A Guide to the University of South Carolina Mathematics Graduate Program

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Contents

1 Introduction

The purpose of this handbook is to serve as a reference for graduate students, faculty, and staff on all issues pertaining to the mathematics graduate program at the University of South Carolina. Comments and suggestions are always welcome; if you have any, please direct them to the Director of Graduate Studies. In compiling this handbook, we attempted to be as thorough and current as possible. We realize, however, that information in this handbook will inevitably change; we will therefore do our best to update the handbook accordingly in a timely manner.

2 Mathematics Department

2.1 Organization

2.1.1 Executive Committee

The administrative officers in the mathematics department form the Executive Committee (EC).

position	current office holder	job description
Department Chair	Linyuan Lu	department executive
Assistant Chair	Adela Vraciu	schedules and assigns all department teaching
Director of Graduate Studies (DGS)	Matthew Boylan	oversees all aspects of the graduate program
Director of Undergraduate Studies (DUS)	Xinfeng Liu	oversees all aspects of the undergraduate program

2.1.2 Staff

Professional staff are essential to the day-to-day running of the department.

position	current office holder	office location
Administrative Assistant to the Chair	Vonda Hensley	409
Assistant Research Director	L. Scott Johnson	417
Business Manager	Joanne James	411B
Graduate Program Administrator	Julia Clark-Spohn	411
Undergraduate Program Administrator	Deeann Moss	413

2.1.3 Graduate Advisory Council

The Graduate Advisory Council (GAC) advises the DGS as necessary. The GAC consists of the following members:

1. **DGS** (ex officio).
2. **At least five tenure-track faculty members.** The Department Chair selects faculty members.
3. **Two graduate student representatives.** Current graduate students elect student representatives once per year for a one-year term. The DGS runs the election by soliciting nominations and collecting and tallying votes. All current graduate students are eligible. The DGS informs students of the vote outcome.

Specific duties of the GAC include, for example:

1. Setting and reviewing academic regulations,
2. Making admissions decisions,
3. Advising students who do not yet have a Ph.D advisor,
4. Addressing student questions and concerns on topics related to the graduate program,
5. Hearing student grievances, petitions, and appeals,
6. Choosing winners and nominees for awards and fellowships.

The graduate student representatives discuss and vote on issues concerning items 1 and 4. Moreover, the student representatives act as a conduit for bringing concerns of graduate students to the GAC. The student representatives do not, however participate in discussion of items 2, 3, 5, and 6.

2.2 Department Activities

2.2.1 Colloquiums and Seminars

The department runs regular colloquiums and seminars.

1. **Colloquiums.**
   (a) **Department Colloquium.**
      i. It is intended for colloquiums to be pitched to a broad mathematical audience.
      ii. The department encourages all graduate students to attend colloquiums.

   (b) **Graduate Colloquium.**
      i. **Activities.** The graduate colloquium includes, for example, the following events.
         A. Graduate students have an opportunity to speak on their own work, whether it be completed research, work in progress, or exposition on a topic of interest.
         B. Faculty give expository talks on their research.
         C. Faculty preview course offerings for the subsequent semester.
         D. It provides a forum for professional development panels on topics such as the job application process.
         E. It provides a forum for the DGS and graduate students to interact directly.

      ii. **Organization.** Graduate students organize the graduate colloquium.

2. **Seminars.**
   (a) **Regular seminars.** Several weekly seminars run in the department. Seminar talks are typically more specialized than colloquiums.
   (b) **Learning seminars.** Students sometimes form groups focused on learning a specific topic with or without faculty involvement.
   (c) **Research seminars.** Faculty sometimes run research seminars for their graduate students. Interested students should discuss participation with the faculty who run the seminar.

3. **Faculty research interests.** For a list of tenured and tenure-track faculty and their research interests, see Appendix G.

2.2.2 Student Organizations

Graduate students play an active role in several organizations.

1. **Society of Industrial and Applied Mathematicians (SIAM).** Graduate and undergraduate students are eligible to join. Members give talks and host speakers from industry.
2. **Association for Women in Mathematics (AWM).** The UofSC AWM student chapter aims to connect graduate students with mathematicians both in academia and in industry, with a focus on connections to and for female mathematicians. It is open to all undergraduates and graduate students. It hosts fun, math-centric events during the academic year.
3. **American Mathematical Society.** UofSC Math is an institutional member of the AMS; as such, its graduate students get complimentary memberships.

2.3 Facilities

2.3.1 LeConte College

LeConte College (LC) houses the Mathematics Department, the Statistics Department, and the University Office of Student Disability Services. Space allocation in LeConte is as follows.

1.3.1.1 Math Department

1. **Classrooms.** First, third, and fourth floors.
2. **Colloquium room.** LC 412.
3. **Computer labs.**
   (a) Maple labs: LC 102, 303A, 401A.
   (b) For students (undergraduate, graduate): LC 316.
4. **Faculty offices.** Third and fourth floors.
5. **Graduate student offices.** First, third, and fourth floors.
6. **Lounges.**
   (a) Undergraduate: LC 311
   (b) Faculty and graduate student: LC 317B
   (c) Wyman Williams Room: 4th floor.
7. **Mailboxes.** Faculty and graduate student mailboxes are outside LC 411.
8. **Main office.** LC 411.
9. **Network administration team.** LC 414 - 418.
10. **Seminar and meeting rooms.** LC 312, 317R, 317S, 407.
11. **Work rooms.** LC 317B, LC 411C.

1.3.1.2 Statistics Department. The Statistics Department is the sole occupant of the second floor.

2.3.2 Office space

1. **Allocation.**
   (a) The department provides all graduate student assistants with office space (for details, see Appendix I), a desk, a computer, and access to a printer
   (b) The department may provide students who are not assistants with these resources subject to availability.
2. **Office assignments.** The DGS assigns office space to graduate students according to the needs of the department.

2.3.3 Computing

1. **Assistance.** The network administration team provides assistance on all computing needs.
2. **E-mail.** Graduate students get a UofSC e-mail address (studentname@email.sc.edu); students should conduct all business pertinent to their role as a graduate student using this.
3. **Webpage.** Graduate students can create a professional webpage (people.math.sc.edu/studentname). For help with setup, students should see the Network Administrator.

2.3.4 Supplies

1. **Classroom.** For classroom supplies such as chalk, students should see the Graduate Administrator or Business Manager.
2. **Course texts.** To obtain course texts for courses that a student teaches, the student should see the Undergraduate Administrator.
3. **Printing.** Students have a printing quota for every semester.
4. **Photocopying.** Students have access to the photocopying machine in LC 317B. Students should see the Business Manager for a username and password.
5. **Work room.** Students do not have access to the faculty work room, LC 411C.

2.3.5 Thomas Cooper Library

Graduate students can access math books and journals through the Thomas Cooper Library. To search the library, visit this link.

1. **Books.** The main campus library houses the mathematics collection; it is on level four of the library, which is underground. Math books have the label “QA”.
2. **Journals.** Students have online access to journals and other resources through the library.

2.3.6 Reporting problems

Students should report problems with University facilities, as necessary. These include, but are not limited to problems in student offices, in classrooms, in hallways, and in restrooms. Examples of problems include, but are not limited to mold, broken office furniture, leaking, heating and cooling issues, and malfunctioning computer equipment.

1. A student should report computing problems to the Network Administrator.
2. A student should report all other problems to the Business Manager.

3 The Ph.D program

The Ph.D degree in mathematics at the University of South Carolina serves to prepare students for professional careers in academic research, college and university teaching, and industry. The primary components of a student's Ph.D career are

1. Program admission,
2. Coursework,
3. Examinations (Qualifying Exam, Comprehensive Exam),
4. Research and dissertation preparation and completion.

This section gives details on requirements and regulations for completion of each component.

3.1 Program admission

For admission to the Ph.D program, the Graduate School requires that applicants must have a baccalaureate degree (or the international equivalent) from an accredited college or university.

3.1.1 Department requirements

1. **Preparation.** An applicant's level of preparation should be at least equivalent to a major in mathematics at the University of South Carolina; applicants must have a minimum of one semester of rigorous, proof-based real analysis.
2. **Grades.** Successful applicants typically have at least a "B" average in all college-level math courses.

3.1.2 Application contents

Applicants submit applications online. Applications consist of the following items:

1. **Official transcripts.** The University requires official transcripts from every institution of higher education previously attended by the applicant at which the applicant earned a grade, including a pass/fail grade. Examples include four-year colleges and universities, junior colleges, community colleges, and technical schools. Unofficial transcripts suffice for purposes of evaluation by the GAC, but ultimately, there are deadlines by which the Graduate School requires receipt of official transcripts. The Graduate School will check official transcripts against previously submitted unofficial ones.
2. **Letters of recommendation.** An application must have at least two letters of recommendation from persons familiar with the applicant's math abilities.
3. **General GRE test scores (math and verbal).** Self-reported unofficial score reports suffice for purposes of evaluation by the GAC, but ultimately, there are deadlines by which the Graduate School requires receipt of official score reports. In extenuating circumstances, the Graduate School can waive this requirement. The Graduate School will check official scores against previously submitted unofficial ones.
4. **Statement of purpose.** The statement of purpose is an open-ended narrative in which the applicant gives insight into their personality, interests, experience, and goals.

5. **Supplemental (non-required) materials.** Applicants may submit supplemental materials, though these are not required. Examples include:
    (a) Curriculum vitae or resume.
    (b) Examples of scholarly work such as publications or theses (undergraduate or masters).
    (c) GRE math subject test.

3.1.3 Fellowships

Directors of Graduate Study at UofSC may nominate applicants to their graduate programs for fellowships.

1. **Presidential Fellowship.** Award: $8,000 supplement per year for four years.
2. **College of Arts and Sciences Graduate Stipend Enhancement.** Award: $4,000 supplement per year for four years.

3.1.4 Requirements for International Students

The Graduate school requires TOEFL scores from applicants whose native language is not English, excepting those who earned their most recent degree (undergraduate or masters) in the U.S., U.K., Canada, Australia, or New Zealand. Score requirements are as follows:

1. Graduate School requirement: score of at least 80.
2. To qualify for an assistantship, the department requires students to score at least 100, including
    (a) 22 in reading,
    (b) 22 in listening,
    (c) 21 in speaking,
    (d) 24 in writing.
3. In extenuating circumstances, the Graduate School can waive these requirements on petition by the DGS.

3.2 Tracks

The Department offers Ph.D tracks in **pure** mathematics and in **applied and computational** mathematics (ACM). Completion of the ACM concentration results in an acknowledgment of the concentration as an "Area of Emphasis" on the final transcript. It is possible to write a dissertation in an ACM area without completing the formal concentration.

The following sections on coursework, pre-dissertation requirements, and the dissertation apply to both tracks. See Appendix A for specific requirements for the applied and computational mathematics track.

3.3 Coursework

See Appendix D for sample course programs for students graduating in 4, 5, and 6 years.

3.3.1 Graduate School requirements

1. **Credits.** For details, see the relevant section of the Graduate Bulletin.
   (a) A minimum of 60 credits beyond the baccalaureate degree.
   (b) A minimum of 12 credits of Math 899, Dissertation Preparation, and a maximum of 30 credits of this course. Possible grades for Math 899 are "T" (for thesis), which indicates satisfactory performance, and "U", which indicates unsatisfactory performance.
   (c) Time limit. Coursework done by a student becomes invalid after 10 years, at which time it must be re-validated if the student intends to continue pursuit of the degree.
2. **Course enrollment loads.** For details see the relevant section of the Graduate Bulletin.
   (a) **Full-time status.** The minimum number of credits necessary for full-time status is as follows:

	Fall	Spring	Summer
graduate assistant	6	6	3
non-graduate assistant	9	9	6

   (b) **Limits.** A student must enroll for at least 1 credit during any term in which dissertation progress is made and university resources are used. The department sets limits on the number of credits in which a student enrolls in a term.
   (c) **Special Enrollment Status (Z-Status).** Z-status allows students to maintain full-time status while taking fewer credits than indicated above. For details, see Appendix B.
   (d) **Summers.** The department does not require students to teach in summers.
      i. If a student teaches in either of the first two summers after initial enrollment, then the student must enroll in 3 credits of 890 or 899.
      ii. If a student teaches in any subsequent summer, then the student may enroll for 1 - 3 credits (typically, 1) of 899 on Z-status.
      iii. If a student does not teach in a given summer, then the student should not enroll in any credits for that summer unless the student is a RA (research assistant) supported by faculty or plans to graduate at the end of the summer, in which case the student may need to enroll in 1 - 3 credits.

3.3.2 CAS and Department rules

The College of Arts and Sciences (CAS) and the Math Department enforce course and credit requirements beyond what the Graduate School does.

1. **Eligible courses.** The 60 required credits must be numbered 700 or higher exclusive of 7xxI courses (courses with the "I" suffix). The complete list of graduate courses is in Appendix E; a list of graduate math courses taught at UofSC since Fall 2013 is in Appendix F.
2. **Courses outside the Department.**
   (a) The courses must support the student's research program. These courses typically reside in areas such as Computer Science, Engineering, and CAS STEM disciplines.
   (b) The student's advisor and the DGS must approve the courses.
   (c) The department can restrict the number of courses a student takes outside of Math.
   (d) Students do not need permission to take courses listed outside the department but cross-listed with Math.
3. **Math 798 (Directed Readings and Research).** Math 798, also known as "Independent Study", can allow a student to pursue an interest not adequately covered by regular courses.
   (a) The student's advisor and the DGS must approve all Math 798 courses.
   (b) The course must have a syllabus and an accountability mechanism such as regular homework and regular meetings.
   (c) The department can place restrictions on independent studies done for credit.
4. **Breadth.** A student must take at least 12 credits (4 courses) beyond the courses covering their qualifying exams and their comprehensive exams. A student may use Math 798, subject to the approval of the student's advisor and the DGS, for at most one of the four courses.

