

GRADUATE DEGREE PROGRAMS IN APPLIED MATHEMATICS

University of Colorado Boulder | Academic Year 2026–2027 — Supplement to the Catalog

Department of Applied Mathematics, 526 UCB, Boulder, CO 80309-0526 | (303) 492-1238 | amgradco@colorado.edu | <https://www.colorado.edu/amath>

INTRODUCTION: The Department of Applied Mathematics offers courses and research in several areas: Computational Mathematics; Mathematical Biology; Mathematical Geosciences; Applied Nonlinear PDEs and Dynamics; Statistics and Data Science; and Stochastic Processes and Applications. For research specialties of departmental and affiliated faculty, see <https://www.colorado.edu/amath>. This document covers admission procedures through degree requirements; contact amgradco@colorado.edu with any questions.

ADMISSION REQUIREMENTS: These requirements apply equally to the M.S. and Ph.D. programs. The M.S. degree described here is inward-facing, so only current CU Boulder students may apply. External applicants are directed to the Professional M.S. degree program, whose requirements appear in a separate document (see website). The program applied for is not itself a factor in admission or funding decisions. Both programs are competitive, and meeting the requirements does not guarantee admission. Successful applicants generally have records considerably stronger in breadth and quality than these minimum standards suggest. The department also offers a track for current CU Boulder undergraduates to obtain an M.S. degree, with admission requirements described in that track's section.

Applicants must hold at least a bachelor's degree or equivalent from an institution comparable to CU in applied mathematics, engineering, mathematics, or a natural science, and those with significant physical-sciences backgrounds are encouraged to apply. Applicants should have strong foundations in mathematical coursework and the mathematical maturity to understand basic concepts in pure and applied mathematics. Academic background should include several semesters of upper-division mathematical coursework beyond calculus, including advanced calculus/real analysis and linear algebra. Additional recommended courses are partial differential equations, complex analysis, numerical analysis, and possibly probability and statistics. These need not be taken in a mathematics department but should require the maturity expected of a strong upper-level mathematics undergraduate. Some computing experience is recommended, such as a working knowledge of a scientific programming language like C/C++, MATLAB, Julia, or Python. An exceptional student with some deficiencies in mathematics background may also be considered, but will likely need to take upper-division undergraduate mathematics courses during the first year (see PROVISIONAL ADMISSION).

APPLICATION DEADLINES: Fall admission applications are due December 1st of the preceding year. Spring admission is generally discouraged given the structure of graduate courses.

APPLYING FOR ADMISSION: The University's online application system is the preferred method for receiving applications, personal statements, supplementary materials, and letters of recommendation. Create an account and start at <https://www.colorado.edu/graduateschool/admissions/apply>. All supporting materials should arrive before the deadline, since missing documents delay processing and may hurt admission chances. Most mailed items take 10 to 14 days to reach the Office of Admissions, plus processing time.

APPLICANTS: Transcripts and other supplementary materials should be sent directly to Graduate Admissions and submitted electronically. Upload PDFs of all unofficial transcripts to the application. If you accept an offer, you will be asked to have official transcripts sent to Graduate Admissions. All submitted academic documents become University property and are not returned, so for irreplaceable documents, contact the International Admissions Team at intlgrad@colorado.edu about alternatives to sending originals.

FINANCIAL AID / TEACHING ASSISTANTSHIPS: Financial aid is available to M.S. and Ph.D. students as teaching assistantships, research assistantships, and fellowships. Include requests for support in the personal statement submitted with the application. Students receiving aid should not expect more than two years of support toward the M.S. or six years toward the Ph.D. Applicants are also encouraged to apply for need-based aid through the Office of Financial Aid at <https://www.colorado.edu/financialaid/ask-us-question> or 303-492-5091. Teaching assistants must enroll in the Teaching Excellence Seminar, APPM 7400, for one semester during or before their teaching assignment.

GRADUATE COMMITTEE: The graduate committee is responsible for interpreting and administering the policies in this supplement. On its own initiative, or by petition from a student or a student's advisor, the committee may consider exceptions when warranted by special circumstances.

PROVISIONAL ADMISSION: Accepted applicants who meet the listed qualifications are classified as regular degree students. Applicants with a few deficiencies in the admission requirements are considered individually and, if accepted, given provisional status.

STANDARDIZED TEST SCORES: Before admission, international applicants must demonstrate a minimum level of English proficiency. This requirement may be met if the applicant speaks English as a native language, has completed at least one year of full-time academic study in the United States or in a country where English is the native language (at the time of application and within two years of the desired admission term, confirmable by official transcripts), or takes the Test of English as a Foreign Language (TOEFL) and attains a score meeting the minimums below (valid for two years from the test date). The graduate committee does not accept IELTS scores in lieu of TOEFL scores.

