

Challenges and Opportunities for Graduate School Bound Liberal Arts Students

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Liberal Arts
Situation

Introduction

- Over the last 10-15 years students from liberal arts colleges have had increasing difficulty being admitted to top graduate programs in pure mathematics.
- Our top students are no less qualified than they were in the past.
- We are not asking for admission of our students into programs where they don't belong.
- Matriculating at liberal arts college shouldn't be terminal or highpoint in someone's math career.

Goals

- Describe our students' strengths and weaknesses.
- Describe the challenges they are facing when applying to graduate schools (pure mathematics).
- Discuss what we can do to make our students more competitive.
- Discuss what the AMS can do.

Who are our students / math majors?

Our top math majors - mathematical past:

- Strong performance and passion for mathematics in high school.
- No commitment yet to an academic career in mathematics (maybe not even to a mathematics major).
- Not aware of the possibilities for lifelong mathematical careers.
- No guidance toward focused mathematical study.

Who are our students / math majors?

Our top math majors - mathematical present:

- Realize as sophomores/juniors want to do pure math (commitment is later than top math majors at R1 institutions).
- Often this is a result of interactions with faculty, individual attention, etc.
- Take as many courses as they can.
- Many are double majors.
- Broadly educated but not as deeply trained.

Issues in having strong math major

- Not enough resources to offer all classes annually (some on 2 year cycle).
- Often limit to number of many math classes they can take (at least first two years) in order to be broadly educated.
- Majority not bound for grad school want applied math / stats / computational courses (viewed as beneficial for getting jobs) → less resources for core pure math courses.

Benefits from a liberal arts education

- Ability to make connections between different subjects (interdisciplinary, benefits of this even in pure math).
- Extensive training in how to learn, in asking questions, in speaking, writing, and presenting.
- Often thesis/REU experience.
- Personalized attention from professors.

Issues in applying to graduate school

- Low GRE score / GRE scores becoming the first cut in admission decisions.
- Few to no graduate level math courses.
- Not surrounded by as many students living / breathing math as at R1 institutions.
- Letters of recommendation from liberal arts college professors.
- Inertia (no graduate students from liberal arts schools in recent past).

Action Items

What should Liberal Arts Colleges do?

- Strong courses in the core areas of pure math.
- Small Open Online Courses across institutions to effectively use resources.
- Encourage Budapest Semester in Mathematics/ REU / thesis (though often thesis results too late for letters of rec, and REUs are joint work).
- GRE prep classes. More problem solving emphasis (a la Putnam / Project Euler).

What can Graduate Schools do?

- Extend Post-Bac program: have students come for a year, take a lot of grad classes, give opportunity to prove themselves.
- Support efforts in our departments / institutions that unless we do X (stronger classes, more upper level, ...) our students will be disadvantaged in applying to grad school.
- Build bridges / connections: visits by researchers, pipeline for REUs, semester in residence,

What can the NSF do?

- REUs, conference support, graduate fellowships marked for students from liberal arts colleges,

What can the AMS COE do?

- Raise awareness.
- Encourage dialogue.
- Provide useful information / statistics on how students from various places have done.

Comments from Colleagues

What can liberal arts colleges do to make our students more competitive?

- Emphasize how well we prepare students for research even if they have less background.
- Emphasize the GREs to our students more; many have never taken a multiple choice/short answer math exam; run GRE courses.
- Start a consortium in which intro graduate level courses are taken remotely.
- Take our students to top places so that they can see what it's like.
- Travel to conferences more and network more so that letter readers recognize the name of the letter writers
- Tell students to back off extracurriculars.

What can the AMS do?

- Start a speaker series in which people from top places travel to small places.
- Beef up <http://www.ams.org/profession/career-info/grad-school/grad-school> by explicitly mentioning the kinds of things that grad schools look for.
- Start a Morgan prize for students from small colleges.

What can graduate programs do?

- If they highlight students on their pages, they should highlight some students from Liberal Arts places.
- Not dismiss letters from people at undergraduate places because the writers aren't at the top of their field / maybe anonymize letters of recommendation?