3.3.3 Typical student coursework

Most but not all students will pursue the following general course trajectory. See Appendix D for 4-, 5-, and 6-year course timelines. The typical student will take 14 - 16 content courses over their career.

1. Four courses on material covered by the qualifying exam: 2 year-long sequences (12 crs.).
2. Six courses on material covered by the comprehensive exam: 3 year-long sequences (18 crs.).
3. Four courses for breadth (12 credits).
4. At most two further elective courses (0 - 6 credits).
5. 12 - 18 credits of Math 899.
6. Math 791 and 792, Pedagogy I and II (2 credits). It is necessary for students to pass these courses in order to qualify to be the instructor of record for lower division courses in the department.

3.4 Pre-dissertation requirements

Normal progress to the Ph.D requires

1. admission to candidacy and
2. the comprehensive exam.

For a timeline to the degree, see Appendix C.

3.4.1 Admission to candidacy

Following Graduate School regulations, admission to candidacy in the Ph.D program requires

1. admission to the Ph.D program,
2. passage of the qualifying exam, and
3. submission of the Doctoral Program of Study (DPOS) form to the Graduate School, and approval of the DPOS by the Graduate School Dean.

Admission to candidacy must take place at least one year before the awarding of the Ph.D.

3.4.1.1 Qualifying Exam

1. **Structure.** The mathematics Ph.D qualifying exam consists of two four-hour written exams. The department offers the exams twice per year, once in August and once in January.
2. **Coverage.** Students take exams on two year-long course sequences:
   (a) Math 703 and 704 (analysis),
   (b) and on either
      i. Math 701 and 702 (algebra), or
      ii. Math 708 and 709 (foundations of computational mathematics).
3. **Rules.**
   (a) **Attempts.**
      i. A student gets at most two attempts per exam on each of two exams. (A student does not get two attempts on each of the three exams.)
      ii. Standard exam schedule:
         A. A student's first attempt on both exams should take place on or before August at the start of year two.
         B. A student's second attempt on one or both exams, if necessary, must take place on or before January of year two.
         C. A student may make a first attempt on one or two exams on entrance (August of year one) or in January of year one.
         D. A student may attempt the qualifying exam without having taken corresponding preparatory coursework at UofSC or elsewhere.
      iii. A student must pass both exams within two years of admission to the Ph.D program; the last opportunity to take exams is January of year two.

iv. The exams are uncoupled. If a student chooses to attempt only one exam in a given exam period, the student does not forfeit an attempt on the exam that they did not take.
v. In exceptional circumstances, subject to the approval of the DGS and/or the Department Chair, minor modifications can be made to the number of attempts and/or the schedule.

(b) **Outcomes.**

i. The department grades each exam on a scale of Pass/Masters Pass/Fail.
ii. Admission to candidacy requires a grade of "Pass" on both exams.
iii. The exams are uncoupled: it is not necessary to earn a "Pass" on both exams during the same exam period.
iv. A "Masters Pass" in one or both exams is not sufficient for admission to candidacy.
v. A student who does not pass both exams within two years of admission to the Ph.D program will not be allowed to continue in the Ph.D program.

(c) **Academic integrity.** Students are expected to follow the university's academic honor code when taking the qualifying exams. See here for details on the university's academic integrity policy.

4. **Administration.**

(a) **Authorship.** Each exam has at least two authors. The DGS will appoint the authors. Typically, one of the authors is the faculty member who taught the year-long course sequence covered by the exam. If two faculty members each taught one semester of the year-long course sequence, then it is typical for these two faculty to co-author the exam.

(b) **Grading.** Exam authors grade the exams they wrote. Exam authors then convene, together with an auxiliary faculty member chosen by the DGS, to form the Qualifying Exam Committee, which determines outcomes of the qualifying exam for each student who took it.

5. **Resources.** The department has syllabi and old exams found here.

3.4.1.2 Doctoral Program of Study (DPOS)

For details, see the relevant section of the Graduate Bulletin.

1. **Purpose.** The DPOS lists all coursework taken over the course of the student's career.
2. **Timing.** A student who passed the qualifying exam completes the DPOS in consultation with the DGS in spring of year two. The Graduate School requires a student to complete the DPOS within two years of starting the program.
3. **Admission to candidacy.** The DGS submits to the Graduate School the student's DPOS and certification that the student passed the qualifying exam. On approval from the Dean of the Graduate School, the student gains admission to candidacy.
4. **Updates.** A student updates the DPOS to include further coursework in subsequent semesters.

3.4.2 Comprehensive Exam

1. **Overview.** The Ph.D comprehensive examination is an in-depth examination consisting of written and oral parts. There are two options for the exam, Options I and II, explained below. **Note:** The comprehensive exam rules explained here reflect the revision ratified by vote of Math Department tenured and tenure-track faculty on November 13, 2020.

2. **Structure.**

   (a) **Option I.**

      i. **Written part.** The written part is administered in three sessions of four hours each. Each session covers the content of two one-semester courses. All courses numbered 700 or higher are eligible, except for courses on which the student was examined for their qualifying exam. A student may include courses, numbered 700 or above, from a unit (or units) outside of mathematics, subject to the discretion of the DGS and the student's Committee.

      ii. **Oral part.** The oral part of the exam is based on the student's Program of Study and may include topics not covered by the written part of the exam. The written and oral parts of the exam should test the student in-depth on their proposed area of research. The oral exam is scheduled for two hours, but may go longer (or shorter) subject to the discretion of the Committee.

   (b) **Option II.**

      i. **Written part.** For the written part of the exam, the student is required to write a document on an advanced topic in the student's research area, chosen in consultation with, and approved by, their advisor. The document must address the student's research plans. Examples include, but are not limited to:

         A. Describing a problem or project that the student proposes to study and possible approaches to it;

         B. Describing work already completed by the student and their plans for generalizations or new directions for future investigation.

         The written document has no minimum page requirement. If there is to be a minimum page requirement, it is determined by the advisor and explicitly mentioned in writing when the student and advisor give written notice to the DGS that the student will be using Option II.

      ii. **Oral part.** The oral part consists of a short (30 - 45 minute) presentation summarizing the document produced for the written part of the exam. After the presentation, the Committee will ask questions designed to ascertain the student's readiness to carry out research in the student's specialty area. The Committee may also ask general questions to assess the candidate's breadth and general qualification to pursue the doctorate.

         There is no limitation on the scope of questions that can be asked in the oral part or on how long the oral part takes.

3. **Rules.**
   (a) **Choosing an option.**
      i. The student's advisor chooses which option the student will use.
      ii. Before scheduling the exam, the student and the advisor inform the Director of Graduate Studies, in writing, of the choice that was made.
   (b) **Committee composition.** A student consults with the DGS and their academic advisor to form their Committee according to the following rules. For details, see the relevant section of the Graduate Bulletin.
      i. **Graduate School requirements for the Committee.**
         A. It must have at least four members.
         B. At least one of the Committee members must be from a unit outside of Mathematics. Students choose the outside member in consultation with their advisor and the DGS. Outside members typically come from units such as Computer Science, Engineering, or CAS STEM fields.
         C. Excluding the outside member, the Graduate School limits membership to the following faculty: regular members of the graduate faculty, associate members of the graduate faculty, and those faculty who hold special term appointments with approval to serve as a regular doctoral committee member. Definitions for these are in the Graduate Bulletin.
      ii. **Department requirements for the Committee.**
         A. The Committee chair is the student's intended thesis advisor.
         B. The balance of the Committee composition is up to the discretion of the DGS in consultation with the Committee chair. The Committee typically contains faculty in the student's research area and authors of any written exams that the student may take for the written portion of the exam.
   (c) **Attempts and schedule.**
      i. **Number of attempts.** A student gets at most two attempts to pass.
      ii. **First attempt.** The student should attempt the comprehensive exam no later than January of the fourth year, keeping in mind that the student must complete it at least 60 days prior to graduation, per Graduate School rules, as listed below.
      iii. **Second attempt (if necessary)**
         A. If a student fails the exam, their second attempt must occur within one year, again, keeping in mind that the student must complete it at least 60 days prior to graduation.
         B. A student who takes the exam a second time can change their exam format, in which case the DGS can (as necessary) appoint a new Committee.
      iv. **Dates offered.** The department offers the comprehensive exam regularly in mid-August and early January. An individual student, at the discretion of the DGS and the student's Committee, may schedule their comprehensive exam at any time during the year.
      v. **Timing of written and oral parts.** A student should complete both parts of the exam within a span of at most three weeks. The DGS can make exceptions to this rule in extenuating circumstances.

(d) **The oral exam is closed to the public,** attended only by the student and the student's Committee.

(e) **Outcomes.** The possible outcomes are:

  i. Pass.

  ii. Fail. A student who fails twice will not be allowed to continue in the program.

(f) **Graduate School rules.**

  i. A result of "Pass" is valid for up to five years, after which it must be re-validated, subject to the discretion of the DGS.

  ii. The student must pass the exam at least 60 days prior to the student's graduation date.

(g) **Academic integrity.** Students are expected to follow the university's academic honor code when completing work in fulfillment of the comprehensive exam. See here for details on the university's academic integrity policy.

4. **Criteria for passage.**

(a) **Committee vote.** On completion of the oral presentation, the Committee votes whether to pass the student.

  i. If the Committee has size 4 (minimum) or 5, then the student needs 3 "Pass" votes including a "Pass" vote from the Committee chair in order to pass.

  ii. If the Committee has size ≥ 6, then the DGS sets rules for passage in consultation with the Committee chair.

(b) Voting must be done by the end of the day on which the oral part of the exam occurs. Exceptions can be made, subject to the discretion of the DGS.

5. **Administrative responsibilities.**

(a) **Student responsibilities.**

  i. The student should seek the assistance of the Graduate Program Administrator in scheduling the oral exam.

  ii. A student who uses Option II to fulfill the comprehensive exam requirement must submit their written document describing their research plans to their Committee at least 14 days prior to the date of the oral presentation. Exceptions can be made to this rule at the discretion of the Committee and the DGS.

(b) **Committee member responsibilities.**

  i. **Vote on pass/fail.** All Committee members attend the student's oral exam. On completion of the oral exam, the Committee votes on whether to pass the student according to the rules above.

  ii. **For students using Option I.**

    A. Exam writers must provide exam syllabi in a timely manner to students taking their written exam.

    B. A faculty member who taught the student a course on which the student will be tested for the written part of the comprehensive exam is responsible for writing and grading the relevant part of the student's exam.

  iii. **For students using Option II.** Committee members must read the student's written document before the student's oral presentation.

3.5 Dissertation

For further details, see the relevant section of the Graduate Bulletin.

1. The doctoral dissertation is the ultimate requirement for a student to earn the Ph.D degree.
2. The dissertation should be original work which contributes significantly to the body of current research and which has the potential for publication in a reputable journal.
3. Graduate School requirements.
   (a) **Committee.** A student consults with the DGS and their advisor to form the Dissertation Committee.
      i. **Composition.**
         A. It must have at least four members.
         B. Membership rules are the same as for the Comprehensive Exam Committee.
         C. Exactly one of the Committee members must be from a unit outside of the department. Students choose the outside member in consultation with their advisor and the DGS. Outside members typically come from units such as Computer Science, Engineering, or CAS STEM fields.
         D. The Committee chair is the dissertation advisor.
         E. The Committee may or may not be the same as the Comprehensive Exam Committee. In math, they are typically the same.
      ii. **Responsibilities.**
         A. The Committee directs the research and preparation of the dissertation.
         B. It examines the student on dissertation content at the dissertation defense.
         C. It determines whether the student's dissertation merits conferral of the Ph.D.
   (b) **Thesis defense.** For details, see the relevant section of the Graduate Bulletin.
      i. **Audience.** The defense should be publicly announced and open to the public.
      ii. **Format.** The defense consists of an oral summary presentation by the student of their dissertation.
      iii. **Committee responsibilities.** All committee members must be present. The department allows members unable to be physically present at the defense to attend electronically (e.g., via Skype). The DGS can make exceptions due to extenuating circumstances. After the thesis defense, the Committee renders its decision on whether the student passes.
   (c) **Format and submission.** A student must follow Graduate School guidelines for formatting and submitting the dissertation.
   (d) **Time limit.** A student has five years after the passage of the comprehensive exam to complete the dissertation, after which time the student will be able to complete the dissertation only after re-validating the comprehensive exam.

3.6 Other Noteworthy Graduate School Rules

3.6.1 Academic standards

1. **For Grade point average (GPA).** For details, see the relevant section of the Graduate Bulletin.
   (a) The cumulative GPA is the GPA of all graduate credit courses recorded on the official UofSC transcript.
   (b) Grades earned for graduate credits transferred from other institutions or taken while an undergraduate do not count toward the GPA.
   (c) Since the possible grades for Math 899, Dissertation Research, are "T" (thesis) and "U" (unsatisfactory), these grades do not contribute to the GPA.
2. **For progression.** A student may pass a course for degree credit with a grade of "C" or higher. Courses in which a student earns less than a "C" do not count for degree credit. For details, see the relevant section of the Graduate Bulletin.
3. **For graduation.** For details see the relevant section of the Graduate Bulletin.
   (a) At time of graduation, a student's GPA must be at least 3.0.
   (b) A student's GPA on all grades recorded on their doctoral program of study (DPOS) must be 3.0.

3.6.2 Academic suspension policy

For details, see the relevant section of the Graduate Bulletin.

1. **Probation.** A student whose cumulative GPA falls below 3.0 will be placed on probation by the Graduate School.
2. A student on probation has one year to raise the cumulative GPA to 3.0.
3. **Suspension.** The Graduate School will suspend students who do not elevate their GPA to 3.0 during the probationary period. Suspended students cannot enroll in further graduate course work.
4. **Reinstatement.** For details on reinstatement after suspension, see the relevant section of the Graduate Bulletin.

3.6.3 Transfer of course credit

For rules on transfer of course credit, see the relevant section of the Graduate Bulletin.