TOEFL SCORES: Foreign applicants must submit official TOEFL scores. This requirement is waived only if the applicant's native language is English, or the applicant has completed at least one year of academic study in the United States or in a country where English is the native language (at the time of application and within two years of the desired admission term). Minimum TOEFL scores are 250 (computer-administered), 600 (paper-based), or 100 (internet-based). The Graduate School will not accept scores more than two years old. The Test of Spoken English (TSE) is not required.

GRE SCORES: All applicants to the Ph.D. program must submit GRE General Test scores. M.S. and BAM applicants are not required to submit GRE scores. GRE scores expire five years after the test date and are no longer available from ETS.

M.S. DEGREE REQUIREMENTS: The department offers two Master's degrees. The traditional Master's program is inward-facing, open to University Ph.D. students. The Professional Master's program is outward-facing, open to applicants from inside or outside the University. This document discusses only the traditional M.S. degree.

General M.S. Degree Requirements: The University Catalog gives the general requirements for the M.S. degree across all departments. The following supplements those requirements for students pursuing an M.S. in Applied Mathematics, and in all cases not mentioned below, the catalog's general requirements apply. The M.S. degree can serve as a stepping stone for any student considering a Ph.D. at CU Boulder or elsewhere, but it is an important program in its own right. One of its principal advantages is preparation for teaching or industry, which is the genesis of the required numerical analysis and out-of-department sequences discussed below. It is also flexible, supporting special-interest directions including the teacher training option in the APPM TEACHER LICENSURE OPTION section.

Foreign Language Requirement: There is no foreign language requirement for the M.S. program.

Academic Advising: Each new student is assigned a faculty advisor (usually the chair of the graduate committee) to help plan a sound program of study, including courses to be taken and the areas in which to take the preliminary exams if applicable. Incoming students cannot register for courses until they obtain approval from their faculty advisor.

Department Course Requirements: A Master's candidate must complete:

- At least 30 semester hours in an approved program of study, with at least 18 of those hours in Applied Mathematics courses at the 5000 level or above.
- A grade of C (2.0) or higher in each course. Generally, APPM 4350/5350 and 4360/5360, and STAT 5000 and 4720/5720 do not count toward this requirement.
- Two yearlong 5000-level course sequences in applied mathematics (see the GRADUATE COURSES section for acceptable sequences); other sequences require faculty advisor approval. If APPM 5600/5610 is not taken, the Numerical Analysis preliminary exam becomes mandatory.
- One yearlong 5000-level graduate sequence outside Applied Mathematics in an area where mathematics has significant application, approved by the chair of the graduate committee.
- Up to 6 credit hours may be taken in 4000-level courses in other departments, upon approval by petition to the graduate committee, provided members of the graduate faculty teach those courses.

Plan Options: The Master's requirements may be fulfilled through either the thesis (Plan I) or non-thesis (Plan II) option described below (see the University Catalog for further details). Students choosing Plan II must obtain approval from the chair of the graduate committee.

Plan I (Thesis option). A student electing a thesis must:

- Enroll in 4 to 6 hours of thesis credit, which count toward the required 30 hours.
- Take an oral comprehensive exam (thesis defense) on their thesis work, administered by a committee of the faculty advisor, who serves as chair, and two other faculty members. Each member must hold a current graduate faculty appointment; the chair must have a regular appointment, and the remaining members must hold either regular or special membership. The chair must be either APPM faculty or an APPM affiliate faculty member.
- Be registered for at least 1 credit hour during the academic term when the defense is passed. This requirement applies when the defense occurs during the summer.
- Submit for approval, at least three weeks before the defense, a completed Candidacy Application for Advanced Degree Form, a completed Master's Examination or Project Report form (available on the Graduate School website), and the dissertation title and abstract in electronic format, all to the graduate program assistant.

A few notes on the process:

- A student who fails the defense may make one and only one more attempt in a later semester, and may switch from the thesis to the non-thesis option in doing so.
- Once the defense is passed, the student must submit the dissertation electronically to the Graduate School by the semester's deadline for online thesis submission, and to ProQuest/UMI, an external vendor. The Thesis Approval Form (TAF) must be uploaded as a supplemental file for the submission to be complete. The thesis should follow Graduate School formatting specifications at <https://www.colorado.edu/graduateschool>; questions go to amgradco@colorado.edu.
- Three printed unbound copies are also due to the graduate program assistant (one single-sided, the other two may be double-sided), on 8.5 x 11 watermarked bond paper of at least 25 percent cotton content and 20-pound weight. All copies are due by the posted Graduate School deadline for online thesis submission for the semester the degree is conferred.

