

Graduate School Information Session for BSM

March 22, 2018

Why go to grad school?

- Math is fun, challenging, stimulating, and leads to careers
- Need a PhD to be a professor/researcher at a college or university (best job in the world!)
- Largest employer of PhD mathematicians is US government (NSA, Military branches, US Geological Survey, and more)
- Private defense contractors (Lockheed, General Dynamics, etc.)
- Tech companies (biggies like Google, and smaller startups)
- All of above hire pure mathematicians, applied mathematicians, statisticians, computer scientists, data scientists

What is grad school like?

- Lots of work and camaraderie (much like BSM?)
- Courses for about 3 years for PhD, then thesis work for 2-3 years. (min=5 years for Americans)
- Most programs have: Preliminary exams (1st or 2nd year), qualifying exams (3rd or 4th years), thesis defense
- (Sometimes there are language exams)

How do you pay for grad school?

- You don't!
- Only go if you get paid to be a TA/RA and if you get tuition remission
- TA jobs vary depending on institution, but they're never taxing
 - Sometimes lead a recitation section (e.g. for calculus)
 - Sometimes teach a section (of calculus) under guidance of a lead instructor
 - Sometimes have full responsibility for your own course
 - Sometimes grade for high level courses
- Sometimes get an RA or fellowship (from school or NSF)

Masters or doctorate degree?

- PhD-granting schools will also give you a MS (after about 2 years)
 - At these schools, you **must** apply to the PhD program even if you're ambivalent.
 - They won't take you seriously if you don't enter the PhD program
 - You risk not getting a TA job and not getting tuition remission
- Some schools only grant masters degrees
 - These are best for applied math, statistics, and mathematics education
 - Some under-prepared students will enter these programs to get more math experience, then move to a PhD program (not BSM students)

Where do you apply?

- Don't just blindly look at the top 20 schools. Really, the top 50 are awesome and the top 75 will lead to good careers.
- You'll live somewhere for 5-7 years, so think about
 - area of country
 - urban/rural
 - big/small
- If you know what area of math you're interested in, do some research
- Ask your professors, but remember that they have their biases
- Find out where other students from your institution went
- Go to JMM in January, where there is a grad school fair.

Visiting schools

Visiting ahead of time is unusual (can visit with reps at JMM), but visiting after acceptance is normal and often subsidized

- Pay attention to happiness of students
- Related to happiness is sense of competition vs. camaraderie
- How many students are professors supervising?
- Ask what the TA jobs are like and how many hours of work are expected
- Ask about the average time to PhD
- Ask about where students go after graduation: not just the kind of jobs, but where they are

What are the applications like?

- General GRE
- GRE math subject test
 - lots of DE, multivariable calculus, linear algebra, and probably probability/statistics
 - A little bit of algebra, topology, analysis, combinatorics
- transcript and resume/cv
- statement of purpose
- letters of support (3?)
- application fee!

What makes a good application?

- **Good GRE scores on the subject exam** (the general exam should be no problem). What is “good?”
- Take as many of the highest-level courses as possible when you return
- Take the Putnam and brag about your score (if possible)
- Ask soon if your BSM professors can write letters
- Ask REU professors for letters specifically describing your role in the research project
- Get someone who knows you well to write at least one of the letters; such a person can put your record in the context of your particular institution (e.g. “best in 20 years”)
- Give your letter writers lots of info about you
- Write a good essay: spend weeks, not days on it.

- **AMS** website has lots of stuff. Go to main page or the page for students
<http://www.ams.org/programs/students/students>
- Similarly for **MAA** website. Go to main page or to
<https://www.maa.org/programs-and-communities/member-communities/students/student-resources>
- From the **AMS** you can link to **MathSciNet** (<http://www.ams.org/mathscinet/>) where you can look up papers that researchers have written. If your institution doesn't have a subscription to the service, try JStor (also by subscription), the arXiv (arxiv.org), or Google.

- The **Mathematics Genealogy Project** can be used to find out about advisors and their students:
<http://www.genealogy.ams.org/>
- **US News & World Report** ranking of best grad schools for math (take this with a grain of salt):
<https://www.usnews.com/best-graduate-schools/top-science-schools/mathematics-rankings>

- Information on the GRE subject test is easy to find (<https://www.ets.org/gre/subject/about/content/mathematics>). ETS also has a practice book for free download. There are a couple of books you can buy, or maybe your department has them. One is *Cracking the GRE Mathematics Subject Test, 4th Edition*.
- Scroll down this page to see a bit of info on subject test scores:
<http://academia.stackexchange.com/questions/13678/what-is-the-median-math-gre-subject-score-for-admission-to-a-group-2-or-3-phd-pr>
- Some stuff from a blog:
<https://igorpak.wordpress.com/?s=gre+subject>