3.6.4 Residency

The residency requirement is two consecutive terms of full-time residency, where a "term" is either a semester (fall or spring) or a term in summer. For details, see the relevant section of the Graduate Bulletin.

4 Academic Advisement

4.1 Advisors

1. **Students who do not yet have Ph.D advisors.** The DGS assigns a GAC member to advise a student who does not yet have a Ph.D advisor.
2. **Students who have Ph.D advisors.** If a student has a Ph.D advisor, then the Ph.D advisor advises the student.
3. **The Ph.D advisor.** The department requires students to have a Ph.D advisor by the end of year two.

4.2 Course advisement and registration

1. **Timing.**
   (a) Advisement for spring takes place over a two-week period in late Oct./early November.
   (b) Advisement for fall takes place over a two-week period in late March/early April.
   (c) The registration period immediately follows the advisement period.
2. **Procedure.**
   (a) The student consults as necessary with their advisor to choose courses.
   (b) The student informs the Graduate Program Administrator of their course choices by e-mail or otherwise on or before the end of the two-week advisement period.
   (c) The student registers for classes when the registration period opens.
3. **Significance.** Adherence to advising procedures assists the department in planning for the subsequent semester.

5 Teaching Policies and Procedures

5.1 Graduate student teaching

5.1.1 Courses taught by graduate students

1. **Spring and fall.** The following is a list of possible course assignments for graduate students and a description of duties for each. The actual list in a given term depends on the needs of the department.
   (a) **TA positions.**
      i. **TA for Math 141 (Calculus I), Math 142 (Calculus II).**
         A. A graduate student calculus TA meets two sections twice per week for a total of four contact hours.
            1. One section meeting is a recitation. Recitation activities typically reinforce concepts introduced during lecture.
            2. Activities in the second section meeting are at the discretion of the lecturer. It is common for this meeting to be a Maple Lab. The Maple Lab has a coordinator who designs Maple projects and meets with TAs to instruct the TAs on how to present the projects to calculus students.
         B. TAs for Honors sections meet their sections only once per week, typically for Maple Lab. The lecturer runs the recitation.
      ii. **TA for Math 344L.** Math 344L is the computer lab companion for undergraduate linear algebra courses: Math 344 (for engineering and computer science); Math 544 (for math majors). A Math 344L TA has up to 3 sections, each of which meets once per week.
      iii. TAs are sometimes called **GIAs** (Graduate Instructional Assistants).

(b) **Instructor of record** for the following courses. For descriptions, see the relevant section of the Undergraduate Bulletin.

Course #	Course Name	Contact Hours
111	Basic College Mathematics	3
111i	Intensive Basic College Mathematics	5
115	Precalculus Mathematics	5
116	Brief Precalculus Mathematics	5
122	Calculus for Business Administration and Social Sciences	3
151	Calculus Workshop I	5
152	Calculus Workshop II	5
170	Finite Mathematics	3
172	Mathematical Modeling for the Life Sciences	3
174	Discrete Mathematics for Computer Science	3
141, 142, 241, 242, 374	Calculus I, II, III, Elementary Differential Equations, Discrete Structures	3

i. Math 116 meets for half of a semester.
ii. The department offers Math 141, 142, 241, 242 to graduate student instructors only as needed.
iii. Graduate student instructors of record are sometimes called **GTAs** (Graduate Teaching Assistants.)

2. **Summer.**
   (a) Students typically have the same possible course assignments as in the academic year.
   (b) Graduate student instructors with at least two full years of experience are eligible to teach upper-division undergraduate courses (i.e., at the 300- and 500-level), as needed by the department.
   (c) The department does not require students to teach in summers.

3. **Assignments.** The DGS, in consultation with the Assistant Chair, assigns graduate student teaching.
   (a) **First-time graduate student instructors.** The DGS assigns first-year students and other first-time graduate student instructors to be teaching assistants for Math 141 or Math 142. The DGS may assign first-year students with teaching experience to be instructors of record.
   (b) **All other graduate student instructors.**
      i. The DGS assigns teaching to all other graduate student instructors according to the needs of the department, taking into account, for example, student evaluation data from previous semesters.
      ii. Second-year students take Math 792, Pedagogy II, in the fall semester. The DGS assigns these students to be instructors of record if they choose.
      iii. Students may request to swap assignments with each other, but they must make the request to the DGS in a timely manner.
4. **Overloads.** It sometimes happens that the department needs graduate student instructors to fill extra teaching positions or positions that come open unexpectedly. When soliciting students to take on an overload, the DGS may consider factors such as teaching evaluation data and student records of taking on overloads in the past.

5.1.2 Graduate student teaching responsibilities

1. **All graduate student instructors.**
   (a) **Basic expectations.**
      i. Instructors should treat all of their students fairly and consistently.
      ii. Instructors should clearly and directly communicate to their students the method and criteria by which the instructor determines grades.
      iii. Instructors should return graded work in a timely manner.
      iv. Instructors should provide sufficient feedback through the grading process for their students to have an opportunity to improve performance on future work.
   (b) **Office hours.**
      i. The department requires all graduate student instructors to hold at least three office hours and to make themselves available by appointment outside of office hours.
      ii. Graduate student instructors can use time in the Math Tutoring Center (MTC) to count toward their three office hours.
      iii. Graduate student instructors must post their office hours on their office door.

(c) **Grading.**

   i. **Scale.** The university allows instructors to award the standard grades of A, B+, B, C+, C, D+, D and F. While the University allows "plus" grades, corresponding "minus" grades do not exist.

   ii. **Additional grades.** For further information, including definitions and uses of of the grades FN (Failure-Non Attendance), I (Incomplete), W (Withdrawal before penalty deadline), and WF (Withdrawal after penalty deadline), see the relevant section of the Undergraduate Bulletin.

   iii. **Historical data.** The department may provide data on grade distributions in undergraduate courses in recent years. The University provides such data here.

2. **Calculus TAs.**

   (a) A calculus lecturer may ask a TA to assist with exam grading.

      1. The lecturer must provide the TA with a detailed grading rubric.
      2. The lecturer must grade at least half of the exams, and must be present while the TA is grading the exams.

   (b) Homework and quiz grading should not exceed 5 hours per week.

   (c) The DGS may require calculus TAs to log their hours in a spreadsheet; students should not be logging more than 20 hours per week. For details, see ACAF (Academic Affairs) 4.00.

3. **Instructors of record.**

   (a) Syllabus. Instructors of record are responsible for producing a course syllabus. For details on required syllabus contents, see part E of ACAF 2.03. The Center for Teaching Excellence (CTE) website provides useful guidelines for syllabus construction.

      1. The syllabus should clearly state instructional objectives, called learning outcomes. The CTE website also has useful guidelines for learning outcomes.
      2. It should clearly state the method the instructor will use to grade students.
      3. Instructors should enforce policies consistently, fairly, and as they are written.
      4. Instructors should avoid making policy changes to the syllabus during a term. In the event that a change must be made, the instructor must inform all students as soon as the change is made.
      5. Instructors must submit their syllabus to the Chair's Administrative Assistant on or before the start of the term.

   (b) Instructors must be able to provide current and accurate assessment of student progress.

   (c) Instructors must grade and return all student work in a reasonable amount of time.

   (d) Instructors must retain final exams for one year, during which time the instructor should be available to discuss it with any student who took it. If the instructor is unavailable for this purpose, they should make suitable arrangements for another qualified member of the department to discuss it with students who inquire.

5.1.3 Supervision of graduate student teaching

1. **Director of Graduate Studies.** The DGS supervises all graduate student teaching. Complaints about courses taught by graduate students go to the DGS.
2. **Course coordinators.** Coordinators for 111, 111i, 115, 116, 122, 170, and 174 supervise graduate student instructors of record for these courses.
3. **Calculus lecturers.** Math 141 and 142 lecturers supervise the graduate student teaching assistants who run the sections which constitute their lectures.
4. **Observation.**
   (a) The DGS arranges for all first-time instructors to be observed at least once during their first year of instruction.
   (b) The DGS coordinates observation of all other graduate student instructors as necessary.

5.2 Teaching resources for graduate students

1. **Center for Teaching Excellence (CTE).** The CTE website is an extensive resource on all aspects of teaching for the UofSC community.
2. **Course resources.**
   (a) **Course outlines.** Course outlines, which give a list of topics covered, are available in the undergraduate office, LC 413, upon request made to the Undergraduate Program Administrator.
   (b) **Course texts.** Every instructor should obtain appropriate texts and other instructional materials from the undergraduate office.
      i. The department determines texts for 100- and 200-level courses.
      ii. For courses number 300 and higher, instructors should consult with course coordinators on required or expected texts. Instructors should submit textbook adoptions via Faculty Enlight.
3. **Overhead and supplies.**
   (a) Instructors can obtain basic supplies such as chalk, staples, paper clips, etc. from the Graduate Program Administrator or Business Manager.
   (b) Graduate student instructors have access to the copier in LC 317. The Business Manager provides instructors with a username and login.
   (c) Shared printers are accessible from most department computers.
4. **Room reservations.** Instructors may need classroom space outside regular class meetings.
   (a) The department discourages graduate student instructors from using the seminar, meeting, or colloquium rooms (312, 317R, 317S, 407, 412) for this purpose.
   (b) The Graduate Program Administrator can book classroom space for instructors.

5.3 Absences from teaching

The department requires graduate student instructors to take necessary steps when they are unable to fulfill their teaching duties for any reason.

1. The graduate student instructor must make every effort to find a substitute in a timely manner.
2. Substitute candidates must be current mathematics department employees: faculty, instructors, teaching faculty, or eligible graduate students.
3. If the course for which the substitute is needed is a calculus lab or recitation, the graduate student instructor should inform the lecturer.
4. If the instructor is unable to procure a substitute, they should inform the DGS and the Graduate Program Administrator as soon as possible.
   (a) The DGS will either find a substitute or cancel the class.
   (b) Instructors do not have authority to cancel or reschedule a class.

5.4 Administrative policies

5.4.1 Classroom management

1. **Class attendance.**
   (a) Neither the university nor the department requires instructors to take attendance. Nevertheless, instructors may take attendance if they choose, and some do.
   (b) The university's attendance policy allows for instructors to exact a grade penalty for absences in excess of 10 percent of scheduled class sessions. For details on the university's attendance policy, see the relevant section of the Undergraduate Bulletin.
2. **Class cancellation.** All instructors must meet their classes at the regularly scheduled time. Instructors are not allowed to cancel class.
3. **Academic integrity.**
   (a) **Honor Code.**
      i. **Purpose.** The university established the Honor Code to promote honesty and integrity in all aspects of campus culture, especially in its academic programs.
      ii. **Policy.** The Honor Code policy document is STAF (Student Affairs and Academic Support) 6.25.
         A. It contains, for example, definitions of what constitutes an Honor Code violation, procedures for how to address Honor Code violations, and sanctions for students found guilty of violating the Honor Code.
         B. It requires instructors to report all violations to the Office of Student Conduct and Academic Integrity (OSCAI). Instructors report a violation by filing an academic integrity incident report.
   (b) **Promoting integrity.** In addition to, for example, vigilant exam proctoring, instructors are encouraged to promote integrity by incorporating a statement on academic integrity in the course syllabus. Sample statements can be found here.
   (c) **Resources.** Graduate student instructors should feel free to consult with their immediate supervisor (e.g., lecturer, course coordinator, or DGS), or directly with the OSCAI at any time concerning Honor Code issues.

4. **Student behavioral issues.** It is the responsibility of the instructor to report troubling student behaviors.
   (a) **Non-emergencies.**
      1. Instructors can contact their supervisor (e.g., course coordinator, DGS) for assistance and advice, as necessary.
      2. Instructors can also contact the Behavioral Intervention Team (BIT) at 777-4333.

   (b) **Emergencies.** If the situation is serious or an emergency, call 911, or call the campus police at (803) 777 - 4215.

5.4.2 Assessment

1. **Final exams.**

   (a) **University policies.** For details, see the relevant section of the Undergraduate Bulletin.
      i. The University Registrar posts the final exam schedule in advance of every term; it does not permit any deviation from the schedule.
         A. The schedule allows up to 2.5 hours for a final exam.
         B. The university prohibits instructors from using class time at the end of a term to administer the final exam.
         C. An instructor can administer a "conflict" final exam for individual students with excuses deemed valid by the instructor.

      ii. Instructors cannot give a quiz, test, or exam during
         A. the last two class sessions of a class that meets two or three times per week or
         B. the last three class sessions of a class that meets four or five times per week.

   (b) **Department policies.**
      i. Instructors must keep final exams for one year.
      ii. If a graduate student instructor expects not to be in residence for a semester or longer, the instructor should leave grade books, grade records, and final exams with the DGS.

2. **Final grades.** University policy requires instructors to submit grades using Self Service Carolina no later than 72 hours after the date of the scheduled final exams.

5.4.3 Privacy and accommodations for students with disabilities

1. **Student records.** The Family Educational Rights and Privacy Act (FERPA) of 1974 affords students certain rights with respect to their education records. For details, see the relevant section of the Undergraduate Bulletin. Further information is on the Registrar's website.
2. **Students with disabilities.** The Student Disability Resource Center (SDRC) can help instructors accommodate the needs of students with disabilities. If a student discloses they have a disability, encourage the student to register with the SDRC in order to receive accommodations. Students may register at any time.

5.5 Tutoring

1. **Math Tutoring Center (MTC).** Graduate students staff a free drop-in tutoring center in LC 105 every term.
   (a) **Hours.** The following table gives hours assigned by the DGS for fall and spring terms. Assignments for summer are typically different since contact hours are greatly condensed.