Plan II (Non-thesis option). A student choosing the non-thesis option must pass any one of four Ph.D. preliminary exams (details in the Ph.D. DEGREE REQUIREMENTS section). Each student must submit a completed Candidacy Application for an Advanced Degree and Master's Exam form to the graduate program assistant. The Master's Exam form designates which prelim will fulfill the requirement, and that exam's prelim committee must sign off on the form. A student who fails a written preliminary exam may make one and only one more attempt, and may switch between the thesis and non-thesis options, or between one preliminary exam area and another, in doing so.

Adequate Progress: M.S. students must demonstrate adequate progress by:

- Maintaining a grade point average at the Graduate School minimum of 3.0 or better in all coursework attempted (the Graduate School will not accept any grade below C, 2.0, toward the M.S.).
- Enrolling in at least 5 credits of qualifying courses every academic term, summer excluded, until the degree is awarded. Any student not required to maintain full-time status may register part-time; to determine whether a course qualifies or to get approval for part-time registration, check with a faculty advisor or the graduate chair.
- Attaining a pass on a Ph.D. preliminary exam by the beginning of the fourth semester (non-thesis option), or enrolling in a total of 4 to 6 hours of thesis credit by the end of the fourth semester (thesis option).

Admission to Candidacy: By the posted Graduate School deadline for the term in which the M.S. degree is to be conferred, each candidate (Plan I or Plan II) must formally apply for admission to candidacy by completing the Candidacy Application for an Advanced Degree, available on the Graduate School website. This application must go to the graduate program assistant with the student's signature and the approval signature of their faculty advisor. Once the graduate chair approves it, the department forwards it to the Graduate School.

Graduation Application: By the posted Graduate School deadline for the term in which the degree is to be conferred, each candidate (Plan I or Plan II) must complete an online graduation application, whether or not they plan to attend commencement. To apply, log on to myCUinfo.colorado.edu and, on the Student tab, select Apply for Graduation under Academic Resources. The application notifies the department and Graduate School of the student's intent to graduate and gives the Commencement Office what it needs to order and ship the diploma. A student who does not graduate in the term indicated must reapply online for the new term. Contact the graduate program assistant for more information.

Time Limit: All M.S. requirements must be completed within four years of the start of graduate studies (see the University Catalog). With faculty advisor approval, students may apply for a [leave of absence](#) from the Registrar, to take three to four semesters off (including summer) without reapplying to return. The program guarantees a place in the graduate program on return and provides access to certain benefits during leave, though it does not guarantee financial support upon return. A student who fails to register for a fall or spring semester without approved leave is considered inactive and must apply for readmission to return; the graduate committee may remove such a student from the program. Any semester(s) on leave count toward the four-year degree limit.

Transfer Credit: Master's students may request a maximum of 9 semester hours transferred from another institution, with approval of the graduate committee and the Graduate School. Work already applied toward a graduate degree from CU Boulder or another institution cannot transfer toward another graduate degree of the same level at CU Boulder. For example, work applied to one Master's cannot be used toward a second Master's from CU, and doctoral work may not be applied toward a subsequent Master's. Credit may not transfer until the student has completed 6 credits of graduate-level coursework as a regular, degree-seeking student on the CU Boulder campus with a GPA of 3.0 or above.

Grievance Policy: A student who feels they have received unfair treatment academically or as a teaching or research assistant should refer to the Graduate School Grievance Process and Procedures at <https://www.colorado.edu/graduateschool/faculty-staff/policies-procedures/graduate-student-grievance-process-and-procedures>. As a general matter, the first person that the grievance goes to is the Grad Chair, unless the grievance is specifically with the Grad Chair in which case the grievance goes to the Dept Chair.

PH.D. DEGREE REQUIREMENTS

General Requirements: The University Catalog provides the general requirements for the Ph.D. In all cases not specifically mentioned in this supplement, the catalog's general requirements apply.

Foreign Language Requirement: There is no foreign language requirement.

Academic Advising: Each new student is assigned a faculty mentor (usually a member of the graduate committee) to help plan a sound program of study, including which courses and preliminary exams to take. Incoming students should speak with their faculty mentor before registering for classes and preliminary exams, and should continue meeting with this mentor regularly at least until they confidently identify a dissertation advisor, who then assumes the role of academic advisor.

