EMORY UNIVERSITY | Department of Mathematics

Mathematics MS and 4+1 Programs Graduate Handbook

2025–26

Contents

1 Introduction

This handbook serves as the official guide to the mathematics MS program at Emory University. It complements the Laney Graduate School (LGS) Handbook, which contains general degree requirements and graduate school policies. Both handbooks are modified yearly to account for policy changes. Before consulting this manual, students should be certain that they have the latest version (dated by school year). If unsure about some policy or rule, students should consult with their advisor, the Graduate Program Coordinator, or the Director of Graduate Studies (DGS).

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2 Degree requirements

The Emory Mathematics MS program offers two possible academic paths, pure and computational, with different sets of degree requirements. To complete an MS in the Emory Mathematics Program, a total of 30 credit hours are required. The MS program is designed so that students may complete the degree requirements within two years.

In each path, the students may elect either a master's thesis or course-only option. The specific requirements are described below.

2.1 Pure mathematics track

1. Core courses (12 credit hours)
    - Math 511–512: Analysis
    - Math 521–522: Algebra
2. Four additional courses chosen from the following (12 credit hours)
    - Math courses at the 500 level or above (except directed study, seminar or research courses)
    - At most one approved undergraduate level math course (such as 411 or 421)
3. One of the following (6 credit hours)
    - Thesis option: An acceptable thesis and oral defense.

- Course-only option: Two additional approved elective courses. One of them can be a directed study course.

2.2 Computational mathematics track

1. Three required courses (9 credit hours)

   - Either Math 511 (Analysis I) or Math 512 (Analysis II)
   - Math 515: Numerical Analysis I
   - Math 516: Numerical Analysis II

2. Three elective courses in computational mathematics (9 credit hours)

   - Math 517: Iterative Methods
   - Math 561: Matrix Analysis
   - Math 571: Numerical Optimization
   - Math 572: Numerical Partial Differential Equations
   - Math 785R: Topics in Computational Mathematics

   Newly created graduate-level courses in computational mathematics are also allowed (except directed study, seminar, or research courses), provided they have been approved by the LGS.

3. Two additional elective courses, chosen from the following list (6 credit hours)

   - Any of the computational math courses listed above
   - Math 511: Analysis I
   - Math 512: Analysis II
   - Math 531: Graph Theory I
   - Math 532: Graph Theory II
   - Math 535: Combinatorics I
   - Math 536: Combinatorics II
   - Math 550: Functional Analysis
   - Math 557: Partial Differential Equations I
   - Math 558: Partial Differential Equations II
   - CS 523, 526, 534, 551, 555, 557

   Students may request to include other elective courses at the 500 level or above, possibly from another department (except directed study, seminar, or research courses). All such requests must be approved by the Mathematics DGS.

4. One of the following options (6 credit hours)

   - Thesis option: An acceptable thesis and oral defense.
   - Course-only option: Either two additional elective courses, as listed under (2) and (3) above, or one additional elective plus a directed study course.

3 Mathematics 4+1 MS program

The mathematics program supports a 4+1 Mathematics MS program for Emory undergraduates, which allows students to earn an MS degree by spending an additional fifth year at Emory.

3.1 Admissions

Applicants for the Mathematics 4+1 program may matriculate in any major of Emory College. The course requirements for admission to the program consist of one of the following sets of undergraduate courses, which need to be completed by the end of the junior year:

1. Mathematics
    - Math 318 (Complex Variables)
    - Math 321 (Abstract Vector Spaces)
    - Math 411-412 (Real Analysis I & II)
    - Math 421-422 (Abstract Algebra I & II)
2. Applied mathematics
    - Math 315 (Numerical Analysis)
    - Math 351 (Partial Differential Equations)
    - At least 3 courses from: 318 (Complex Variables), 344 (Differential Geometry), 346 (Intro to Optimization), 347 (Non-Linear Optimization), 352 (PDEs in Action), 361-362 (Mathematical Statistics I & II), 411-412 (Real Analysis I & II)
    - CS 171 (Intro to Computer Science II)

Applicants to the 4+1 Mathematics MS program are required to have a grade point average of 3.25 or higher at the time of admission. In addition, they must have obtained a grade of B or better in each of the prerequisite courses listed above. The minimum grade point average must be maintained through completion of their undergraduate degree.

Emory students who have transferred from Oxford College are eligible for the Mathematics 4+1 program, provided they have met the course requirements listed above. (Since the only required courses currently offered at Oxford are Math 315 and CS 171, students transferring from Oxford might only be able to meet the requirements for the applied mathematics option.)

Qualified students will be able to apply to the program during the spring of their junior year. The application materials will consist of a CV, personal statement, Emory transcript, and 3 recommendation letters from faculty. Applications will need to be completed by early March. The 4+1 program committee will then have the responsibility of reviewing the applications, and will then make recommendations for admission to ECAS/LGS. Final decisions will be made and students notified before the enrollment deadlines for the subsequent Fall semester.

3.2 Curriculum

Students in the 4+1 Mathematics MS program will complete the requirements for one of the two tracks in the existing master's program as outlined in §2. In order to satisfy these requirements during the +1 year, students in the program must take at least two math courses at the 500 level or above by the end of their senior year. The program will recommend that students take

two additional 500-level courses in either the junior or senior year, for a total of four graduate courses as an undergraduate. However, as noted above, only two such courses could count towards both BS and MS degrees. Under this plan, the +1 year would consist of a standard graduate load of 6 courses, or 4 courses plus a master's thesis.

A student who completes only two graduate courses as an undergraduate could still complete the program, but this would increase the course load during the +1 year. It might also limit course selection, because many graduate courses have full-year course sequences as prerequisites.

For the pure mathematics track, students in the 4+1 program should plan to complete at least one of the core graduate sequences, 511-512 (Analysis) or 521-522 (Algebra), during the senior year. For the computational track they should plan to complete the graduate sequence 515-516 (Numerical analysis) during the senior year.

3.3 Advising and supervision

Each student in the 4+1 program will be assigned a faculty advisor from the Mathematics program. For students undertaking a master's thesis this will be the thesis advisor. This advisor will be assigned during the Spring semester of the senior year, after a student has successfully applied for admission to the program. Students admitted to the program will be advised on the financial aid requirements for the +1 year. In consultation with the advisor, students in the program will prepare a plan for the +1 year and submit this to the 4+1 program committee.

4 Academic progress

The LGS sets minimum standards for academic performance for all students in graduate programs at Emory, as outlined in the LGS handbook. All students in the MS and 4+1 programs will meet with the DGS at the end of each academic year to review academic performance and progress towards the degree.

5 Grievance policy

Students who have a grievance related to aspects of their program in the Department of Mathematics should describe the grievance and relevant details in a letter addressed to the DGS. The DGS will try to resolve the grievance in conversations with the student and relevant parties. If this is unsuccessful, the DGS will appoint a committee of three program faculty members or use an existing standing committee, who will review the grievance and propose an appropriate response. If it is not possible to resolve the grievance within this committee or the framework of the program's administrative structure, the DGS will forward the grievance to the Office of the Senior Associate Dean of the LGS. At that time, the grievance will be handled according to the grievance procedure described in the LGS Handbook. If the grievance is with the DGS, the student submits the grievance directly to the Senior Associate Dean of the LGS.