Teaching assignment	Tutoring center hours
111, 122, 170, 172, 174	2
TA positions: 141, 142, 344L/544L	1
111i, 115	0
Instructors of record: 141, 142, 221, 222, 241, 242, 374	0

   (b) **"Down time".** Graduate students may do their own work during "down time". However, all graduate student staff must make it clear to undergraduates that they are available for questions.
   (c) **Graded assignments.** A graduate student can ask at any time whether a question concerns graded homework. If a question concerns graded work, then the graduate student should ask for the instructor's policy on giving help.
   (d) **Upper division material.** Graduate student MTC staff are expected to assist undergraduates in all 100- level courses. Graduate students can decide to assist undergraduates on questions on courses numbered 200+ at their discretion.
   (e) **Office hours.** Graduate students may use MTC hours to count toward their 3 total office hours for the course they teach.

2. **Independent tutoring.** Some students offer to tutor for pay outside of the MTC.
   (a) The department prohibits a graduate student from tutoring groups or individuals in any section of any course the graduate student currently teaches or assists in teaching.
   (b) Graduate students may tutor for classes other than those which they currently teach or assist in teaching.

5.6 Student evaluations

1. Undergraduate students complete evaluations of the teaching of their graduate student instructors at the end of every term.
2. Instructors get to see the evaluations after submitting final grades for the term.
   (a) The DGS uses student teaching evaluations in making various decisions such as teaching assignments.
   (b) The GAC uses student teaching evaluations to review student progress and select award winners.

6 Assistantship details

There are two types of graduate assistantships: GTA (teaching assistant) and GRA (research assistant). The Graduate School webpage has basic information on assistantships.

6.1 Qualification, review, and renewal of assistantship status

1. **Merit.** The department awards assistantships on the basis of merit.
2. **Review.** Assistantship status is subject to annual review by the GAC in spring.
   (a) If the assistant is a GTA, the GAC will evaluate their performance in the classroom.
   (b) The GAC evaluates the academic progress of all assistants.
3. **Renewal.** Assistantships are renewable, subject to annual reviews.

6.2 Tuition abatement and stipends

1. **Tuition abatement.**
   (a) Rules.
      i. The College of Arts and Sciences (CAS) funds tuition abatement sufficient for students to meet credit requirements for the Ph.D degree.
      ii. For each student, the DGS determines the specific number of credits in any term for which the CAS provides abatement.
      iii. The sponsor for a RA is responsible for covering the tuition costs for the RA.
   (b) Cost.
      i. The University Bursar lists the cost of a credit.
      ii. Graduate student assistants automatically qualify for in-state tuition.
      iii. Auditing a course. The cost to audit a course is the normal tuition cost. Students who audit a course must pay for it themselves.

2. **Stipends.**
   (a) Teaching assistants earn a stipend according to the following rules.
      i. Academic year.
         A. The base stipend is the amount promised in the letter offering admission.
         B. On passage of the qualifying exam, the stipend increases by $500 for the year ($250 per semester).
         C. On passage of the comprehensive exam, the stipend increases an additional $500 for the year ($250 per semester).
      ii. Summer.
         A. Compensation for graduate student instructors, based on maximum enrollment, is as follows.
            1. Teaching assistants: $1,900 per section.
            2. Instructors of record: $3,500 per 3-credit hour course.
         B. Courses numbered 100 - 599 not meeting minimum enrollment standards may be offered at a reduced level of compensation or they may be cancelled according to the following:

	100%	75%	50%	0% (cancellation)
enrollment	10	8	5	≤ 4

Courses numbered 100 - 599 must have at least 10 students for the instructor to be compensated as in A. 1. and 2. above.

   (b) The sponsor for a research assistant is responsible for covering the RA's stipend during the period in which the student is a RA; the amount of the stipend is up to the sponsor's discretion.

6.3 Hiring details

For further information see ACAF (Academic Affairs) 4.00, "Graduate Assistantships", of the University's Policies and Procedures manual.

1. **Annual hire dates.**
   (a) Academic year (9 months): August 16 - May 15.
   (b) Summer: varies by assignment.
2. **Work parameters.**
   (a) **Hours per week.** The minimum number is 10 and the maximum is 20.
   (b) **Teaching assignments.**
      i. The DGS assigns first-time teaching assistants to act as TAs for either of the first two semesters of calculus.
      ii. To qualify as an instructor of record, a graduate teaching assistant must satisfy either of the following criteria. See item A.1.c of ACAF.1.20, for details.
         A. Hold a Masters degree in mathematics (M.A. or M.S.).
         B. Satisfy all of the following.
            1. Completion of 18 credits of graduate coursework in mathematics.
            2. Direct supervision by a qualified supervisor (e.g., course coordinator, DGS).
            3. Passage of Math 791 and 792, the Department's Mathematics pedagogy sequence for graduate students. Students enroll in these courses for one credit; the courses are "Pass/Fail".
            4. Planned and periodic evaluations by department faculty.
3. **Course loads.** Graduate assistants must take at least six credits in fall and spring semesters to remain full-time; they must take at least three credits in summer to remain full-time. Students may take fewer credits, but at least one credit, if they are on Z-status. The DGS sets the maximum number of credits an individual student can take in any term.
4. **Outside employment.**
   (a) The university and the department expect graduate assistants to devote full-time effort to their studies and assistantship responsibilities. Students are, therefore, discouraged from having additional employment on or off campus while they hold the assistantship appointment. See I.D of ACAF.4.00 for details.
   (b) Students can do independent tutoring if they tutor groups or individuals other than those they currently teach or assist in teaching.
   (c) A student becomes ineligible for Z-status when the student works twenty or more hours outside of the assistantship.
5. **Withdrawal.** A student intending to withdraw from the program must inform the DGS in writing. If the student taught within the last year, the student should leave grade books, grade records, and final exams with the DGS.

6.4 Fees

Graduate students are responsible for paying fees. For details, see the Graduate School's page on Tuition and Fees.

1. **Health insurance.** For more information on health insurance, see Student Health Services' page on Required Health Insurance.
   (a) Health insurance is mandatory for all of the following groups:
      i. Graduate students enrolled in six or more credits in a term.
      ii. Graduate students with assistantships.
      iii. International graduate students.
   (b) Options.
      i. **Enrollment in health insurance through UofSC.**
         A. See Student Health Services' page on Required Health Insurance for premium information.
         B. The Graduate school provides a $1,000 subsidy ($420 in Fall, $580 in Spring) to students enrolling through UofSC. The subsidy is applied automatically to the student's bill.
      ii. **Waiving out.**
         A. Students may provide proof of insurance as follows.
            1. Third-party insurance.
            2. Coverage under parents' plan, if the student is eligible.
         B. There is a published deadline by which time the waiver is to be completed.
         C. If the student does not "waive out", the student's tuition bill is charged.
2. **Application Fee.** $50. This is paid once when the student applies for admission.
3. **Technology Fee.** $200 per year.
4. **Student Health Center Fee.** $190 per year.
5. **International Student Fee.** $200 per semester.

7 Grievances, petitions, and appeals

7.1 Procedures

1. **At the department level.**
   (a) A graduate student who wishes to submit a grievance, petition, or appeal on an issue over which the department has oversight should do so in writing to the DGS.
   (b) If the DGS is party to the grievance, petition, or appeal then the graduate student should direct it in writing to the Department Chair.
   (c) In response to the written request for grievance, petition, or appeal, the DGS or Department Chair, as appropriate, will form a committee to seek resolution on the issue.
2. **Beyond the Department.**
   (a) If a student is not satisfied with the resolution of the matter by the mathematics department, they may address their grievance, petition, or appeal to the University's Committee On Scholastic Standards and Petitions.
   (b) A student wanting to appeal a Graduate School rule should submit their grievance, petition, or appeal in writing to the Dean of the Graduate School. The Dean will either act on the request or refer the matter to the Graduate Council Grievances, Appeals, and Petitions Committee.

7.2 Graduate School Ombudsman

1. **Purpose.** The Graduate School Ombudsman serves as a confidential, neutral, informal and independent resource for graduate student concerns and conflicts.
   (a) The Ombudsman strives for impartiality, fairness and objectivity in the treatment of graduate students and the consideration of their issues.
   (b) The Ombudsman advocates for fair and equitably administered processes, but does not advocate on behalf of the student.
   (c) Communications made to the Graduate School Ombudsman are not notice to the university. However, the Ombudsman may refer individuals to the appropriate place where formal notice to the university can be made.
2. **Communication.** To ensure confidentiality, graduate students with concerns or conflicts should not email the Ombudsman; instead, call (803-777-4243) or arrange a visit (Suite 552, Close-Hipp Building).

8 Equal Opportunity Programs

In order to protect the rights of all people who live and work at UofSC, the Office of Equal Opportunity Programs ensures that the university is in compliance with state and federal anti-discrimination and harassment laws and regulations.

1. If you or someone you know has been the victim of any kind of discrimination or harassment at UofSC, you can file a report online.
2. The university's Student Non-Discrimination and Non-Harassment Policy is STAF 6.24.

9 Awards

9.1 For prospective students

Section 2.1.3 on Fellowships gives information about the University's Presidential Fellowship and the CAS Graduate Stipend Enhancement award.

9.2 Department awards

The Department gives four awards to students annually in late spring.

1. **List of awards.**
   (a) Outstanding graduate student.
   (b) Outstanding graduate student instructor.
   (c) Outstanding first year student.
   (d) Outstanding first year student in applied and computational math.
   (e) Peer award.
2. **Award.** Winners of awards (a) - (d) get a book allowance, which they can claim through the Business Manager. Students have up to one year after leaving USC to claim the award.
3. **Process.** For awards (a) - (d), the DGS solicits nominations from faculty in mid/late spring. The GAC confers in late spring to determine winners, who are announced at a reception in the department at the end of the spring. Graduate students vote on (e).

9.3 Graduate School awards

The Graduate School sponsors grants, fellowships, and scholarships.

1. **Travel Grants.**

   (a) Award. Students apply for up to $500 for domestic travel and up to $800 for international travel to professional meetings.

   (b) Eligibility.

      i. The student must be presenting at the meeting.

      ii. The student needs an invitation letter or an acceptance letter.

   (c) Restrictions.

      i. A student is eligible to receive up to two travel grants over the course of the student's career.

      ii. A student is eligible for no more than one travel grant per fiscal year (July 1 - June 30).

   (d) Process. The application process entails completing and submitting a form online, and securing endorsements from the student's advisor and the DGS. The Graduate School webpage gives deadlines for submission.

2. **Trustee Fellowships.**

   (a) Criteria. Awarded to students who exhibit excellence in research and scholarship.

   (b) Fellowships.

      i. C.C. Royal Graduate Fellowship ($2,500).

      ii. George M. Reeves Graduate Fellowship ($750).

      iii. Dera D. Parkinson Graduate Fellowship ($750).

   (c) Eligibility. All math graduate students are eligible.

   (d) Restrictions. The DGS can nominate up to two students for these awards. If the DGS nominates two students for the same award, the DGS must rank the nominees. All nominees will be considered for any fellowship for which they qualify.

   (e) Process. The DGS submits the nomination application prepared by the nominee online via the Graduate Management System (GMS). The application deadline is in spring.

   (f) Announcement. Winners are announced at the Discover USC awards ceremony in April.

3. **Outstanding Thesis Award.**

   (a) Criteria. Theses are evaluated on the basis of originality, clarity of style and presentation, scholarship, research methodology, and contributions to the field for discipline.

   (b) Award. $250.

   (c) Eligibility. The award is retroactive; it is open to students who completed a thesis in 2019.

   (d) Restrictions. The DGS can nominate up to two candidates.

   (e) Process. The DGS nominates a candidate, the candidate prepares the application, and the DGS submits the application via GMS. The application deadline is in spring.

4. **Outstanding Graduate Student Teaching Award.**
   (a) Criteria. Awarded annually to a graduate instructor or instructional assistant "on the basis of outstanding performance in teaching."
   (b) Award. $1,000.
   (c) Eligibility. Any math graduate student with experience as a GIA or GTA is eligible.
   (d) Process. The DGS nominates a candidate, the candidate prepares the application, and the DGS submits the application via GMS. The application deadline is in spring.
   (e) Announcement. Winners are announced at the Discover USC awards in April.
5. **Dean's Award for Excellence in Leadership.**
   (a) Criteria. The award is "for graduate students at any level who have demonstrated excellence in leadership on campus, in their academic disciplines, or in the community."
   (b) Award. $1,000.
   (c) Eligibility. All math graduate students are eligible.
   (d) Process. The DGS nominates a candidate, the candidate prepares the application, and the DGS submits the application via GMS. The application deadline is in spring.
   (e) Announcement. Winners are announced at the Discover USC awards in April.

9.4 Diversity Fellowship Programs

For information on Diversity Fellowship Programs, see the Graduate School's webpage

1. **Grace Jordan McFadden Professors Program**
   (a) Description. GJMPP is a diversity pipeline program to prepare doctoral and MFA students from underrepresented groups to become college and university professors. For details, see here.
   (b) Award. $6,000 per year up to four years.
   (c) Eligibility. Open to students from underrepresented groups entering years one or two of their graduate careers.
   (d) Process. The student completes the application by April 1. In the case of multiple applicants from math, the DGS will rank the applicants.
   (e) Announcement. May 15.
2. **GEM Consortium** UofSC is part of the Graduate Degrees for Minorities in Engineering and Science (GEM) Consortium. GEM works to increase access and success of underrepresented minority groups in the STEM fields and provides fellowships to underrepresented minority graduate students. GEM's principal activity is the provision of graduate fellowships at the MS and Ph.D. levels coupled with paid summer internships. GEM also offers programming on the importance of graduate school and tools for access and successful matriculation.
3. **SREB-State Doctoral Scholars Program** The SREB (Southern Regional Education Board)-State Doctoral Scholars Program is part of a nationwide initiative to produce more minority Ph.D.s and encourage them to seek faculty positions. Dissertation and Ph.D. fellowships are available to current and prospective UofSC students.