Dissertation Advisor: The doctoral dissertation advisor is a Ph.D. student's primary research supervisor and chairs the student's comprehensive exam and dissertation defense committees. Doctoral students should begin research rotations with potential dissertation advisors once preliminary exam requirements have been satisfied, if not sooner. These rotations may involve reading and discussing research articles, working on a starter research project, and presenting initial work to the advisor's research group or in departmental seminars. All tenured and tenure-track APPM faculty may serve as dissertation advisors, as may affiliate APPM faculty ([listed](#) on the APPM website), though affiliate advisors must be accompanied by a tenured or tenure-track APPM faculty co-advisor. Students should not assume unaffiliated out-of-department faculty can imminently become their primary advisors. A student who wants research mentorship from unaffiliated faculty should first select an amenable APPM dissertation advisor willing to involve the outside faculty member as an active research co-advisor. Pursuing exploratory summer research projects with a faculty member during the first or second year does not bind the student or faculty to a permanent advising relationship.

PH.D. DEGREE DEPARTMENT COURSE REQUIREMENTS: The standard Graduate School requirements listed here include:

- 30 credit hours of coursework at the 5000 level or above, and
- 30 hours of Applied Mathematics dissertation credit.

The Applied Mathematics department adds the following, which count toward the 30 coursework hours above:

- 18 credit hours from APPM and/or STAT courses at the 5000+ level, to include:
 - 6 hours from APPM 5600 and 5610 (Numerical Analysis I & II), completed in the first or second year.
 - 6 hours from APPM 5440 and 5450 (Applied Analysis I & II), completed in the first or second year.
 - 3 hours from either APPM 5470 (Methods of Applied Mathematics: PDEs and Integral Equations) or

STAT 5530 (Mathematical Statistics), completed in the first semester.

- One more approved APPM or STAT sequence at the 5000+ level (see the GRADUATE COURSES section; other sequences require approval from the chair of the graduate committee). This sequence may include APPM 5470 or STAT 5530, in which case only one more three-credit course is needed to reach 18 hours total.
- 6 credit hours from a two-course out-of-department sequence at the 5000+ level, pre-approved by the Graduate Program Chair.
- For students matriculating before August, 2026, no more than 10 dissertation credit hours taken in the semesters prior to the academic term during which the comprehensive exam is passed will count toward the 30 dissertation credit hours required for the Ph.D. degree.

Note that some 5000-level APPM and STAT courses are not accepted for the Ph.D. degree; see the GRADUATE COURSES section for the list. The department offers several single-credit seminars supporting teaching and research. These requirements amount to four or five credit hours that count toward the 30-hour requirement above:

- All students with a teaching assistantship must take APPM 7400 (SEM-Teaching Excellence) before or during their first TA semester, typically the first semester. Enrollment includes required attendance at the department colloquium.
- All students must take APPM 7400 (SEM-Introduction to Research) in the Spring of their first year. Enrollment includes required attendance at the department colloquium.
- All second-year students must take APPM 7400 (SEM-Graduate Research Seminar) in the Spring, presenting on their progress toward the second-year milestone (see below).
- After the first year, students must take at least two semesters of seminar courses (APPM 8000, 8100, 8300, 8400, 8500, 8600, or 8700) before graduation. First-year students are welcome to attend research area seminars of interest without formally enrolling.

PH.D. DEGREE ANNUAL MILESTONES: Students must meet the annual program milestones by the stated deadlines to demonstrate adequate progress. To demonstrate adequate progress toward the degree, doctoral students must:

- **Year 1:** Meet both of the following targets for passing Preliminary Exams (see the Preliminary Examinations section for details):
 - Take either a PDE or Statistics preliminary exam in January of Year 1.
 - Take either the Numerical Analysis or Applied Analysis preliminary exam in May of Year 1.
 - Re-take in August of their first year all preliminary examinations failed in January or May.
- **Year 2:** By April 15 of their second year, submit a Research Training Summary of work accomplished and future plans toward finding a research advisor and research area (see the Research Training Summary section for details), and give a presentation in APPM 7400 Year 2 Graduate Research Seminar.
- **Year 3:** Pass the comprehensive examination by the end of the Spring semester of Year 3.
- **Year 4 and Beyond:** Defend their dissertation, or submit a Dissertation Progress Report to their committee by April 15 each year. After passing the comprehensive exam, students are also encouraged to hold an annual committee meeting to review progress and get feedback.
- **Post-Comps:** [Register](#) for at least five dissertation credit hours every Fall and Spring semester, beginning with the semester following the passing of the comprehensive exam and extending through the academic term (including summer session) when the dissertation is successfully defended.
- **All Years:** Maintain a cumulative GPA of at least 3.0. Students whose GPA falls below 3.0 at any time must transition to the M.S. track unless the Graduate Committee grants an exception. Grades below B- (2.7) do not count toward the Ph.D.

