

# Thinking about Math Grad School

Association for Women in Mathematics

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# What is Math Grad School?

## Masters:

- 1-2 years
  - Coursework plus examination, or research plus thesis
- Typically the same tuition as undergraduate programs  
UCD: \$13,590
- Funding opportunities through TA-ships or research stipends

## Ph. D.:

- ~5 years:
  - 2-3 years of coursework, followed by 2-3 years of independent research
- Typically **FREE TUITION**, plus guaranteed TA-ship stipend, ~\$20,000/year
- Other funding opportunities through research stipends

## Coursework?

At UC Davis, first year is **core coursework** followed by **Prelims**

- Applied Math: Analysis (metric spaces, topology, measure theory, Fourier analysis, functional analysis), Methods in applied math (Nonlinear dynamics, PDE theory, and asymptotics)
- Pure Math: Analysis, Algebra, Complex Analysis

Second/third year is more math classes of interest and specialization courses

- Applied has roughly 10 additional course requirements - 2 numerics, 4 other math classes, 4 specialization courses (can be out of dept.)
- Pure has roughly 6 additional course requirements in dept.

Other programs are similar, but research before applying!

## Research?

After coursework, it's all about research!

- Find an advisor (or two) who shares common research interests
  - In applied math, can typically work with professors outside dept. on interdisciplinary problems!
- Take Qualifying Exam - Research Proposal and Oral Examination
- produce 2-3 research papers
- shape research papers into a Ph.D. thesis

Finding an **advisor** to work with and an **interesting problem** to work on can be the hardest part!

## Preparing to apply

- Get good grades
- Take challenging math courses
- Get good scores on the **GRE** and **Math subject GRE**
- Some out-of-classroom experience, e.g. internships or research experience

UC Davis has quarterly and Summer research programs with professors in the math department. Outside of Davis, there are many other Summer REU Programs.

Also can attend conferences as an undergraduate! Great opportunities to network and meet potential mentors or advisors.

# GREs

## General GRE:

- 3 parts
  - Analytic (writing essays)
  - Verbal (reading comprehension and vocabulary)
  - Quantitative (tricky math problems, < calculus level)
- Offered year-round, can take once a month up to 5 times a year
- \$205 fee per test, \$27 to report score to a school/program

## Math GRE:

- Covers tons of topics, probably more than you've covered as a senior
- **Only offered 3 times a year** - once in Spring (April), twice in Fall (Oct, Nov)
- \$150 fee per test, \$27 to report score

## Math GRE Topics

- 50% Calculus (21A-D, 22B).
- 25% Algebra: Abstract algebra (150A-C) and number theory (115AB), linear algebra (22A or 67, 167), and high school algebra.
- 25% Additional Topics:
  - Real analysis (25, 125AB)
  - Discrete mathematics (148), logic, set theory, combinatorics (145, 146), graph theory, and algorithms
  - Other topics: general topology (147), geometry (141, 116), complex variables (185A), probability and statistics (135A), and numerical analysis (128ABC)

My tip: Focus on calculus - knocking out the calculus problems quickly will up your score more than trying to learn all the various topics which may or may not come up on the exam.

## Research Experience and Conferences

This isn't necessary to get in to grad school, but is necessary to give you an idea of if/what you want to research for 5 years

- Can give you an idea of what working on a math research problem is like
- Can introduce you to new topics/problems you never heard of in your coursework
- Working with a professor can give you an idea of what you want/need out of a research advisor
- Also looks good on your application!

Check AWM emails for Conference announcements! Can go even if you aren't presenting.



## Personal Statements

- Talk about how your research experiences, or experiences working on projects in classes, helped you develop skills that are relevant to doing research
- Show that you are curious and enthusiastic about whatever area you're going into (or think you're going into; they won't hold you to whatever you write)
- Be specific!!
- Show drafts to professors and make sure to get feedback. They know what admissions committees will look for.

# Application Schedule

## Year before:

- Think about applying to graduate school (vs. getting a job)
- Try to set up a summer REU or internship
  - Pay attention to math club/dept/AWM emails
  - Ask a professor who does cool research if they would be willing to mentor you
- Impress professors for letters of rec
  - Can ask right after a class finishes, before they forget you
  - Be respectful, make sure to explain why you picked them to write letters, ask early!
  - Find professors who are well-connected in desired field

# Application Schedule

## Summer:

- REU project or internship
- Study for GREs
  - Lots of free prep material online
  - Take lots of free practice tests
- Decide where to apply
  - Learn about graduate school programs (websites), differences between applied and pure programs
  - Research potential research advisors (websites, papers)
  - Talk to faculty and graduate student mentors about where to apply / what problems to work on / who to work with
  - Consider interdisciplinary programs: e.g., mathematical engineering, math finance, math biology

## Application Schedule

- **Aug:** Sign up for general and math GRE, take general GRE.
- **Sept:** Identify and apply for fellowships and scholarships: NSF Graduate Research Scholarship deadline is **October 26, 2018**
- **Oct/Nov:** Take math GRE, draft essays and get feedback, prepare packets for letter writers:
  - Where you are applying, deadlines for those places (MAKE IT EASY ON THEM)
  - What you want writers to mention in letters: e.g., how they know you, what skills/personal qualities can they attest to, what projects they've seen you do
- **Nov-Jan:** Fill out applications (\$50-100 each) and send scores (EARLY)

## Once you get in

Visit schools (or email current grad students) to find out:

- How much attention do grad students get from faculty?
- How much teaching do grad students do?
- What kind of jobs are students getting after they finish their degrees?
- How miserable are the grad students?

Consider summer prep/boot camp programs, e.g., at the grad school you'll attend. National programs include: EDGE for Women, IMMERSE, Park City Math Institute

## Calendar Recap

### **August:**

- Start writing your statement of purpose
- Narrow down your list of universities
- Find 34 profs who will write excellent letters of recommendation
- Review for the GREs
- Look for scholarships
- E-mail potential research advisors?

**Sept-Nov:** Take the GREs: general and math

**October 26, 2018:** NSF Graduate Research Scholarship deadline

**Nov-Jan:** Submit applications (check university and department sites for deadlines)

## Now for Q&A Panel

This presentation was adapted from  
<http://www.sjsu.edu/math/docs/grad-school-workshop.pdf>.

Check out <http://www.phdcomics.com/>

**Piled Higher and Deeper by Jorge Cham**

[www.phdcomics.com](http://www.phdcomics.com)



title: "Why are we doing this?" - originally published 10/29/1997