9.5 Awards through the Office of the Vice President for Research

1. **SPARC awards.**
   (a) SPARC stands for "Support to Promote Advancement of Research and Creativity". For more information see the SPARC webpage.
   (b) Award. Up to $5,000 to support research.
      i. "SPARC funds can be used to pay for salary, supplies, travel and other costs essential to completing and promoting funded projects."
      ii. Many math SPARC recipients take the award in summer.
   (c) Eligibility. All math graduates students are eligible.
   (d) Process.
      i. All applicants complete and submit a competitive grant proposal package. The process provides training in grant proposal development.
      ii. Applications are typically due in the middle of the fall semester; the call for applications is typically in early fall.
      iii. Applicants must attend a pre-application workshop.
      iv. Applicants must have a faculty advisor on the proposal.
         A. The faculty advisor should be the student's Ph.D advisor.
         B. The faculty advisor serves as the PI on the grant and submits the proposal; the student is co-PI on the grant.
   (e) Announcement. Applicants learn the result of their proposal the following January.
2. **Breakthrough Graduate Scholars Award.** For details, see the webpage of the VPR (Vice President for Research).
   (a) Criteria. Awarded to students who "demonstrate excellence in the classroom, and make considerable contributions to research and scholarly activities in their field. Examples of award-worthy activity include obtaining fellowships and awards, presenting at national and international conferences, creating performances or exhibitions, publishing papers or book chapters."
   (b) Eligibility. All math graduate students are eligible.
   (c) Restrictions. The DGS can nominate at most one graduate student per year.
   (d) Process. The DGS nominates a student who prepares and submits the nomination application.

9.6 External Awards

There are external awards available to students such as the National Science Foundation's Graduate Research Fellowship. See the NSFGRFP webage for details.

1. Award: three years of support during a five-year fellowship.
   (a) Award comes with a stipend and
   (b) a cost-of-education allowance to the Fellow's institution.
2. Eligibility. Important criteria:
   (a) U.S. citizen, national, or permanent resident.
   (b) Have never earned a masters, professional, or bachelors/masters degree, unless returning to graduate study after an interruption of at least two years.
   (c) Graduate students enrolled in a degree-granting program are limited to only one application to the GRFP, submitted in the first year or at the beginning of the second year of their degree program.
3. The deadline for submission for the Mathematical Sciences is typically in late October.

10 Masters programs

The Department offers four different Masters degree programs.

1. Master of Arts (M.A.).
2. Master of Sciences (M.S.).
3. Master of Mathematics (M.M).
4. Master of Arts in Teaching (M.A.T).

10.1 Program admission

1. The requirements for the the M.A. and M.S. are identical to the requirements for the Ph.D.
2. Admissions requirements for the M.M. and M.A.T. degrees are less stringent.

10.2 Graduate school requirements

For details, see the Graduate Bulletin.

1. **Coursework.**
   (a) The student must complete the Masters Program of Study (MPOS) within one year of enrollment. The MPOS lists all courses taken by the student.
   (b) The student must complete 30 credits.
      i. At most 9 credits of Math 799, Thesis preparation, can be used on the MPOS.
      ii. At least half of the courses listed on the MPOS, exclusive of Math 799, must be at the 700 level or higher.
2. **Comprehensive assessment.** This requirement must be distinct from course requirements. For details, see the relevant section of the Graduate Bulletin.
   (a) **Purpose.** The comprehensive assessment requires a student to synthesize and integrate knowledge acquired in coursework and other learning experiences and to apply theory and principles in a situation that approximates some aspect of professional practice or research in the discipline. It must be used as a means by which faculty judge whether the student has mastered the body of knowledge and can demonstrate proficiency in the required competencies.
   (b) **Models.**
      i. Written and/or oral exams.
      ii. Thesis.
         A. It is typically a short monograph. Its content may come from current research papers, and it may include the student's original contributions.
         B. A committee evaluates the thesis. For details on committee composition, see the relevant section of the Graduate Bulletin.
   (c) **Expiration.** The comprehensive assessment remains valid for two years after which it must be repeated.
3. **Time to degree.** A student has six years from their original enrollment date to complete the Masters degree.

10.3 M.A. and M.S. degrees

10.3.1 M.A. degree

The primary goal of the M.A. (Master of Arts) is to prepare students to enter a Ph.D. program. For details, see the relevant section of the Graduate Bulletin.

1. **Coursework.** A student's program of study for this degree is usually narrower than the M.S. in scope but more intense in content.
   (a) The 30 required credits must all be numbered 700 or higher, exclusive of 7xxI courses.
   (b) A student must have 3 credits of Math 799.
   (c) Required courses. Students must take two year-long sequences:
      i. Math 703 and Math 704 (analysis)
      ii. and either
         A. Math 701 and 702 (algebra), or
         B. Math 708 and 709 (foundations of computational math).
2. **Thesis.** The department requires the student to write a thesis, which could lead to topics of suitable depth for a Ph.D. dissertation.
   (a) The thesis committee consists of a major professor and second reader.
   (b) The department encourages the student to present the thesis in a seminar, but does not require the student to do so.
3. **Comprehensive assessment.** A student satisfies the comprehensive assessment by earning at least a "Masters Pass" on at least one of the qualifying exams.

10.3.2 M.S. degree

The primary goal of the M.S. is to provide broad and intensive preparation for teaching in a junior college or working in industry. For details, see the relevant section of the Graduate Bulletin.

1. **Coursework.** The MPOS for the M.S. degree should emphasize breadth by including courses in both pure and applied math.
   (a) The 30 required credits should be numbered 700 or higher, exclusive of 7xxI courses. However, in special circumstances approved by the DGS, the student's MPOS may include up to 9 credits of 7xxI or 500-level courses if these courses supplement 700-level coursework.
   (b) A student must have 3 credits of Math 799.
   (c) Required courses.
      i. Math 703 (first semester of analysis sequence)
      ii. and either
         A. Math 701 (first semester of algebra sequence) or
         B. Math 708 (first semester of applied and computational math sequence).
2. **Thesis.** The Department requires the student to write a thesis; the thesis committee consists of a major professor and a second reader.
3. **Comprehensive assessment.**
   (a) The student fulfills the requirement with an oral defense of the thesis.
   (b) The student may also fulfill the requirement by earning a "Masters Pass" on at least one of the qualifying exams. In this case, the department encourages the student to present the thesis in a seminar, but does not require the student to do so.

10.3.3 Transition from Ph.D. to M.A. or M.S.

In the event that a student in the Ph.D program fails to pass the qualifying exams by January of the second year, the student exits the Ph.D and program and completes the necessary forms to enter a suitable Masters program.

1. **Transition to M.A.**
   (a) A student with at least a Masters Pass on at least one qualifying exam meets the comprehensive assessment requirement for the M.A. degree and is eligible for that degree or the M.S. degree.
   (b) To complete the M.A. degree, the student writes a thesis. The Department encourages the student to present the thesis in a seminar, but does not require the student to do so.
2. **Transition to M.S.**
   (a) A student without at least a Masters Pass on any qualifying exam is eligible for the M.S. degree but not the M.A. degree.
   (b) To complete the degree, the student writes a thesis and gives an oral defense of it.

10.4 M.M. and M.A.T. degrees

The M.M. (Masters in Mathematics) and M.A.T. (Masters of Arts in Teaching) degrees are specialized degrees whose primary goals are to prepare the student to teach math at the secondary school or junior/community college levels. Neither of these degrees requires a thesis.

10.4.1 M.M. degree

The primary goal of the M.M. degree is to provide broad and thorough training in mathematics through course work specifically designed to meet the needs of mathematics educators of either of two types: secondary-school teachers for whom South Carolina certification is not an issue; those intending to teach at the junior/community college level. For details on the MM degree, see the relevant section of the Graduate Bulletin.

1. **Admissions.**
   (a) Requirements.
      i. Applicants must have a Bachelor's degree from an approved institution of higher education.
      ii. Applicants must have at least 6 credits beyond Math 241, multivariable calculus.
      iii. Applicants must have at least a "B" average in all college-level math courses.
      iv. The department prefers applicants with Math 300, transition to advanced mathematics, or its equivalent. Math 300 is a prerequisite for all 500-level courses; it does not count toward the student's MPOS.

   (b) Application. Applicants submit applications online. Applications consist of the following items:
      i. Official transcripts from every institution of higher education previously attended by the applicant at which the applicant earned a grade, including a pass/fail grade.
      ii. At least two letters of recommendation from persons familiar with the applicant's math abilities.
      iii. General GRE scores (math and verbal).

2. **Coursework.**
   (a) A student must complete 30 credits.
   (b) If a student does not have credit for Math 300 or its equivalent, then the student must take this course. It is a prerequisite for all 500-level courses. It does not, however, count toward the student's MPOS.
   (c) Required courses.
      i. Core sequences.
         A. Math 701I/546 and 702I/547 (algebra) and
         B. Math 703I/554 and 704I/555 (analysis).
      ii. Geometry: Math 531 (Euclidean geometry) or Math 736I/532 (modern geometry).
      iii. Linear algebra: Math 544.
      iv. Breadth.
         A. Discrete math: Math 574.
         B. Number theory: Math 780I/580.
         C. Probability and statistics: one of Stat 509, Math 511, Stat 515.
   (d) A student may take up to 3 credits outside of Math, Statistics, or Computer Science.
3. **Comprehensive assessment.**
   (a) The comprehensive assessment consists of two written exams, each 2 hours long. One exam is based on the year-long algebra sequence (Math 701I/546 and 702I/547); the other is based on the the year-long analysis sequence (Math 703I/554 and 704I/555).
   (b) The DGS appoints faculty to write the exams; typically they are faculty who taught the relevant courses to the student.
   (c) Students can take the comprehensive exam at any time after completing the corresponding coursework.

10.4.2 M.A.T. degree

The Department offers the M.A.T. (Master of Arts in Teaching) degree jointly with the College of Education. The primary goal of the M.A.T. degree is to prepare students to obtain teaching certification in mathematics at the secondary school level. For details on the program including information on both math and education requirements, see the relevant section of the Graduate Bulletin.

1. **Admissions.**
   (a) Requirements.
      i. Applicants must have a Bachelor's degree from an approved institution of higher education.
      ii. Applicants must have coursework up to and including Math 241.
      iii. Applicants must have at least a "B" average in all college-level math courses.
      iv. The department prefers applicants with at least 6 credits beyond Math 241. Most often these 6 credits come from linear algebra (Math 544) and discrete math (Math 574).
      v. The department may admit applicants with background deficiencies on a probationary basis. Such deficiencies include, for example, missing any of Math 241, Math 300, Math 544, or Math 574.
   (b) Application. Applicants submit applications online. Applications consist of the following items:
      i. Official transcripts from every institution of higher education previously attended by the applicant at which the applicant earned a grade, including a pass/fail grade.
      ii. At least two letters of recommendation from persons familiar with the applicant's math abilities.
      iii. General GRE scores (math and verbal).
2. **Coursework.**
   (a) A student must complete 30 credits.
   (b) Between 6 and 15 of the 30 credits must be in education courses.
   (c) At least 15 credits must be in math and statistics courses.
   (d) Required math courses. If the student already took these courses or their equivalents, then the student will substitute suitable elective courses.
      i. Remediation of deficiencies. Students who do not have any of Math 241, Math 300, Math 544, or Math 574 must take these courses prior to full admission. Math 300 is a prerequisite for all 500-level math courses.
      ii. Core courses.
         A. Math 701I/546 (first semester of algebra sequence).
         B. Math 703I/554 (first semester of analysis sequence).
      iii. Math 300 (Transition to advanced mathematics). It is a prerequisite for all 500-level courses.
      iv. Geometry: Math 531 (Euclidean geometry) or Math 736I/532 (modern geometry).
      v. Number theory: Math 780I/580.
      vi. Statistics: Stat 509 or Stat 515 and Stat 516.

3. **Comprehensive assessment.** The comprehensive assessment consists of a written exam covering the student's MPOS and emphasizing the theoretical underpinnings of calculus, the basic forms of mathematical reasoning, argumentation, and proof, a repertoire of fundamental examples and counter-examples, problem solving, and insight into how these can inform the teaching of secondary mathematics. Geometric and statistical reasoning will frequently be called upon; students will generally be free to draw on their knowledge of analysis, algebra, discrete mathematics, or number theory as they see fit to demonstrate forms of mathematical argumentation and proof.

Appendices

A Applied and computational mathematics (ACM) Ph.D track

A.1 Overview

For details, see the ACM Curriculum page.

1. **Purpose**
   (a) To implement a modern applied and computational mathematics curriculum into graduate training.
   (b) To support science and engineering education and research on the University of South Carolina campus.
   (c) To foster interdisciplinary research across various disciplines in science, engineering, and medicine.
2. **Concentrations.**
   (a) Applied mathematics.
   (b) Computational mathematics.
   (c) Interdisciplinary mathematics.
3. **Research areas.**
   (a) Applied analysis and asymptotic analysis.
   (b) Applied harmonic analysis, approximation theory, and application of wavelets.
   (c) Computational algorithm development and analysis.
   (d) Computational fluid dynamics, rheology of complex fluids, and computational nanoscience.
   (e) Computational biology and cell dynamics.
   (f) Fluid dynamics, multiphase flows, and fluid flow in porous media.
   (g) Energy research, electron transport, and thermal transport.
   (h) High performance computing and simulation of fluid flows and interfacial phenomena.
   (i) Mathematical modeling and multiscale modeling of biological and nano materials.
   (j) Mathematical biology and cellular dynamics.
   (k) Partial differential equations and wave propogations.
   (l) Signal and image processing and $3 - D$ visualization and pattern recognition.
   (m) Combinatorics, computational combinatorics, and stochastic combinatorics.
   (n) Network theory, graph theory, and discrete algorithms.

A.2 Curriculum

1. **Sequences.** We list the following coherent course sequences for reference.