Students matriculating before August 2026 must complete their comprehensive exam by April 15 of their fourth year. If they do not do their comprehensive exam in their third year, then they must submit a Research Plan by April 15 of their third year. See Research Plan section for details.

PRELIMINARY EXAMINATIONS: Preliminary exams are offered in four areas: Applied Analysis, Numerical Analysis, Partial Differential Equations, and Statistics. Preparation, through core courses and self-study, trains students in the key areas of Applied Math and sets the stage for research and dissertation work. Students must pass preliminary exams to show research-preparedness at an early stage in their doctoral studies. Each is a three-hour written exam. Previous exams and syllabi with version history are on the Applied Mathematics website. Starting January 2025, the Statistics exam no longer includes content from APPM 5560 (Markov Processes). The preparatory courses are:

- Applied Analysis: APPM 5440 and APPM 5450

- Numerical Analysis: APPM 5600 and APPM 5610
- Partial Differential Equations: APPM 5470 (not MATH 5470)
- Statistics: STAT 5530

The content of each exam is solely determined by the exam syllabi; the preparatory courses may cover additional material. Reviewing all material listed on the exam syllabi through individual self-study and peer group study is an important part of preparation.

Partial Differential Equations and Statistics exams are held in January; Applied Analysis and Numerical Analysis exams are held in May; make-ups for all exams are held in August. January and August exams are held the week before the first week of Spring and Fall classes, and May exams are held the week before Memorial Day. Results are emailed to students within two weeks of the exam date. Exams are prepared, anonymized, and graded by a committee of at least two faculty members, with final review and approval of scores by a committee of all preliminary exam committee members and the Graduate Program Chair. Each exam is graded Pass or Fail, and no exam may be attempted more than twice.

Students are advised to align their Year 1 course schedule with the exams they plan to take. In Fall of Year 1, they should select either Applied Analysis I (APPM 5440) or Numerical Analysis I (APPM 5600), and either Partial Differential Equations (APPM 5470) or Statistics (STAT 5530). In Spring of Year 1, they should take the continuation of whichever of Applied Analysis or Numerical Analysis they chose in Fall. This helps ensure preparation for the corresponding exams, both by having instructors strongly engage students in the material and by connecting them with other first-year students taking the same exams.

By August of Year 1, Ph.D. students must (1) obtain a Pass in either Partial Differential Equations or Statistics and (2) obtain a Pass in either Numerical Analysis or Applied Analysis. Continuation of financial support is contingent on meeting this requirement. Students who fail the same preliminary exam twice will be recommended for dismissal from the program.

PH.D. DEGREE RESEARCH TRAINING SUMMARY: By April 15th of Year 2, Ph.D. students shall submit to the Graduate Program Advisor a written Research Training Summary as their Year 2 milestone. It shall detail efforts toward advancing their independent research path, including a review of how they used their first-year APPM summer fellowship to enhance their research training, and their research preparation during the academic year. It shall also include a plan for advancing their research training in their second summer, either using their second-year APPM summer fellowship or other support such as an internship or fellowship. As part of their research development, students must give a talk in APPM 7400, Graduate Research Seminar, evaluated in writing by their mentor, with the evaluation submitted to the Graduate Committee by April 15.

The summary must be signed by a tenured or tenure-track APPM faculty member relevant to the student's research activities. If the student has already found a dissertation advisor among the APPM affiliated faculty, the in-department co-advisor should sign. A core faculty signature at this stage certifies support for the student's proposed second-summer research activities and does not necessarily indicate a commitment to an advising relationship.

The Graduate Committee determines whether a student has passed this milestone based on the Research Training Summary together with the written mentor evaluation of the APPM 7400 talk and summer research plan, all of which must be received by the Graduate Committee by April 15. Students who have made meaningful progress toward an independent research direction and who have a credible plan for second-summer research will be deemed to have made adequate progress. If the committee determines a student has not made adequate progress, it will develop an Academic Recovery Plan that sets conditions to be met by August 1 of the same year. Because the student will have had an additional summer of research training, these conditions will exceed the standard applied on April 15. Students who fail to satisfy the conditions of the Academic Recovery Plan will be recommended for dismissal from the program.

