Overview of PhD Programs
for Prospective Students

School of Mathematics, Georgia Tech

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See our Prospective Student Page for a hyperlink version of this presentation:

www.math.gatech.edu/∼ghomi/GraduateProgram/ProspectiveStudent.pdf

Outline

Degrees offered by the School of Mathematics

- PhD
  - Mathematics
  - Algorithms, Combinatorics, and Optimization (ACO)
  - Computational Sciences and Engineering (CSE)
  - Bioinformatics (BINF)
  - Quantitative Biosciences (QBios)
  - Machine Learning (ML)
- Masters
  - Mathematics
  - Computational Sciences and Engineering (CSE)
  - Statistics
  - Quantitative and Computational Finance (QCF)

Requirements for a PhD

All PhD programs require the following elements:

- ► Course work
- ► Written comprehensive exams
- ► Oral comprehensive exam
- ► Minor — 9 hours of course work outside area of specialization.
- ► Dissertation

But each item is interpreted a little differently depending on the program.

Requirements for PhD

Course work

- ► ACO PhD:
  - ► 7 Core Courses (2 in CS, 2 in ISyE and 3 in Math)
  - ► 15 hours of additional coursework at the 6000 level or above (including some specific math courses)
- ► CSE PhD:
  - ► 1 hour course "Intro to CSE"
  - ► 12 hours of core courses
  - ► 9 hours of computation specialization
  - ► 9 hours of an application specialization.
- ► Math PhD: 30 hours of course work in math at the 6000 level or higher, subject to some breadth requirements plus 9 hours for a minor.

Minor can be part of the above course work (but not part of the core courses).

Requirements for PhD

Written comprehensive exams

- ► ACO PhD:
  - ► The exam contains questions based, more or less, on the material in the ACO core courses.
  - ► Must be passed by the end of the 4th academic semester (not including summers), but encouraged to complete within 3 academic semesters.
- ► CSE PhD:
  - ► Select 2 exams from among 5 subjects: numerical methods, discrete algorithms, modeling and simulation, computational data analysis, and high performance computing.
  - ► Must be completed within 2 years of starting program.
- ► Math PhD:
  - ► Pass 2 exams chosen from 7 subjects.
  - ► Must be completed within 2 years of starting program.

Requirements for PhD

Oral comprehensive exams

- ► ACO PhD (also called Research Proposal):
  - ► Write 3-6 page proposal about research.
  - ► 20 minute oral presentation to a committee followed by questions from the committee.
  - ► Must be completed by end of 3rd year.
- ► CSE PhD:
  - ► Create a computational artifact.
  - ► Write 5 page proposal discussing work and computational artifact.
  - ► Oral presentation to committee.
  - ► Must be completed by end of 3rd year.
- ► Math PhD:
  - ► Short written proposal concerning area of research.
  - ► Oral presentation to committee.
  - ► Must be completed by end of 3rd year.

Requirements for a Masters

A masters in Mathematics, CSE, or Statistics requires:

- 30 hours of course work (with some required courses and some elective course), **or**

- at least 21 hours of course work and a thesis (total of 30 hours of work)

Many students get a masters degree (or 2) on their way to a PhD.

Graduate Courses

The coursework for all our degrees is very broad:

- ► Every semester we offer around 30 graduate level (6000 or above) courses.

- ► Huge number of courses offered in departments across Ga Tech that are relevant to mathematics graduate students.

- ► We usually teach over 1,300 students per year in graduate math courses!

Graduate Courses Link

Outline

Teaching Assistantships

All PhD students are offered TA positions.

- TAs stipend is \$2,185 per month for the 9 month academic year; they may also work in the summer if desired (for a 12 month salary of \$26,220).

- TAs get tuition waiver, which amounts to about \$28,000 for two semesters. (There are still some fees a student must pay: around \$1,100 per semester. TAs must also have medical insurance: around \$1,300 per year.)

- The TA contract is for one year at a time, but will be renewed for 5 years of support (subject to satisfactory progress toward your degree and satisfactory performance of teaching duties where required). A 6th year of support is also offered as long as the student is making satisfactory progress towards the PhD.

Teaching Assistantships

- In a normal semester a TA runs 2 recitations sections (about 35 students each) that each meets twice a week. They will also need to hold office hours, prepare for teaching, grade homework/exams.

- We expect the time devoted to TAing to be about 12-14 hours per week (for 2 recitations).

- *In the Summers the teaching load is only one recitation.*

- In your first semester you only have 1 recitation section, and will take a TA training class (1 hour, see below).

- Once you have passed your comprehensive exams you have the opportunity to teach your own classes.

TA Training

- ▶ The week before your first semester on campus we run an intensive TA training class that helps get you ready for teaching Georgia Tech students.
- ▶ During the first semester (while you have a lighter teaching load) you also take a 1 hour course that focuses on teaching. This is to help your first semester go smoothly and lay the ground work for teaching your own class.
- ▶ For international students we also have language training if necessary.
- ▶ We have a lead instructor seminar to help you transition from recitation sessions to teaching your own class.
- ▶ There are many optional classes offered by Center for the Enhancement of Teaching and Learning (CETL) that you can take to learn more about teaching, pedagogy, technology in the classroom and many other skills.

Research Assistantships

- Research assistantships (RAs) have the same stipend and tuition waiver as a TA but the only duties when you are an RA is to pursue your research.

- Many faculty members can support RAs through their research grants.

