made with the department's photocopiers should be related to a graduate student's work as an an assistant (AI or GA) or to the student's research.

Please submit large jobs (eg for exams) to the Duplicating and Mail Manager by completing a *request form* at least 24 hours before you need it completed.

The *request forms* can be found in the mailroom on the wall opposite the mailboxes. After filling out a request form, attach it to the document that you want photocopied and place it in the box. You can also send [email](#).

### **Photocopying at Other Campus Locations**

Making photocopies at the Swain West Library and at other campus locations requires an ID card and a Campus Access account.

### **Supplies**

Office supplies are kept in a cabinet in the main office (RH 115). Please ask the Receptionist for help in finding supplies.

### **Student Web Pages**

Each graduate student is listed on the [Department Web site](#). You are responsible for keeping the information on the Web page up to date. Please log in using your IU username and passphrase to make any necessary changes.

You can also create your [own personal home page](#) at IU and link to it from the departmental web page.

## **Registering for Classes**

### **Course offerings**

The course offerings for the current semester can be found at the [Registrar's office](#).

### **Minimal Number of Classes**

To maintain your status as a graduate student, you need to register for at least one credit hour per semester.

To be allowed to work as an Associate Instructor, you need to register for at least 6 credit hours.

International students have sometimes different requirements, consult with [International Services](#).

## Fee Remission

As an associate instructor, the College will pay the fee remissions for up to 12 credit hours per semester, and 6 credit hour for the summer sessions. This usually covers courses offered by departments that are in the College, and courses that are required for your degree.

Fee remission covers 96.5% of the cost of tuition for all out-of-state students. In-state students have at least 91% of the cost of tuition covered.

## Outside Courses

The most commonly requested "outside" courses are those from the School of Informatics, but there are other schools that might be of interest.

There are three ways to obtain approval, and they all go through the DGS to the College.

1. First, you can take two courses to satisfy the breadth requirements, using the outside topic. For this to work, the courses need to have some significant mathematical content.

2. Secondly, you can declare an outside minor for your PhD. This will then allow you to complete the coursework required for this minor. Consult with the relevant school. We had non-College outside minors in the Business School, the School of Informatics, and in the Music School. Of course, outside minors in departments within the College are also possible (Physics, Statistics, etc).

3. If your advisor states that taking a specific course is essential for completing your degree, this course will typically be also approved. For this, an email from the advisor to the DGS is needed.

## Dropping and Adding Classes

For official deadlines on registering or dropping classes, please review the [Registrar's Web page](#).

Dropping and adding classes is free until Thursday of the first week of classes in an academic year semester.

After that, a portion of your fee remission for a dropped class will be lost. This portion increases over time.

*Scenario 1:* You register for 12 credit hours, but drop a class after the second week of classes. If you then add another class, you will be charged part of the fee remission.

You would have been fine if you had done the drop/add before Thursday of the first week of classes.

*Scenario 2:* You register for 9 credit hours, drop a class after 5 weeks of classes, and add another class. You are fine, because the College covers up to 12 credit hours.

Graduate students who wish to drop one class and add another during the second week of classes can avoid an additional tuition assessment by submitting the `drop' and the `add' as a "pair". Just dropping as class will cause no problems with fee remissions as long as you keep at least 6 credit hours.

### **Bursar Bill**

You should visit the following web pages for billing and fee information:

- [Billing and payment](#)
- [List of all fees](#)

Bills are generally due on the 10th of each month.

## **If You Need Help ...**

If you are unsure about something, please ask. The first points of contact are usually your advisor, the DGS, or the Graduate Secretary.

### **Academic Rules**

The academic life of a graduate student is explained in the [Graduate Bulletin](#). It is updated every year, and you can chose to use the current version or the one that was valid when you started your studies. We also have information specific for our program on our [Graduate Program](#) web pages.

### **Appointments**

The [Handbook for Student Academic Employees](#) tells all obligations and benefits.

### **College Rules**

The College of Arts and Sciences has its own set of additional policies, many of them concerned with academic employment. You can find information on their [Graduate Students](#) pages.

### **Health Issues**

You can find medical assistance at the [IU Health Center](#). For counseling, a first point of contact is [CAPS](#).

Insurance issues are discussed [here](#).

### **Academic Progress**

Your interim advisor, advisor, or DGS will try to answer all questions.

## **Building Problems**

If you encounter any problems with our buildings (Rawles Hall, Swain East, Atwater) please inform the Receptionist by either visiting Rawles Hall Room 115 or by calling 855-3171.

# Employment

## Graduate Assistantships and Associate Instructorships

### Graduate Assistants versus Associate Instructors

A Graduate Assistant (GA) is a non-native speaker of English or non-US citizen who has not yet passed the Test of English Proficiency for Associate Instructor Candidates (TEPAIC). If a Graduate Assistant passes the TEPAIC exam, then the student will be promoted to the rank of Associate Instructor in the following semester provided they are a student in good standing.

### The possible roles of a Graduate Assistant (GA)

A Graduate Assistant is usually assigned to grade papers. A Graduate Assistant may not tutor or instruct undergraduates.