Reference	Mathematical descriptor	Course title	Course number
S1	real and complex analysis	Analysis I and II	703, 704
S2	foundations of computational mathematics	Foundations of Computational Mathematics I and II	708, 709
S3	mathematical modeling	Applied Mathematics I and II	720, 721
S4	theory of advanced differential equations	Differential Equations I and II	723, 724
S5	numerical differential equations	Numerical Differential Equations I and II	726, 727
S6	functional analysis	Functional Analysis I and Applied Functional Analysis	756, 755
S7	probability theory	Probability I and II	710, 711 (cross-listed as STAT 810, 811)
S8	approximation theory	Approximation Theory and Nonlinear Approximation Theory	725, 729

2. **Qualifying exams.**
   (a) Most, if not all ACM students take qualifying exams based on sequences S1 (analysis) and S2 (computational mathematics).
   (b) Students who advance to candidacy by passing the algebra sequence (701, 702) rather than sequence S2 (708, 709), can use S2 or a year-long sequence in scientific computing to satisfy the breadth requirement.

3. **Comprehensive exam courses.** All Ph.D. students take a written and oral comprehensive exam based on three year-long course sequences (6 courses total). The comprehensive course sequences for ACM students come from two groups.

   (a) **Group G1.** Core areas: applied mathematics and differential equations.

Reference	Mathematical descriptor	Course title	Course number
S3	mathematical modeling	Applied Mathematics I and II	720, 721
S4	theory of advanced differential equations	Differential Equations I and II	723, 724
S5	numerical differential equations	Numerical Differential Equations I and II	726, 727

   (b) **Group G2.** Emphasis electives: areas most closely relevant to applied and computational mathematics.

Reference	Mathematical descriptor	Course title	Course number
S6	functional analysis	Functional Analysis I and Applied Functional Analysis	756, 755
S7	probability theory	Probability I and II	710, 711 (cross-listed as STAT 810, 811)
S8	approximation theory	Approximation Theory and Nonlinear Approximation Theory	725, 729
	Fourier analysis and wavelets	Fourier Analysis and Wavelets	750, 751
	discrete mathematics	Discrete Mathematics I and II	774, 775
	graph theory	Graph Theory I and II	776, 777
	optimization	Optimization and Discrete Optimization	722, 770
	two closely related courses	Topics in Applied Mathematics	at least one course listed as 728x

   (c) Rules for creating a comprehensive exam syllabus.

      i. Students much choose the first comprehensive sequence from group G1.

      ii. Students may choose the second comprehensive sequence from either group G1 or group G2. *These sequences distinguish ACM students.*

      iii. Students must choose the third comprehensive sequence from group G2 but not group G1. Alternatively, students may choose any other approved sequence which does not overlap with either of the first two sequences.

4. **Breadth requirement.** A student must take at least 12 credits (4 courses) beyond the courses covering their qualifying exams and their comprehensive exams.

   (a) List of areas.

Mathematical descriptor/explanation	References	Course numbers
numerical analysis or similar topics in approximation theory, functionals and operators, linear and nonlinear systems of equations, preconditioning, eigenvalue problems, domain decomposition	S2 (if not used for qual exams)	708, 709, 728x
mathematical modeling or similar topics in dimensional analysis, scaling, perturbation methods, calculus of variations, financial mathematics, models of continua, gas dynamics, complex fluids, multiscale analysis	S3	720, 721
differential equations or similar topics in ODEs, PDEs, integral equations	S4	723, 724
numerical methods for differential equations or similar topics in finite difference methods, finite element and volume methods, variational methods, multigrid methods	S5	726, 727
analysis: topics in real, complex, and functional; analytic number theory	S6 or other suitable courses in analysis	752, 754, 755, 756, 757, 782, 783
stochastic methods or similar topics from stochastic differential equations, probability, learning theory	S7	710, 711 (cross-listed as STAT 810, 811)
applied analysis: topics in approximation theory, Fourier analysis, wavelets	S8	725, 729, 750, 751
discrete mathematics: topics in discrete mathematics, graph theory	N/A	774, 775, 776, 777
scientific computing or similar topics in parallel computing, molecular dynamics simulation, data structures, numerical optimization, GPU computing, visualization, Monte Carlo simulation	N/A	772, 770, 728x
pure mathematics: topics in algebra, geometry, topology, logic, number theory outside of topics in analysis covered elsewhere	N/A	701, 702, 73x, 74x, 76x, 780, 784, 785, 788x
interdisciplinary applications: chemistry, physics, biology, geology, nanosciences	N/A	700-level

(b) Rules for choosing breadth courses.

   i. Students should gain exposure to at least 7 of the 11 breadth areas.

   ii. The comprehensive exam covers 3 of these; students need 4 more.

5. **Remarks.**

   (a) A course taken to satisfy the breadth requirement can be classified in no more than one breadth area.

   (b) Courses from the qualifying exam sequences do not satisfy the breadth requirement.

   (c) The breadth area of topics courses (728x) will be designated when the instructor announces the course.

   (d) Relevant courses from departments outside of Mathematics can be approved for any of the breadth areas.

B Special enrollment status (Z-status)

When a student completes all required non-899 courses and approaches 60 credits but is not ready to graduate, the student must enroll in Z-status (also called Special Enrollment Status). Enrollment in Z-status allows students to maintain full-time status while taking fewer than 6 credits in fall or spring and fewer than 3 credits in summer. Appropriate use of Z-status ensures that students do not exceed 60 credits over a career, or at least that students exceed 60 credits minimally. A summary of important facts on Z-status is as follows. For further details, see the relevant section of the Graduate Bulletin.

1. **Eligibility requirements.**
   (a) Student has completed all of their coursework except for 899.
   (b) Student is working full-time on thesis.
   (c) Student is not employed outside of their assistantship, or if applicable, employed no more than half-time (20 hours) if not on a graduate assistantship.
   (d) A program of study (POS) form is required.
2. **Limitations.**
   (a) Students can be on Z-status during any of fall, spring, or summer terms.
   (b) Students can be on Z-status for up to two years; approval is a formality.
   (c) The online documentation states that Z-status is limited to two terms. **This is false**.
   (d) Students can petition for a third year of Z-status; however, there is no guarantee of approval for a third year.
   (e) Once a student is on Z-status, the student must remain on Z-status for the balance of their graduate career.
3. **Application process.**
   (a) **How to apply.** A student must
      i. complete the online form,
      ii. get the DGS or their advisor to sign the form,
      iii. submit the form or a scanned electronic version of it to the Graduate Administrator, who will send it to the Graduate School.
   (b) **When to apply.**
      i. Students must apply before every term in which they wish to be on Z-status (fall, spring, summer). Students should do this in a timely manner, say at least one or more weeks in advance of the term, to allow time for processing.
      ii. The online documentation states that it is enough for students to request Z-status once per year. While this may be true in theory, it is **false** in practice.

C Summary of timeline to Ph.D. degree

The following table gives the major benchmarks on the way to earning the Ph.D degree. For more information, see the Graduate School webpage. This webpage has important dates, deadlines, and forms.

Event	Deadline
qualifying exam	January of year two
doctoral program of study	end of year two
comprehensive exam	60 days prior to expected graduation date
graduation application	85 days prior to expected graduation date
final version of dissertation to dissertation committee	45 days prior to expected graduation date
dissertation format check	30 days prior to expected graduation date
dissertation defense	
dissertation submitted to Graduate School	20 days prior to graduation

D Example course programs

Most UofSC Ph.D students graduate in at most five years. This section provides example course programs for students depending on whether it takes 4, 5, or 6 years to finish. Furthermore, the programs below make the following assumptions:

- Students graduate in May of the designated year,
- students teach in all eligible summers,
- students take Math 791 and Math 792.

Not all students conform to these assumptions. Hence, there is flexibility in the programs below, primarily arising from the large number of ways to distribute credits for Math 899.

D.1 Graduation in May of year four

Year 1	Credits	Courses	Year 2	Credits	Courses
Fall	9	2 qual courses, 1 elective course	Fall	10	3 elective courses 1 credit of 792
Spring	10	2 qual courses 1 elective course 1 credit of 791	Spring	9	3 elective courses
Summer	3	899: qual prep	Summer	3	899: comp prep
Total	22	Overall: 22	Total	22	Overall: 44
Year 3	**Credits**	**Courses**	**Year 4**	**Credits**	**Courses**
Fall	6	3 courses (electives)	Fall	1	1 credit of 899 (Z-status)
Spring	6	0 - 2 courses (electives) 0 - 6 credits of 899 (Z-status)	Spring	1	1 credit of 899 (Z-status)
Summer	2	2 credits of 899 (Z-status)			
Total	14	Overall: 58	Total	2	Overall: 60

D.2 Graduation in May of year five

Year 1	Credits	Courses	Year 2	Credits	Courses
Fall	9	2 qual courses, 1 elective course	Fall	10	3 elective courses 1 credit of 792
Spring	10	2 qual courses 1 elective course 1 credit of 791	Spring	9	3 elective courses
Summer	3	899: qual prep	Summer	3	899: comp prep
Total	22	Overall: 22	Total	22	Overall: 44

Year 3	Credits	Courses	Year 4	Credits	Courses
Fall	6	3 courses (electives)	Fall	1	1 credit of 899 (Z-status)
Spring	4 - 6	0 - 2 elective courses 0 - 6 credits of 899 (Z-status)	Spring	1	1 credit of 899 (Z-status)
Summer	1	1 credit of 899 (Z-status)	Summer	1	1 credit of 899 (Z-status)
Total	11 - 13	Overall: 55 - 57	Total	3	Overall: 58 - 60

Year 5	Credits	Courses
Fall	1	1 credit of 899 (Z-status)
Spring	1	1 credit of 899 (Z-status)
Total	2	Overall: 60 - 62

D.3 Graduation in May of year six

Year 1	Credits	Courses	Year 2	Credits	Courses
Fall	9	2 qual courses, 1 elective course	Fall	10	3 elective courses 1 credit of 792
Spring	10	2 qual courses 1 elective course 1 credit of 791	Spring	9	3 elective courses
Summer	3	899: qual prep	Summer	3	899: comp prep
Total	22	Overall: 22	Total	22	Overall: 44
Year 3	Credits	Courses	Year 4	Credits	Courses
Fall	6	3 courses (electives)	Fall	1	1 credit of 899 (Z-status)
Spring	1 - 6	0 - 2 elective courses 0 - 6 credits of 899 (Z-status)	Spring	1	1 credit of 899 (Z-status)
Summer	1	1 credit of 899 (Z-status)	Summer	1	1 credit of 899 (Z-status)
Total	8 - 13	Overall: 52 - 57	Total	3	Overall: 55 - 60
Year 3	Credits	Courses	Year 4	Credits	Courses
Fall	1	1 credit of 899 (Z-status)	Fall	1	1 credit of 899 (Z-status)
Spring	1	1 credit of 899 (Z-status)	Spring	1	1 credit of 899 (Z-status)
Summer	1	1 credit of 899 (Z-status)			
Total	3	Overall: 58 - 63	Total	2	Overall: 60 - 65

E Math graduate courses

Number	Title	Description
700	Linear Algebra	Vector spaces, linear transformations, dual spaces, decompositions of spaces, and canonical forms.
701	Algebra I	Algebraic structures, sub-structures, products, homomorphisms, and quotient structures of groups, rings, and modules.
702	Algebra II	Fields and field extensions. Galois theory, topics from transcendental field extensions, algebraically closed fields, finite fields.
703	Analysis I	Compactness, completeness, continuous functions. Outer measures, measurable sets, extension theorem and Lebesgue-Stieltjes measure. Integration and convergence theorems. Product measures and Fubini's theorem. Differentiation theory. Theorems of Egorov and Lusin. L_p-spaces. Analytic functions: Cauchy-Riemann equations, elementary special functions. Conformal mappings. Cauchy's integral theorem and formula. Classification of singularities, Laurent series, the Argument Principle. Residue theorem, evaluation of integrals and series.
704	Analysis II	Topics in description of 703 not covered in 703.
705	Analysis III	Signed and complex measures, Radon-Nikodym theorem, decomposition theorems. Metric spaces and topology, Baire category, Stone-Weierstrass theorem, Arzela-Ascoli theorem. Introduction to Banach and Hilbert spaces, Riesz representation theorems.
708	Foundations of Computational Mathematics I	Approximation of functions by algebraic polynomials, splines, and trigonometric polynomials; numerical differentiation; numerical integration; orthogonal polynomials and Gaussian quadrature; numerical solution of nonlinear systems, unconstrained optimization.
709	Foundations of Computational Mathematics II	Vectors and matrices; QR factorization; conditioning and stability; solving systems of equations; eigenvalue/eigenvector problems; Krylov subspace iterative methods; singular value decomposition. Includes theoretical development of concepts and practical algorithm implementation.
710	Probability Theory I	Probability spaces, random variables and distributions, expectations, characteristic functions, laws of large numbers, and the central limit theorem.

Number	Title	Description
711	Probability Theory II	More about distributions, limit theorems, Poisson approximations, conditioning, martingales, and random walks.
720	Applied Mathematics I	Modeling and solution techniques for differential and integral equations from sciences and engineering, including a study of boundary and initial value problems, integral equations, and eigenvalue problems using transform techniques, Green?s functions, and variational principles.
721	Applied Mathematics II	Foundations of approximation of functions by Fourier series in Hilbert space; fundamental PDEs in mathematical physics; fundamental equations for continua; integral and differential operators in Hilbert spaces. Basic modeling theory and solution techniques for stochastic differential equations.
722	Numerical Optimization	Topics in optimization; includes linear programming, integer programming, gradient methods, least squares techniques, and discussion of existing mathematical software.
723	Differential Equations I	Elliptic equations: fundamental solutions, maximum principles, Green's function, energy method and Dirichlet principle; Sobolev spaces: weak derivatives, extension and trace theorems; weak solutions and Fredholm alternative, regularity, eigenvalues and eigenfunctions.
724	Differential Equations II	Detailed study of the following topics: method of characteristics; Hamilton-Jacobi equations; conservation laws; heat equation; wave equation; linear parabolic equations; linear hyperbolic equations.
725	Approximation Theory	Approximation of functions; existence, uniqueness and characterization of best approximants; Chebyshev's theorem; Chebyshev polynomials; degree of approximation; Jackson and Bernstein theorems; B-splines; approximation by splines; quasi-interpolants; spline interpolation.
726	Numerical Differential Equations I	Elliptic equations: fundamental solutions, maximum principles, Green?s function, energy method and Dirichlet principle; Sobolev spaces: weak derivatives, extension and trace theorems; weak solutions and Fredholm alternative, regularity, eigenvalues and eigenfunctions.