- *In each of the recent semesters approximately 1/4 of our students have had RA support.*

Outline

Why Georgia Tech?

- One of the largest, youngest, and most distinguished faculty in the nation with very broad range of expertise.

- Plenty of personal attention (our student to faculty ratio is one of lowest in the nation!).

- A recent Institute wide survey showed that our PhD students are the most satisfied among more than 20 world class schools on campus!

- "Introduction to Graduate Mathematics" class which all first year students take together.

- Comprehensive exam preparation classes in the Summer.

- Dynamic research environment with numerous seminars and colloquia.

- Sustained upward trajectory (for more than two decades the School of Math has been rising steadily in all national and worldwide rankings.)

Why Georgia Tech(Cont'd)

- ▶ Part of an institute which is focused exclusively on math, science, and Engineering (half of Georgia Tech's 15,000 undegrads takes courses in the School of Math every semester!)

- ▶ Superior TA and instructor training.

- ▶ 12 month TA/RA stipend.

- ▶ 100% post PhD employment.

- ▶ Different paths: academic, industrial, education.

- ▶ Located in a vibrant, cosmopolitan, and dynamic city—the capital of the Southeast, and an increasingly walkable, bikable, livable environment, offering extraordinary cultural and recreational opportunities.

Outline

Faculty Profile

- 61 tenured or tenure-track faculty (one of the largest in the nation).
- Two dozen postdocs and visiting faculty every semester.
- Wide variety of expertise:

  - Algebra
  - Analysis
  - Applied and Comp. Math
  - Differential Equations
  - Discrete Mathematics

  - Dynamical Systems
  - Geometry and Topology
  - Mathematical Biology
  - Mathematical Physics
  - Probability and Statistics

- Our faculty is highly visible world wide. Speaking in national and international conferences, supported by numerous grants, and recognized by numerous awards.

Faculty Profile (Cont'd)

- One of the youngest and most active in the world.
- 14 faculty members have been honored with AMS Fellowships!
- New Assistant Professors have already garnered 10 NSF CAREER awards, and 4 Sloan Fellowships, within the last 5 years!
- Our faculty are among the most diverse: 11 permanent female faculty members plus 8 female postdocs.

Awards won by our Faculty

Faculty Research Interests

Student Profile

- Diverse international student body.
- 105 PhD students and 25 Masters students.
- All PhD students have office space in the *graduate wing* of Skiles.
- One or two students win prestigious NSF fellowships each year.
- All PhD students receive full financial support (stipends plus tuition waiver)

Academic life

- Assigned an "initial mentor" as soon as you arrive.
- Professional development course *Introduction to Graduate Math*, taken by all first year students.
- *Research Horizons Seminar*: organized by students for students.
- Departmental colloquia and numerous research seminars.
- Each year there are several conferences held at Ga Tech, some organized by students.
- Multitude of Campus-wide clubs and activities, as well as Job Fairs.
- Students chapters of AMS, SIAM, AWM; as well as other activities like the High School Math Competition, and the Graduate Student Council
- Friendly environment.

Expectations

- The first focus is on completing the Comps. There are Fall-Spring course sequences for each exam.

- After the comps, focus shifts to research. Big step: choosing a thesis advisor (half of the time, students stay with their initial mentor, and half of the time they choose someone ellse).

- Most PhD recipients have scholarly publications before graduating.

- Average time to completion of the PhD is a little over 5 years.

Post PhD Employment since 2011

▶ Academia
  • Instructor at Princeton • Postdoc University of Michigan • Postdoc University of Toronto • Instructor at the Univeristy of Iowa • Postdoc Rice University • Postdoctoral Associate at University of Rome • Postdoctoral Associate at UIC • Instructor at Wittenberg • Instructor at University of Colorado, Colorado Springs • Visiting Assistant Prof. at Clemson • Postdoc at Emory • Postdoc at Rutgers • Assistant Prof. of Practice at Notre Dame • Postdoc at NYU • Postdoc at Duke • Postdoc at Aachen • Postdoc at McGill • Postdoc at Ohio State • Tenure Track at Waterloo • Postdoc at University of North Carolina - Chapel Hill • Postdoc at Lund • Postdoc at BYU • Postdoc at U Mass Amherst • Postdoc at UCLA • Instructor at Atanta Metropolitian College • Postdoc at Fields Institute • Postdoc at Cambridge (UK) • Postdoc at Berkeley (UK) • Postdoc at Wisconsin (UK)

▶ Industry
  • Oracle senior software engineer • Amazon (operations research scientist) • Amazon (mobile development division) • Wells Fargo • Atlanta Local Business • Travelocity • Scurry Mechanical Contractors • Walmart Labs (Data Scientist) • Harvest Research Group (Developer) • Walmart (Data Scientist) • NCR (Data Scientist) • Google (Software Engineer) • Uber (Data Scientist)

▶ Government
  • Research Mathematician at NSA

Alumni Employment Webpage

Outline

PhD Admission

- ▶ We had a record 330 applications this year (each of the past 5 years has set a new record).

- ▶ We have admitted only 20% of the applicants this year (we used to admit 30%).

- ▶ Of those admitted to the program approximately 30% join our doctoral programs.

- ▶ About 25-30% of applicants, of admitted students, and of students who enroll are female.

- ▶ Requirements: General GREs, Subject GRE, Statement, Letters of Recommendation. Previous course work is also important.

For more info please check:

School of Math's Graduate Program Page

or send me an email at:

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Thank you for considering Georgia Tech!