### The possible roles of an Associate Instructor (AI)

An Associate Instructor will be assigned to either grade, assist, tutor, conduct a recitation, or teach their own class.

### Workload

Each Graduate Assistant and Associate Instructor is expected to work an average of about 16 hours per week. Graduate Assistants and Associate Instructors will occasionally have assignments split across different courses and different instructors. We try to keep all assignments reasonably balanced.

### Expectations

We expect you to carry out all of your AI duties diligently and in a timely manner. Our undergraduate program depends on you. If you need a substitute (for instance because of a conference you'd like to attend), please discuss this with your supervisor and find a substitute well in advance. If you experience any difficulties with your assignment, please contact your supervisor or the director of graduate studies immediately.

## Assignments

### Preference Forms

Students may express preferences for assignments before the assignments are made. Each semester the student will receive a preference form for the following semester.

This form will also allow you to list times when you are not available. Please do so diligently and by the given deadline. Later changes can not always be accommodated.

## **Supervisors**

Prior to the beginning of each semester, the Graduate Office will inform you of your assigned role via e-mail. By IU policy, each student is responsible for checking their IU e-mail to determine their assignment. If you are grading, assisting, or conducting recitations, you are assigned to one or more instructors. Please contact these instructor immediately, introduce yourself, and ask about your duties. You may be asked to arrange office hours or to be available for proctoring exams at specific dates and times.

If an Associate Instructor is assigned to teach their own class, then they should contact the coordinator of that class.

In any case, a good communication between supervisors and AIs/GAs is essential. Let your supervisor know how he or she can best reach you.

## **Grading**

When grading for a class, ask the instructor about

- a grading rubric that outlines what emphasis you should give to various aspects of the homework;
- how homework and exam scores should be entered in a grade book;
- turnaround times and deadlines.

## **Assisting**

Assisting requires a variety of duties: You will tutor in the departmental help sessions, hold office hours, prepare and proctor exams, grade exams and enter grades, record clicker scores, or answer student emails. The required duties vary with the supervisor. Please contact your supervisor(s) to discuss the precise duties for each class.

## **Recitations**

We have recitations for the 200/300 level Calculus classes. They meet once a week. You will typically work two such recitations as an assignment, discussing class topics, working examples, and proctoring and grading quizzes.

## **Teaching Classes**

If you are interested in teaching a class, you need to take M595 (1 credit hour) either before or during the first semester you would like to teach.

Textbook desk copies for courses that you are teaching can be obtained from the Receptionist in RH 115. You must return these books to the Receptionist at the end of each semester.

# Mile Stones

## The Qualifying Examinations

The three Tier exams are the mile stones that measure your progress in our PhD program. The precise rules are spelled out in the graduate bulletin or on our [web page](#). The following are additional guidelines.

### Guide to Tier I

The Tier I exams are administered twice a year in the week before the semester starts. They are four hour exams in Algebra and Analysis. The difficulty of the problems is at the level of the more challenging problems in a rigorous, proof based Analysis or Algebra course.

There are several ways to prepare for these exams. For each area, you should be familiar with the material, either from course work or from text books. Or, even better, do it like Gauss, who, when he first saw Euler's works at the University, lamented that he had discovered all this himself and there was nothing new for him.

You should also work as many problems as you can. If you know how to do a problem, skip it. Spend at least 15 minutes on a problem you don't know how to solve right away. Then look at the solution, but only line by line, and try to complete it yourself. When you have a complete solution, write it down in as much detail as you feel necessary. Come back to the problem a week later.

The exam solutions will not only be graded for the potential merit of an idea, but also for completeness and clarity of the solution.

The exams will be graded anonymously by the multiple faculty members who form the Tier I committee, and conflicting scores will be resolved in discussions among the Tier I committee. When all exams are graded, you will be notified about your scores, and whether you have passed or failed.

Each incoming PhD student has to pass both exams in the first two years of their study. This is regardless of whether these are new students or whether they transfer from another program. Thus, there are at most four possible attempts for each exam. Our experience shows that it is beneficial to pass these exams as early as possible. We have also found that students who do well on these exams, generally do very well later in the program (and vice versa).

### Guide to Tier II

After you have passed both Tier I exams, the graduate support committee will conduct the Tier II review of your progress so far. In order to make a careful and meaningful review consistent with the original plan and requirements of our Tier system we request

that you submit to us a one or two page typed statement assessing your studies so far and describing your plans for the next stage in your studies.

The committee will review

- your grades,
- your Tier I exam scores,
- evaluations of your AI duties,
- comments from select faculty, and
- your personal statement, described below.

Based on this information, the committee will determine whether you have made satisfactory progress towards the requirements of the program. In some cases, they will make recommendations about how to accelerate the student's progress. If progress is not deemed satisfactory, then the committee may recommend that you be placed in a probationary status with perhaps reduced or no AI support.

To prepare for your statement, you should review the PhD requirements in the Graduate Bulletin (see [our web page](#)). Then you should address the following questions:

- To what extent have you covered the breadth requirements, and how do you plan on completing them?
- What area or areas do you think you might want to do research in?
- What professor or professors would you like to work with, or to learn more about their work?
- What subjects do you feel are your strengths, your weaknesses?
- How do you assess your chances of completing a Ph.D.?