Number	Title	Description
727	Numerical Differential Equations II	Ritz and Galerkin weak formulation. Finite element, mixed finite element, collocation methods for elliptic, parabolic, and hyperbolic PDEs, including development, implementation, stability, consistency, convergence analysis, and error estimates.
728	Topics in Applied Mathematics	Content varies.
729	Nonlinear Approximation	Nonlinear approximation from piecewise polynomial (spline) functions in the univariate and multivariate case, characterization of the approximation spaces via Besov spaces and interpolation, Newman's and Popov's theorems for rational approximation, characterization of the approximation spaces of rational approximation, nonlinear n-term approximation from bases in Hilbert spaces and from unconditional bases in L_p ($p > 1$), greedy algorithms, application of nonlinear approximation to image compression.
730	General Topology I	Topological spaces, filters, compact spaces, connected spaces, uniform spaces, complete spaces, topological groups, function spaces.
731	General Topology II	Topics in description of 730 not covered in 731.
732	Algebraic Topology I	The fundamental group, homological algebra, simplicial complexes, homology and cohomology groups, cup-product, triangulable spaces.
733	Algebraic Topology II	Topics in description of 732 not covered in 732.
734	Differential Geometry	Differentiable manifolds; classical theory of surfaces and hypersurfaces in Euclidean space; tensors, forms and integration of forms; connections and covariant differentiation; Riemannian manifolds; geodesics and the exponential map; curvature; Jacobi fields and comparison theorems, generalized Gauss-Bonnet theorem.
735	Lie Groups	Manifolds; topological groups, coverings and covering groups; Lie groups and their Lie algebras; closed subgroups of Lie groups; automorphism groups and representations; elementary theory of Lie algebras; simply connected Lie groups; semisimple Lie groups and their Lie algebras.
737	Introduction to Complex Geometry I	Algebraic geometry over the complex numbers, using ideas from topology, complex variable theory, and differential geometry.

Number	Title	Description
738	Topics in Geometry and Topology	Content varies.
739	Introduction to Complex Geometry II	Topics in the description of 737 not covered in 737.
741	Algebra III	Theory of groups, rings, modules, fields and division rings, bilinear forms, advanced topics in matrix theory, and homological techniques.
742	Representation Theory	Representation and character theory of finite groups (especially the symmetric group) and/or the general linear group, Young tableaux, the Littlewood Richardson rule, and Schur functors.
743	Lattice Theory	Sublattices, homomorphisms and direct products of lattices; freely generated lattices; modular lattices and projective geometries; the Priestley and Stone dualities for distributive and Boolean lattices; congruence relations on lattices.
744	Matrix Theory	Extremal properties of positive definite and hermitian matrices, doubly stochastic matrices, totally non-negative matrices, eigenvalue monotonicity, Hadamard-Fisher determinantal inequalities.
746	Commutative Algebra	Prime spectrum and Zariski topology; finite, integral, and flat extensions; dimension; depth; homological techniques, normal and regular rings.
747	Algebraic Geometry	Properties of affine and projective varieties defined over algebraically closed fields, rational mappings, birational geometry and divisors especially on curves and surfaces, Bezout?s theorem, Riemann-Roch theorem for curves.
748	Topics in Algebra	Content varies.
750	Fourier Analysis	The Fourier transform on the circle and line, convergence of Fejer means; Parseval?s relation and the square summable theory, convergence and divergence at a point; conjugate Fourier series, the conjugate function and the Hilbert transform, the Hardy-Littlewood maximal operator and Hardy spaces.

Number	Title	Description
751	Mathematical Theory of Wavelets	The L_1 and L_2 theory of the Fourier transform on the line, bandlimited functions and the Paley-Weiner theorem, Shannon-Whittacker Sampling Theorem, Riesz systems, Mallat-Meyer multiresolution analysis in Lebesgue spaces, scaling functions, wavelet constructions, wavelet representation and unconditional bases, nonlinear approximation, Riesz?s factorization lemma, and Daubechies? compactly supported wavelets.
752	Complex Analysis	Normal families, meromorphic functions, Weierstrass product theorem, conformal maps and the Riemann mapping theorem, analytic continuation and Riemann surfaces, harmonic and subharmonic functions.
754	Several Complex Variables	Properties of holomorphic functions of several variables, holomorphic mappings, plurisubharmonic functions, domains of convergence of power series, domains of holomorphy and pseudoconvex domains, harmonic analysis in several variables.
755	Applied Functional Analysis	Banach spaces, Hilbert spaces, spectral theory of bounded linear operators, Fredholm alternatives, integral equations, fixed point theorems with applications, least square approximation.
756	Functional Analysis I	Linear topological spaces; Hahn-Banach theorem; closed graph theorem; uniform boundedness principle; operator theory; spectral theory; topics from linear differential operators or Banach algebras.
757	Functional Analysis II	Topics in description of 756 not covered in 756.
758	Topics in Analysis	Content varies.
760	Set Theory	An axiomatic development of set theory: sets and classes; recursive definitions and inductive proofs; the axiom of choice and its consequences; ordinals; infinite cardinal arithmetic; combinatorial set theory.
761	Theory of Computable Functions	Models of computation; recursive functions, random access machines, Turing machines, and Markov algorithms; Church's Thesis; universal machines and recursively unsolvable problems; recursively enumerable sets; the recursion theorem; the undecidability of elementary arithmetic.

Number	Title	Description
762	Model Theory	First order predicate calculus; elementary theories; models, satisfaction, and truth; the completeness, compactness, and omitting types theorems; countable models of complete theories; elementary extensions; interpolation and definability; preservation theorems; ultraproducts.
768	Topics in Foundations of Mathematics	Content varies.
770	Discrete Optimization	The application and analysis of algorithms for linear programming problems, including the simplex algorithm, algorithms and complexity, network flows, and shortest path algorithms. No computer programming experience required.
774	Discrete Mathematics I	An introduction to the theory and applications of discrete mathematics. Topics include enumeration techniques, combinatorial identities, matching theory, basic graph theory, and combinatorial designs.
775	Discrete Mathematics II	A continuation of MATH 774. Additional topics will be selected from: the structure and extremal properties of partially ordered sets, matroids, combinatorical algorithms, matrices of zeros and ones, and coding theory.
776	Graph Theory I	The study of the structure and extremal properties of graphs, including Eulerian and Hamiltonian paths, connectivity, trees, Ramsey theory, graph coloring, and graph algorithms.
777	Graph Theory II	Continuation of MATH 776. Additional topics will be selected from: reconstruction problems, independence, genus, hypergraphs, perfect graphs, interval representations, and graph-theoretical models.
778	Topics in Discrete Mathematics	Content varies.
780	Elementary Number Theory	Diophantine equations, distribution of primes, factoring algorithms, higher power reciprocity, Schnirelmann density, and sieve methods.
782	Analytic Number Theory I	The Prime Number Theorem, Dirichlet's theorem, the Riemann zeta function, Dirichlet's L-functions, exponential sums, Dirichlet series, Hardy-Littlewood method partitions, and Waring's problem.

Number	Title	Description
783	Analytic Number Theory II	Topics in description of 782 not covered in 782.
784	Algebraic Number Theory	Algebraic integers, unique factorization of ideals, the ideal class group, Dirichlet's unit theorem, application to Diophantine equations.
785	Transcendental Number Theory	Thue-Siegel-Roth theorem, Hilbert's seventh problem, diophantine approximation.
788	Topics in Number Theory	Content varies.
791	Mathematics Pedagogy I	First of two required math pedagogy courses for graduate assistants in the department. Pedagogical topics include assessment theory, discourse, theory, lesson planning, and classroom management. Applications assist graduate students with syllabus/lesson/assessment creation, teacher questioning, midcourse evaluations, and student learning and engagement. **Pass/Fail Grading; 0 - 1 credits.**
792	Mathematics Pedagogy II	Second of two required math pedagogy courses for graduate assistants in the department. Pedagogical topics include student-learning and reflection theories, sociomathematical norms, and constructivism. Applications assist graduates with lesson/revision/reflection, student-centered investigations, curriculum problem solving and metacognition. **Pass/Fail Grading; 0 - 1 credits.**
798	Directed Readings and Research	Independent study.
890	Graduate Seminar	A review of current literature in specified subject areas involving student presentations. Content varies. **1 - 3 credits.**
899	Dissertation Preparation	For doctoral candidates. **1 - 6 credits.**

F Courses offered since Fall 2013

Fall 2019			Spring 2020
number	course	instructor	
701	Algebra I	Kustin	
703	Analysis I	Dilworth	
708	Computational Math I	Binev	
723	Differential Equations	Tan	
725	Approximation Theory	Petrushev	
726	Numerical Differential Equations I	Wang, H.	
737	Complex Geometry I	Kass	
776	Graph Theory I	Czabarka	
782	Analytic Number Theory	Thorne	

Fall 2018			Spring 2019		
number	course	instructor	number	course	instructor
701	Algebra I	Vraciu	702	Algebra II	Vraciu
703	Analysis I	Dilworth	704	Analysis II	Schep
708	Computational Math I	Sun	709	Computational Math II	Sun
720	Applied Math I	Vasquez	728	Machine Learning	Dahmen
			730	General Topology I	Nyikos
746	Commutative Algebra	Kustin	747	Algebraic Geometry	Duncan
748	Local Methods in Arithmetic Geometry	Kass	748	Advanced Topics in Commutative Algebra	Kustin
774	Discrete Math I	Szekely	775	Discrete Math II	Szekely
			778	Probabilistic Methods in Discrete Math	Lu
788	Computational Number Theory	Filaseta	780	Elementary Number Theory	Trifonov

Fall 2017			Spring 2018		
number	course	instructor	number	course	instructor
701	Algebra I	Thorne	702	Algebra II	Thorne
703	Analysis I	Androulakis	704	Analysis II	Androulakis
708	Computational Math I	Yang	709	Computational Math II	Yang
726	Numerical Differential Equations I	Wang, Q.	727	Numerical Differential Equations II	Wang, Q.
733	Algebraic Topology II	Howard			
737	Complex Geometry I	Ballard	739	Complex Geometry II	Howard
			748	Cohomology of Vector Bundles and Syzygies	Kustin
756	Functional Analysis I	Girardi	757	Functional Analysis II	Girardi
761	Computable Functions	McNulty			
776	Graph Theory I	Lu	777	Graph Theory II	Lu
			778	Combinatorial Complexity	Cooper
785	Transcendental Number Theory	Trifonov	784	Algebraic Number Theory	Boylan

Fall 2016			Spring 2017		
number	course	instructor	number	course	instructor
701	Algebra I	Duncan	702	Algebra II	Duncan
703	Analysis I	Girardi	704	Analysis II	Girardi
708	Computational Math I	Yang			
723	Differential Equations I	Ju	724	Differential Equations II	Ju
735	Lie Groups	Thorne	732	Algebraic Topology I	Howard
746	Commutative Algebra	Vraciu	747	Algebraic Geometry	McFaddin
750	Fourier Analysis	Petrushev	751	Wavelets	Petrushev
762	Model Theory	McNulty	768	Equational Logic	McNulty
774	Discrete Math I	Griggs	775	Discrete Math II	Griggs
			778	Linear Algebraic Methods in Discrete Math	Szekely
788	Irreducible Polynomials I	Filaseta	788	Irreducible Polynomials II	Filaseta

Fall 2015			**Spring 2016**		
number	course	instructor	number	course	instructor
701	Algebra I	Ballard	702	Algebra II	Ballard
703	Analysis I	Schep	704	Analysis II	Schep
708	Computational Math I	Binev	709	Computational Math II	Binev
720	Applied Math I	Wang, Z.	721	Applied Math II	Wang, Z.
725	Approximation Theory	Petrushev	729	Nonlinear Approximation	Petrushev
726	Numerical Differential Equations I	Wang, H.	728	Numerical Solution of Stochastic Differential Equations	Wang, H.
			738	Differential Topology	Howard
747	Algebraic Geometry	Kass	742	Representation Theory	Duncan
748	Local Cohomology	Kustin			
758	Stochastic Calculus I	Dilworth	758	Stochastic Calculus II	Dilworth
776	Graph Theory I	Czabarka	777	Graph Theory II	Czabarka
778	Probabilistic Methods in Discrete Math	Cooper	778	Spectral Graph Theory	Lu
780	Elementary Number Theory	Boylan	788	Elliptic Curves and Arithmetic Geometry	Thorne

Fall 2014			**Spring 2015**		
number	course	instructor	number	course	instructor
701	Algebra I	Kass	702	Algebra II	McNulty
703	Analysis I	Dilworth	704	Analysis II	Dilworth
708	Computational Math	Liu	709	Computational Math	Liu
720	Applied Math I	Binev			
723	Differential Equations I	Ju	724	Differential Equations II	Ju
728	Fluid Dynamics	Vasquez	728	Modeling of Complex Fluids	Vasquez
732	Algebraic Topology I	Ballard	733	Algebraic Topology II	Ballard
			748	Homological Algebra	Vraciu
756	Functional Analysis I	Androulakis	757	Functional Analysis II	Androulakis
774	Discrete Math I	Cooper	775	Discrete Math II	Cooper
778	Large Networks and Graph Limits	Lu	778	Linear Algebraic Methods in Discrete Math	Szekely
782	Analytic Number Theory	Trifonov	788	Modular Forms	Boylan

