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/∼yu/GraduateProgram/ProspectiveStudents.pdf

Outline

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Degrees offered by the School of Mathematics

- PhD
  - Mathematics (MATH)
  - 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

- MATH PhD:
  - 30 credit hours of course work at the 6000-level or higher.
  - Breadth Requirements must be satisfied.
  - Additional 9 credit hours to form the doctoral minor field of study.
- ACO PhD:
  - 7 Core Courses (2 in CS, 2 in ISyE and 3 in MATH)
  - 15 credit hours of additional coursework at the 6000 level or above (including some specific math courses)
- CSE PhD:
  - 1 credit hour course “Intro to CSE" , and 12 credit hours of core courses
  - 9 credit hours of computation specialization, 9 credit hours of application specialization, and 9 credit hours of MATH courses not cross-listed with another department.

Requirements for PhD

Course work

- QBioS PhD:
  - 4 credit hours of Foundations of QBioS, 2 credit hours of Seminars in QBioS, 1 credit hour for Professional Development in QBioS
  - Three courses from Quantitative Modeling Core; Two courses from Bioscience Disciplinary Electives; One course from Quantitative Models in the Biosciences
  - One elective for the “interface” minor requirement
- ML PhD:
  - 12 credit hours of core courses
  - 15 credit hours of electives from a large list of courses
- BINF PhD:
  - 9 credit hours of courses from each of the following groups: Bioinformatics and Computational Bioscience; Biology, Biochemistry or Biomedical Engineering; Mathematics and Computer Science
  - 9 credit hours of courses in an approved minor, and 24 research credit hours

Requirements for PhD

Written comprehensive exams

- Math PhD:
  - Pass 2 exams chosen from 7 subjects.
- ACO PhD:
  - The exam contains questions based on the material in the ACO core courses.
- CSE PhD:
  - Select 2 exams from among 5 subjects: numerical methods, discrete algorithms, modeling and simulation, computational data analysis, and high performance computing.

For all above programs, students must pass the comp exams within 2 years of starting program.

Requirements for PhD

Oral comprehensive exams

- MATH PhD:
  - Short written proposal concerning area of research.
  - 40 minute oral presentation to committee, plus questions and feedback from committee.
- 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.
- CSE PhD:
  - Create a computational artifact, and write a proposal.
  - Oral presentation to committee.

Requirements for PhD

Oral comprehensive exams

- BINF PhD:
  - Write proposal.
  - Oral presentation to committee.
- QBioS PhD:
  - Write a proposal.
  - 45 minute oral presentation to committee.
- ML PhD:
  - Take a one-semester course and submit a summary report.
  - Closed oral exam with committee (with a short presentation).

Must be completed by end of 3rd year.

Requirements for a Masters

A masters in Mathematics, CSE, or Statistics requires:

- 30 credit hours of course work (with some required courses and some elective course), **or**
- at least 21 credit hours of course work and a thesis (total of 30 credit 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

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Teaching Assistantships

All PhD students are offered TA positions.

- TAs stipend is $2,583 per month for the 9 month academic year; they may also work in the summer if desired (for a 12 month salary of $31,000).
- TAs get tuition waiver, which amounts to about $28,000 for two semesters. (There are still some fees a student must pay: around $1,120 per semester. TAs must also have medical insurance: around $1,100 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 studio 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 studios).
- *In the Summers the teaching load is only one studio.*
- In your first semester you will have reduced teaching duty, so that you can take a TA training class and Grad Groups.
- 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 studio 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.*

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Why Georgia Tech?

- One of the most distinguished faculty in the nation with very broad range of expertise.
- Plenty of personal attention (with 2:1 student to faculty ratio).
- Previous 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 (at least half of Georgia Tech's 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: academia, industry, government.
- 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.

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Faculty Profile

- 52 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.
- 13 faculty members have been honored with AMS Fellowships!
- New Assistant Professors have already garnered 8 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 a number of female postdocs.

Awards won by our Faculty

Faculty Research Interests

Student Profile

- Diverse international student body.
- 110 PhD students and 17 Masters students.
- All PhD students have office space in the *graduate wing* of Skiles.
- On average, 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* and *Grad Groups*, 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.
- Peer mentoring program.

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 else).
- 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
  • Postdoc at MSRI • Postdoc at UIUC • Postdoc at MIT • Postdoc at Chicago • Postdoc at Brown • Instructor at Princeton • Postdoc University of Michigan • Postdoc University of Toronto • Instructor at the University 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 Atlanta Metropolitan College • Postdoc at Fields Institute • Postdoc at Cambridge (UK) • Postdoc at Berkeley (UK) • Postdoc at Wisconsin (UK)
- Industry
  • Paramount Global • Goldman Sachs • Delta Airlines • Meta • Oracle • Amazon • Wells Fargo • Atlanta Local Business • Travelocity • Scurry Mechanical Contractors • Walmart Labs • Harvest Research Group • Walmart • NCR • Google • Uber
- Government
  • Sandia National Laboratories • NSA

Alumni Employment Webpage

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PhD Admission

- 350 – 400 applications each of the past 5 years.
- We admitted about 20% of the applicants last year.
- Of those admitted to the program approximately 30% join our doctoral programs.
- Typically, about 25-30% of applicants, of admitted students, and of students who enroll are female.
- Requirements: Subject GRE (waived), Statement, Letters of Recommendation. Previous course work is 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!