Take this exercise as an opportunity to reflect on the next direction your studies will take, but also as a warm-up exercise for similar statements you will have to make in your future career as you apply for grants, write research and teaching statements for jobs, etc.

You should also ask your advisor or a faculty member who knows you to write a few paragraphs on your behalf. Feel free to talk to the DGS if you have any questions.

### **Guide to Tier III**

As part of your Tier II exam, you were expected to find an advisor who will guide you towards the Tier III exam. This process typically involves taking reading courses in which you are led towards research level material.

When you and your advisor think you are ready, you need to write a Tier III syllabus, that lists material for a major and a minor topic. The two topics need to be sufficiently far apart. For instance, using Partial Differential Equations for the major topic and Ordinary Differential Equations for the minor topic will most likely not be allowed. The syllabus for the major topic will cover at least two semesters of introductory level classes in that area, and at least one research level article or book. The precise level and amount of material are up to your advisor, so please discuss this with him or her early. For the minor topic, a one semester introductory course is usually sufficient. The syllabus should also contain a list of three faculty members who have agreed to be on your Tier III committee. Two of them will represent the major area, one the minor area. You submit the syllabus to the DGS for approval about four weeks before you plan to take the exam.

The exam is oral and will last 90 minutes or more. You should talk to your advisor about possible preparation. For intense, you might be asked to prepare a brief presentation (about 15 minutes) about a research paper. Any such presentation must be held without using slides.

In rare cases students fail the Tier III exam. This typically happens under the following circumstances:

- The candidate has significant gaps in the foundational material of major area and fails to answer basic questions;
- the candidate has started working with the advisor rather late and might not be aware of the expectations.

## Final Steps

After your qualifying exams, you will usually work on finishing all remaining requirements, conducting research, writing your thesis and prepare defending your thesis. During this time, there are certain useful and essential steps to take, which we will describe below. The graduate school maintains a [detailed timeline](#) with ever-changing lines and instructions.

### Registering for G901

When you have fulfilled all requirements *except* for writing the thesis, you can register for G901 instead of for regular classes, which will save you fees. You can also devote all your time to working on your thesis.

### Nomination to Candidacy

You can submit this form after you passed the Tier III exam, have completed the coursework and have passed the language exam. This has to happen before the next step:

### Nomination of Research Committee

This form must be approved by the Dean of the Graduate School at least **6 months** before you defend your thesis. We recommend that you submit this form as soon as your Nomination to Candidacy has been approved. These forms do not expire, and the committee and other information can be changed.

The PhD research committee is responsible to read and comment on your thesis. One member of the committee is supposed to represent the minor area. This can be waived in case of an inside minor.

### Defense Announcement

There is a 30 day waiting period between defense announcement and the date of the

defense. You should submit the form electronically at least 45 days in advance in case there are delays with the approval.

### **Submitting your thesis**

Note that there are [very precise guidelines](#) about formatting your thesis.

### **Leaving the Program**

Your AI employment will end the semester you officially graduate.

Please inform the Graduate Office as soon as possible if you decide to leave the program. Before you leave, please be sure that all books and keys have been returned to the Department, and be sure that all grade information is given to the Receptionist at the front desk of RH115.

### **Applying for Jobs**

In your final year, you will want to apply to the job market. Talk to your advisor about the outlook. Postdocs are sometimes advertised more or less privately. In any case, you will need to put together a file with personal statement, teaching statement, CV. Ask several faculty to write you letters of recommendation at least a month before your first application is due. Make sure you also receive a teaching letter. Give a seminar talk to show off your results. Go to conferences and talk to people. Create a home page.

# Administration

The following personnel are directly relevant to the graduate program. These positions are temporary like everything else. Please see the [departmental web pages](#) for the current situation.

## The Director of Graduate Studies (DGS)

The DGS is the Mathematics faculty member who oversees the graduate program.

The DGS is responsible for determining whether students have met the requirements of their academic program, sometimes in consultation with the Graduate Advisory Committee.

Together with the Graduate Advisory Committee, the DGS is responsible for graduate program policy.

The DGS is the supervisor of each Associate Instructor (AI) and Graduate Assistant (GA) employed by the Mathematics Department.

## The Graduate Secretary

The Graduate Secretary

- manages the graduate office,
- facilitates communication between graduate students and the Director of Graduate Studies,
- reviews all graduate student records and
- assists their understanding of coursework requirements for completion of their degree,
- oversees
  - graduate student records,
  - GA and AI payroll,
  - graduate student offices and contact information,
  - admissions information,
  - statistical data, and
- organizes the annual graduate student reception and departmental awards ceremony.

## The Graduate Advisory Committee

The Graduate Advisory Committee is a committee of Mathematics Faculty members that assists the DGS in evaluating applications to the program, in evaluating student progress, and in developing graduate program policy.

## Department Chair

The Department chair is the Mathematics faculty member who is responsible for the operation of the entire Mathematics Department.