Fall 2013			Spring 2014		
number	course	instructor	number	course	instructor
701	Algebra I	Vraciu	702	Algebra II	Vraciu
703	Analysis I	Androulakis	704	Analysis II	Androulakis
708	Computational Math I	Sun	709	Computational Math II	Sun
726	Numerical Differential Equations I	Wang, H.	727	Numerical Differential Equations II	Wang, H.
746	Commutative Algebra	Kustin	748	Topics in Commutative Algebra	Kustin
747	Algebraic Curves and Riemann Surfaces	Kass	748	Topics in Algebraic Geometry	Kass
750	Fourier Analysis	Petrushev	751	Wavelets	Petrushev
758	Stochastic Calculus	Dilworth			
776	Graph Theory I	Lu	777	Graph Theory II	Lu
780	Elementary Number Theory	Trifonov	788	Computational Number Theory	Filaseta
			788	Geometry of Numbers	Thorne

G Faculty research interests

G.1 By primary area

Area	Faculty
Algebraic Geometry	Matthew Ballard Alexander Duncan Jesse Kass Xian Wu
Applied Mathematics	Peter Binev Daniel Dix Lili Ju Xinfeng Liu Douglas Meade Yi Sun Changhui Tan Paula Vasquez Hong Wang Qi Wang Zhu Wang Xiaofeng Yang
Approximation Theory	Wolfgang Dahmen Pencho Petrushev Vladimir Temlyakov
Commutative Algebra	Andrew Kustin Matthew Miller Adela Vraciu
Differential Geometry	Ralph Howard
Discrete Mathematics	Joshua Cooper Eva Czabarka Lincoln Lu Laszlo Szekely
Functional Analysis	George Androulakis Stephen Dilworth Maria Girardi Anton Schep
Logic, Set Theory, Algebra, and Topology	George Mcnulty Peter Nyikos
Number Theory	Matthew Boylan Michael Filaseta Frank Thorne Ognian Trifonov

G.2 Faculty details

Faculty	Ph.D (school, year, advisor)	Area	Research Interests
George Androulakis	U. Texas, 1996, H. Rosenthal	Functional Analysis	Banach space theory, operator theory, and applications of functional analysis to mathematical physics.
Matthew Ballard	U. Washington, 2008, C. Doran	Algebraic Geometry	Derived categories, mirror symmetry, birational geometry, invariant theory.
Peter Binev	Sofia U., 1985, V. Popov	Scientific Computing, Approximation Theory, Numerical Analysis	Nonlinear approximation, learning theory, high dimensional problems, numerical methods for PDEs, computer graphics, image and surface processing.
Matthew Boylan	U. Wisconsin, 2002, K. Ono	Number Theory	Elliptic modular forms and Maass forms and their applications to algebraic number theory, elliptic curves, L-functions, partitions, and other topics in number theory.
Joshua Cooper	UC-San Diego, 2003, F.-C. Graham, R. Graham	Combinatorics, Number Theory	Extremality, regularity, and quasirandomness of graphs and permutations; combinatorial number theory; universal cycles; coding theory; combinatorial algorithms.
Eva Czabarka	U. South Carolina, 1998, J. Griggs	Discrete Mathematics and its Applications	Extremal set theory, graph theory, crossing numbers, network science, bioinformatics.
Wolfgang Dahmen	RWTH Aachen, 1976, E. Görlich	Numerical Analysis, Approximation Theory	Adaptive solution concepts in learning theory or computational harmonic analysis, and in interdisciplinary applications.

Faculty	Ph.D (school, year)	Area	Research Interests
Stephen Dilworth	U. Cambridge, 1985, D. Garling	Functional Analysis	Finite-dimensional and infinite-dimensional Banach space theory; classical Banach spaces; approximation in Banach spaces.
Daniel Dix	U. Chicago, 1988, C. Amick	Analysis	Initial value problems for partial differential equations governing the evolution of nonlinear waves, asymptotic behavior of solutions, solutions with special symmetry, completely integrable equations, and solitons.
Alexander Duncan	U. British Columbia, 2011, Z. Reichstein	Algebraic Geometry	Birational geometry, Galois cohomology, linear algebraic groups, rational surfaces, and toric varieties.
Michael Filaseta	U. Illinois, 1984, H. Halberstam	Number Theory	Analytic, classical algebraic, combinatorial, computational, elementary, and transcedence topics. Lattice points close to (or on) a curve or surface, the distribution of special sequences of integers in short intervals, applications of Pade approximations to number theory, the irreducibility of polynomials over the rationals, and computations with sparse or lacunary polynomials.
Maria Girardi	U. Illinois, 1990, J. Uhl	Functional Analysis	Classical and geometrical Banach space theory.
Ralph Howard	Cal Tech, 1982, J. Conn	Differential and Integral Geometry, Analysis	Global Lorentzian geometry, geometric inequalities, stochastic geometry and analysis related to differential equations arising in geometry.

Faculty	Ph.D (school, year)	Area	Research Interests
Lili Ju	Iowa St., 2002, M. Gunzberger	Computational Mathematics	Scientific computation and numerical analysis. Exact boundary controllability problems for the wave equation. Parallel algorithms and high-performance computing. Human brain imaging.
Jesse Kass	Harvard, 2009, J. Harris	Algebraic Geometry	Singular curves, Jacobians.
Andrew Kustin	U. Illinois, 1979, P. Griffith	Commutative Algebra and Algebraic Geometry	Cohen-Macaulay and Gorenstein algebras, finite free resolutions, linkage, deformation theory, and differential graded commutative algebras.
Xinfeng Liu	Stony Brook, 2006, J. Glimm	Applied Mathematics	Scientific computing, high performance computing, interfacial phenomena, multiphase flows, computational biology, cellular dynamics.
Linyuan Lu	UC-San Diego, 2002, F.-C. Graham	Discrete Mathematics	Large information networks, combinatorial probabilistic methods, extremal graph theory, algorithms, computational geometry, computational biology, and internet computing.
Douglas Meade	Carnegie Mellon, 1989, R. MacCamy	Applied Mathematics	Numerical methods for wave propagation on unbounded domains, nonoverlapping domain decomposition methods, and computer algebra systems.
George McNulty	UC-Berkeley, 1972, A. Tarski	Logic, Algebra, and Discrete Mathematics	Finite axiomatizability of equational classes of algebras, structural properties of the lattices of equational theories, and algorithmic computability in algebraic, logical, and combinatorial settings.

Faculty	Ph.D (school, year)	Area	Research Interests
Matthew Miller	U. Illinois, 1979, P. Griffith	Commutative Algebra and Mathematical Biology	Problems in commutative algebra mostly using homological techniques, and the relationships between Betti numbers and Hilbert functions; mathematical biology, especially modeling of animal behavior in math biology.
Peter Nyikos	Carnegie Mellon, 1971, S. Franklin	Topology	Point-set topology, covering and base properties of regular spaces, and the structure theory of locally compact spaces; the application of special axioms from set theory to constructing examples and establishing consistency and independence results; applications to Boolean algebras and functional analysis.
Pencho Petrushev	Sofia U., 1977, V. Popov	Approximation Theory, Harmonic Analysis, Numerical Methods	Nonlinear approximation by rational functions, splines, and wavelets, approximation by ridge functions and neural networks, image processing.
Anton Schep	U. Leiden, 1977, A. Zaanen	Functional Analysis, Operator Theory	Linear integral operators on Banach function spaces, positive operators and C_0-semigroups of positive operators on Banach lattices, spectral properties, and compactness properties of special classes of operators.
László Székely	Eötvös U., 1983, V. Sós, M. Simonovits	Combinatorics and Graph Theory	Extremal combinatorics, discrete geometry, graphs drawn on Surfaces, Reconstruction of phylogenetic trees from genetic sequences.

Faculty	Ph.D (school, year)	Area	Research Interests
Yi Sun	Princeton, 2006, B. Engquist	Applied and Computational Mathematics	Multiscale modeling and simulation in solids, fluid mechanics, chemistry and biology; mathematical modeling and computation of biomaterials, biofluids, cellular dynamics and traffic and pedestrian flow; mathematical and computational neuroscience.
Changhui Tan	U. Maryland, 2014, E. Tadmor	Applied Mathematics	Nonlinear partial differential equations, fluid dynamics, hyperbolic conservation laws, and complex biological models.
Vladimir Temlyakov	Steklov Institute, 1978, S. Telyakovskii	Approximation Theory	Approximations of functions in one variable and multivariable cases (approximations by polynomials, n-widths, optimal cubature formulas). Integral operators (estimates of singular numbers, approximation numbers, bilinear approximation of kernels of these operators).
Frank Thorne	U. Wisconsin, 2008, K. Ono	Number Theory	Distribution of primes and broadly related questions.
Ognian Trifonov	Sofia U., 1989, V. Popov	Analytic Number Theory and Approximation Theory	Application of finite differences to determining information about lattice points close to a curve or surface. Interests also include the application of these results to gap problems in number theory.
Paula Vasquez	U. Delaware, 2007, L. Cook-Ioannidis	Applied Mathematics	Multiscale modeling and simulation of viscoelastic fluid flows, computational and mathematical biology.
Adela Vraciu	U. Michigan, 2000, M. Hochster	Commutative Algebra and Algebraic Geometry	Tight closure theory, linkage, and homological properties of rings and modules.
Hong Wang	U. Wyoming, 1992, R. Ewing	Numerical Analysis and Differential Equations	Numerical approximation to differential/integral equations, scientific computations.

Faculty	Ph.D (school, year)	Area	Research Interests
Qi Wang	Ohio St., 1991, M. G. Forest	Applied Mathematics	Computational mathematics, computational fluid dynamics and rheology of complex fluids, continuum mechanics and kinetic theory, multiscale modeling and computation of soft matter and complex fluids of anisotropic microstructures, multiscale modeling and computation of biofluids and biomaterials, parallel and high performance computing.
Zhu Wang	Virginia Tech, 2012, T. Iliescu	Applied and Computational Mathematics	Numerical analysis, scientific computing, reduced-order modeling, climate modeling, and inverse problems.
Xian Wu	Harvard, 1986, P. Griffiths	Algebraic Geometry	Differential geometry, complex manifolds.
Xiaofeng Yang	Purdue, 2007, J. Shen	Applied Mathematics	Scientific computation, mathematical modeling of liquid crystalline polymers. Numerical analysis, spectral methods and scientific computing with applications in fluid mechanics.

H Forms

All graduate students submit appropriate paperwork as they progress through their careers. Students will find many of the forms in this section in the Graduate School's Forms Library.

H.1 Hiring forms

New graduate assistant hires and anyone employed by USC must complete and submit the following forms as soon as possible before employment starts.

Form name/ID	Description
I-9	Employment Eligibility Verification (also needed in year 4)
W-4	Employee's Withholding Allowance Certificate (tax info, must be completed using VIP)
Background Check Disclosure Form	Authorizes disclosure of background check to USC
Background Check Authorization Form	Authorizes background check

H.2 Ph.D. degree academic forms

Ph.D. students submit the following forms to the Graduate School over the course of their careers as they reach certain program benchmarks.

Form name/ID	Description	When needed
Doctoral Program of Study (DPOS)	Lists courses satisfying Ph.D. requirements	Submitted in spring of year 2 with Qualifying Exam Verification Form
Doctoral Committee Appointment Request (G-DCA)	Application for appointment of Comprehensive Exam Committee/ Dissertation Committee	Submitted in spring of year 2 prior to comprehensive exams
Qualifying Exam Verification Form	Verification that student has passed qualifying exam	Submitted in spring of year 2 with DPOS
Doctoral Comprehensive Exam Verification Form	Verification that student has passed comprehensive exam	Submitted after passage of comprehensive exam, typically in fall of year 3
Request for Special Enrollment (Z-Status, GS-ZS)	Gives students full-time status while taking less than a full credit load	Submitted before every term in which it is used; needed as soon as a student finishes content courses, usually in year 4, but sometimes in spring of year 3
International Students Exemption from Full-Time Enrollment	Gives international students full-time status while taking less than a full credit load	Submitted once, before the first semester of under-enrollment; international students must also fill out GS-ZS forms as above
Application for Degree or Certificate (AS - 126)	Application for Ph.D degree	Submitted after completion of all graduation requirements, in the final year
Dissertation Signature and Approval Form (G - DSF)	Records completion of dissertation	Students obtain committee member signatures at thesis defense on passage of the defense

H.3 Masters degree academic forms

Masters students submit the following forms to the Graduate School over the course of their careers as they reach certain program benchmarks.

Form name/ID	Description	When needed
Masters Comprehensive Exam Verification Form	Verification that student passed Masters comprehensive exam	Submitted once student passes comprehensive exam
Masters Program of Study (MPOS)	List courses satisfying Masters requirements	Submitted once student has selected all courses satisfying degree requirements

H.4 Forms for both Ph.D. and Masters students

Both Ph.D. students Masters students can use the following forms.

Form name/ID	Description	When needed
Program of Study Adjustment Form (GS-43 or POSA)	Adjusts POS to accommodate changes made following original submission	Submitted whenever a Ph.D or Masters student needs to make a change to their POS
Open Access Authorization for Thesis or Dissertation	Gives authorization for the University to add thesis or dissertation to the University's electronic repository	Submitted by Ph.D students and some Masters students after completion of dissertation or thesis
Grievances, Appeals, and Petitions Form (G-GAP)	Means to formally file a grievance, appeal or petition to be heard by the appropriate subcomittee of the Gradaute School's Council	Can be submitted if the issue in question has already been discussed at the Department level and after the student reads the Graduate School's grievance policy
Independent Study Contract (GS-50 (G-ISC))	Used for any graded, for-credit course in which the content and requirements are not governed by a standard syllabus	Submitted whenever a student enrolls in Math 799 for credit

I Graduate student office space

first floor		third floor		fourth floor	
room	#desks	room	#desks	room	# desks
103 A	2	300 A	3	400 A	3
104 A	3	300 K	3	400 K	3
104 B	3	301	3	418 A	3
107 A	3	309 A	2		
107 B	3	313 A	2		
122 A	3	314 A	3		
122 B	4	317 N	3		
123 B	3				
total	24	total	19	total	9

There is office space for 52 graduate students. Additional space exists in LC 122, which the Department uses only as necessary.