PH.D. DEGREE RESEARCH PLAN: This section only applies to students matriculating before August 2026 who do not complete their comprehensive exam by the end of their third year. These students must submit a Research Plan as part of their Annual Progress Report (APR is a Google sheet - email amgradco@colorado.edu for access) by April 15th of their third year. The plan includes a title, a brief description of the proposed research problem, methods to be utilized in the course of the research, and relevant references. A [template](#) and [example](#) are provided. The Research Plan is considered a milestone document and cannot be completed without choosing a dissertation advisor who will approve the plan. The plan addresses commitments by the advisor, first-year mentor, and student, plans for dissemination (e.g., journal venue

and date, talk venue and date, extended research visits), anticipated comprehensive exam date, anticipated thesis defense date, and the anticipated research level for each semester (e.g., any courses to be taken, level of RA/TA support). Student, advisor, and mentor signatures designate approval and acceptance of the Research Plan. Students should submit revised research plans if they change dissertation advisors after submitting one.

PH.D. DEGREE DISSERTATION COMMITTEE: After choosing a field of specialization, the Ph.D. student presents a list of no fewer than five faculty members to serve on their dissertation committee, for approval by the graduate chair.

The committee chair serves as the student's dissertation advisor and supervises their research. The chair must be a member of the department faculty or affiliate faculty with a current regular or tenured graduate faculty appointment. If an affiliate is selected as chair, the student must first receive approval from the graduate chair, and a member of the department faculty must serve as co-chair.

The other four members must hold current regular or special memberships on the graduate faculty. At least three committee members must be on the department faculty; any others may be affiliate faculty, faculty outside the department, or Ph.D.-holding scientists outside CU-Boulder (e.g. in industry, at government labs, or at other universities) who have obtained regular or special graduate faculty appointments at CU-Boulder. See the Graduate School [rules on appointments](#). At least one member must be from outside the department.

The Graduate Committee and the dean of the Graduate School must approve the committee's composition, and any later modifications require approval from both.

PH.D. DEGREE THESIS PROPOSAL / COMPREHENSIVE EXAMINATION: Prior to admission to candidacy, and no later than the end of the Spring semester of the third year, each doctoral student must pass their comprehensive examination. Its purpose is to ensure the student has a sufficient grasp of the fundamentals of their thesis area to begin research, the ability to exchange ideas with the dissertation committee, and a broad base of knowledge in applied mathematics. A submitted or near-submitted paper and a conference presentation are common by this stage, but the examining board sets the standard for passing. The following are required before the exam:

- ***At least two weeks before:*** Apply for admission to candidacy by completing a Candidacy Application for an Advanced Degree (available on the Graduate School website), signed by the student and their faculty advisor and submitted to the graduate program assistant. At the same time, forward a completed Doctoral Examination Report form to the graduate program assistant for approval by both the graduate chair and the Graduate School, along with the abstract and title of the student's comprehensive examination presentation.
- ***One week before:*** Submit a 5 to 10 page thesis proposal, with motivation for the topic and references to key papers, to each committee member. The proposal should be written in consultation with the committee chair, and the student's original research plan must be appended.

The exam consists of a presentation by the student on their research proposal, up to one hour, followed by a questioning period of up to one additional hour. The presentation portion is open to all faculty and students in the program. The dissertation committee constitutes the examining board, and a passing grade is given if at least four of the five members (including the chair) vote satisfactory performance. A candidate who fails may attempt it once more after a period determined by the examination board, typically in the range of three to nine months. If the candidate does not pass on the second attempt, their record will be reviewed by the Graduate Committee, which will either provide another recovery plan or recommend dismissal to the Graduate School.

PH.D. DEGREE DISSERTATION PROGRESS REPORT: By April 15 of each year following the comprehensive examination and before the dissertation defense, Ph.D. students shall submit to the Graduate Program Advisor a written Dissertation Progress Report as their annual milestone. It shall detail research activities in the preceding year and a plan for completing the work required to defend. The dissertation committee reviews the report and may use the opportunity to give formal feedback on the student's progress and its expectations for a successful defense. Students are encouraged to convene a brief meeting with their committee in connection with the report to discuss progress and expectations directly, and the committee may require such a meeting where it has concerns about progress toward defense.

PH.D. DEGREE DISSERTATION DEFENSE / FINAL EXAM: Upon dissertation completion, the student's

dissertation committee administers an oral final exam (defense) on the dissertation and related topics. This exam is open to the public. More than one dissenting vote disqualifies the candidate. A student who fails may attempt the exam once more after a period determined by the examining committee, typically in the range of three to nine months, subject to the six-year program limit. Before the defense the following must be completed:

- ***At least two weeks prior:*** Submit a completed Doctoral Examination Report form (available on the Graduate School website) to the graduate program assistant for approval by both the graduate chair and the Graduate School, along with the abstract and title in electronic format.
- ***At least two weeks prior:*** Submit a copy of the dissertation to the committee, allowing ample time for the committee to review it.

