Putting Your Best Foot Forward: What is Important for Your Graduate School Application

IMPACT Summer Camp

Preparing for Graduate School in the Mathematical Sciences

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Overview

1. WWW: Which Way to Walk?
2. Careers: Where do I want to end up?
3. Applying: Showing off your fancy footwork
A web of mathematics
1 Degrees
- Undergraduate to graduate bridge programs
- Masters [to prepare for industrial career]
- Masters [to prepare for strong PhD program]
- PhD [focus: original research]

2 Mathematical Sciences Graduate Programs
- Mathematics
- Computational and Applied Mathematics
- Statistics
- Data Science
- Financial Mathematics
- Institutes for Computational Engineering, Sciences, and Medicine

3 Research specialties represented?
The Institution

1. Public or private
2. Texas or far-from-Texas
3. Big city or rural college town

The Department

1. Size, mission, and scope of department
2. A supportive environment?
3. Where do MS/PhD students get jobs?
4. Faculty research groupings and interests
5. Composition of faculty and students:
   - Are there people like me, and do I care about that?
Which Way to Walk: Financial Support

1. Teaching assistantships [20 hours per week as TA]
2. Research assistantships [100% research]
3. University or national fellowships
4. NSF graduate research fellowships
   - Apply prior to grad school or in 1st year
   - End of October deadline.

Don’t pay a penny for graduate school in STEM!
Which Way to Walk: The Environment

1. What proportion of students are on a TA vs RA?
2. How demanding are TA duties?
3. How much emphasis is given to coursework?
4. How (well) does the qualifying exam system work?
5. What proportion of students publish?
6. Professional development opportunities?

Apply to programs that will support your success!
Which Way to Walk: Some Resources

1. Professors at your current institution!

2. AMS: Finding a Graduate Program

3. Gather information prior to applying

4. Ask lots of hard questions when you get an offer

5. Be prepared for a First Year Adjustment

6. Switch if the environment is not supportive

Educate Yourself

Is a graduate degree worth the effort for me?
Where do I want to end up?

Graduate school is both

- A stage in your intellectual journey
- A stepping stone to a satisfying career

**Post PhD Employment**

- **Business & Industry** [34%]
- Academia: PhD-granting depts [27%]
- Academia: MS/BS/2YR [17%]
- Other academic depts and institutes [13%]
- **Government** [5%]
- Stat/Biostat [5%]

Overall 35% are in Postdocs

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12015-16 AMS Annual Survey; USC in USA
Where do I want to end up?

- Let your desired career path inform but not overly constrain your choices in graduate school
- Do what you love the most
- Be swept off your feet by a variety of math
- The web of mathematics connects many fields to employment options
- However, BIG careers may be facilitated by computational and applied fields

Expect the unexpected!
Where do I want to end up?: Resources

- Talk to Professors at your current institution
- Start networking
- AMS: The Profession
- AMS: Career Information
- SIAM: Careers in Applied Mathematics
- BIG Math Network
Showing off your fancy footwork

The Application Package

1. Application form
2. Academic **Transcripts** (including GPA)
3. **Letters** of recommendation (3)
4. General (maybe also Math Subject) GRE scores
5. Statement of Purpose
6. Resume: awards, honors, with focus on math

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2. Deadlines: Dec 15-Mar 1
Commonly Recommended Coursework

1. Calculus sequence, linear algebra, and D.E.’s
2. Proof-based analysis [2 semesters]
3. For more theoretical programs:
   - Proof-based abstract algebra [2 semesters]
   - Point set topology
   - Courses like complex analysis, differential geometry
4. For more computational programs:
   - Numerical methods
   - Physics and computer science
   - Familiarity with computer programming

“The best predictor of success in any graduate program is success in one or more introductory graduate courses.”
Letters of Reference

1. Engage letter writers early in process
2. They can advise on where to apply
   - Personal connections often increase credibility
3. Ask if they can write you a strong letter
4. “From professors in mathematics or a closely related field who have supervised the applicant in class or research”
   - From upper-division, conceptually oriented mathematics classes
   - At least one about proof-based courses: abstract algebra, analysis
   - For applied math: At least one in numerical analysis or computational math courses
Statement of Purpose

1. Motivation for **grad school**
2. Why you are a good fit for **this** program
3. Possible research interests
4. Potential advisors
5. **Evidence** of potential for success
6. Undergraduate research experiences
7. Career plans & professional goals
8. Teaching experience

**Address failures honestly and coherently**

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3 Don’t talk about how you have loved math since grade 3
4 Not required by some top tier programs [e.g. Harvard, Berkeley]
What Applications Committees Look For For

1. Evidence of fit for program
2. Success in several proof-based courses
3. Evidence can pass Qualifying Exams
4. Evidence of independent work as predictor of aptitude for research
5. Evidence of verbal and written communication skills
6. Evidence of interpersonal skills
7. Honest explanations of early failures/gaps

A consistent story told by transcripts, letter writers, and applicant