After passing the defense:

- ***Submit the dissertation electronically*** to the Graduate School by the semester's deadline for online thesis submission, and to ProQuest/UMI. The thesis should follow Graduate School formatting specifications at www.colorado.edu/graduateschool
- ***Submit three printed unbound copies to the graduate program assistant*** (one single-sided, the other two may be double-sided) on 8.5 x 11 watermarked bond paper of at least 25 percent cotton content and 20-pound weight. All copies are due by the same posted Graduate School deadline for the semester the degree is conferred.

PH.D. DEGREE DISSERTATION REQUIREMENT: A dissertation must be based on original investigation and reflect a mature understanding and critical judgment of the subject matter, as well as familiarity with the tools and methods of research. The subject must be approved by the dissertation committee and submitted to the committee at least two weeks before the defense. The dissertation should contain material publishable in a peer-reviewed journal in, or related to, applied mathematics, and there is an expectation that students submit for publication in peer-reviewed journals prior to graduation.

The candidate must submit to the department both an electronic copy (PostScript or PDF) and an unbound copy printed single-sided on 8.5 x 11 watermarked bond paper of at least 25 percent cotton content and 20-pound weight, by the posted Graduate School deadline for online dissertation submission for the semester the degree is conferred. The dissertation must follow Graduate School formatting specifications at www.colorado.edu/graduateschool.

PH.D. DEGREE GRADUATION APPLICATION: A Ph.D. candidate must complete an online graduation application whether or not they plan to attend commencement. To apply, log on to myCUinfo.colorado.edu and, on the Student tab, select Apply for Graduation under Academic Resources. The application notifies the department and the Graduate School of the student's intent to graduate and gives the Commencement Office what it needs to order and ship the diploma. A student who does not complete graduation requirements for the term indicated must reapply online for the new term. Contact the graduate program assistant for more information.

M.S. DEGREE FOR PH.D. STUDENTS: Courses taken to satisfy the M.S. degree in Applied Mathematics count toward the minimum requirements for the Ph.D. A Ph.D. student need not also obtain the M.S., but any who intend to must satisfy that degree's requirements. A doctoral candidate may complete the M.S. non-thesis option by passing one of the preliminary exams. Interested students should contact the graduate program assistant for details.

PH.D. DEGREE TIME LIMIT: Students must complete all Ph.D. requirements within six years of commencing doctoral work, including defending the dissertation and submitting it to the Graduate School. Dissertation defense typically occurs around Year 5; TA support in later years is possible but not guaranteed. Students needing additional time must petition the Dean of the Graduate School with their faculty advisor's endorsement. (See PH.D. DEGREE ANNUAL MILESTONES for the year-by-year schedule.)

LEAVE OF ABSENCE: With faculty advisor approval, students may apply for a [leave of absence](#) from the Registrar, to take three to four semesters off (including summer) without reapplying to return. The program guarantees a place in the graduate program on return and provides access to certain benefits during leave, though it does not guarantee financial support upon return. A student who fails to register for a fall or spring semester without approved leave is considered inactive and must apply for readmission to return; the graduate committee may remove such a student from the program. Any semester(s) on leave count toward the six-year degree limit.

PH.D. DEGREE TRANSFER CREDIT: With Graduate Committee approval, Ph.D. students may transfer up to 21 semester hours of coursework from another institution toward the doctoral degree. Coursework already applied toward a completed graduate degree, at CU Boulder or elsewhere, cannot count toward another CU Boulder degree at the same or lower level (for example, credits used for one Master's cannot count toward a second, and doctoral coursework cannot later apply to a Master's). Credit may not be transferred until the student has completed 6 credits of graduate-level coursework as a regular, degree-seeking student on the CU Boulder campus with a GPA of 3.0 or above.

PH.D. DEGREE GRIEVANCE POLICY: A student who believes they have received unfair treatment academically or as an employee should refer to the Graduate School Grievance Process and Procedures:

<https://www.colorado.edu/graduateschool/faculty-staff/policies-procedures/graduate-student-grievance-process-and-procedures>. As a general matter, the first person that the grievance goes to is the Grad Chair, unless the grievance is specifically with the Grad Chair in which case the grievance goes to the Dept Chair.

BACHELOR'S-ACCELERATED MASTER'S (BAM) DEGREE PROGRAM: B.S. AND M.S. IN APPLIED MATHEMATICS

PURPOSE OF THE PROGRAM: This five-year program leads to both a Bachelor of Science and a Master of Science in Applied Mathematics, awarded at the end of the fifth year. It enables well-qualified, motivated students to experience graduate-level coursework earlier and to earn an M.S. in a reduced time period.

The BAM program lets currently enrolled CU Boulder undergraduates earn both degrees in a shorter time. Students receive the Bachelor's degree first but begin taking graduate coursework as undergraduates, typically in their senior year. Because some courses double count toward both degrees, students earn the Master's in less time and at lower cost than in a stand-alone Master's program, while continuing to work with their established faculty mentors.

ADMISSIONS REQUIREMENTS: To gain admission, a student must:

- Have a cumulative GPA of 3.4 or higher
- Have a GPA of 3.4 or higher in APPM, STAT, and MATH courses
- Have completed at least 60 credit hours of coursework (transfer students must have completed at least 24 credit hours at CU Boulder)
- Have completed at least two APPM/STAT courses numbered 3000 or higher with a GPA of 3.4 or higher

PROGRAM REQUIREMENTS: Students may take up to 12 hours during the undergraduate program for later use toward the Master's degree, but only 6 of those hours may double count toward both the Bachelor's and Master's degrees. Students must apply to graduate with the Bachelor's degree and apply to continue with the Master's degree early in the semester in which undergraduate requirements will be completed.

If you are interested in the BAM program, meet with your advisor and then contact the graduate coordinator at amgradco@colorado.edu for more information. For more information about the B.S./M.S. program, consult the Department of Applied Mathematics Undergraduate Curriculum Guide.

PH.D. WITH CERTIFICATE IN INTERDISCIPLINARY QUANTITATIVE BIOLOGY: The IQ Biology program prepares students for interdisciplinary research at the intersection of mathematics, computational biology, bioengineering, biophysics, and image analysis. Students earn the Applied Mathematics Ph.D. together with the IQ Biology certificate.

Students should consult the IQ Biology program for admissions and curriculum details (<https://www.colorado.edu/certificate/iqbiology>). IQ Biology Core courses may count toward the credits required outside Applied Mathematics for the Ph.D.

Because IQ Biology coursework and lab rotations occupy the first year, the standard Applied Mathematics milestones shift accordingly:

- Year 1: IQ Biology Core courses and lab rotations (IQ Bio courses typically count as out-of-department credits).
- Year 2: Both preliminary exams (PDE or Statistics, and Numerical Analysis or Applied Analysis).
- Year 3: Applied Analysis or Numerical Analysis series; comprehensive exam.

Thesis research is carried out with a faculty advisor in Applied Mathematics, and the dissertation committee must include at least one other IQ Biology faculty member. All other Applied Mathematics Ph.D. requirements apply as described elsewhere in this handbook.

APPM TEACHER LICENSURE OPTION: Graduate students in Applied Mathematics who also wish to pursue secondary mathematics teaching licensure may satisfy the department's yearlong outside-sequence requirement through the School of Education's Teacher Education Program (specifically EDUC 5317 and EDUC 5375). This path leads to both the M.S. in Applied Mathematics and a secondary teaching license, but it adds substantial coursework and a full-semester student-teaching commitment, will delay graduation, and does not guarantee departmental financial support beyond the second year. Interested students should consult an advisor in the School of Education for admissions requirements and details, and complete their Applied Mathematics coursework within the first two years. Other M.S. requirements are described elsewhere in this supplement.

GRADUATE COURSES: Many graduate courses in other departments are, in essence, applied mathematics courses and may be taken for credit toward Applied Mathematics graduate coursework; in fact, each graduate student must take a yearlong sequence outside the department. Consult a faculty advisor for approval.

BASIC COURSES: Acceptable 5000-level APPM and STAT sequences include the following (others require faculty advisor approval): APPM 5380-5390, APPM 5430-5470, APPM 5440-5450, STAT 5530-5100, APPM 5460-5470, APPM 5470-5480, STAT 5530-5540, APPM 5600-5610, APPM 5380-STAT 5400, STAT 5530-5400, STAT 5400-5540, STAT 5400-5100, and STAT 5400-5610.

The following courses, cross-listed as graduate/undergraduate, do not count toward the 30-credit-hour M.S. or Ph.D. requirement except by petition to the Graduate Committee:

- APPM 5350 Methods in Applied Mathematics: Fourier Series and Boundary Value Problems
- APPM 5360 Methods in Applied Mathematics: Complex Variables and Applications
- APPM 5720 Open Topics in Applied Mathematics
- STAT 5000 Statistical Methods and Application I
- STAT 5520 Introduction to Mathematical Statistics

STAT 5520 counts only for the B.S./M.S. track; M.S. and Ph.D. students should take STAT 5530 instead.

Note: Transcripts may state "repeat, not for credit" when a seminar is taken more than once. This is a system artifact and should be ignored; repeated seminars are credited toward the M.S. or Ph.D.