GRADUATE HANDBOOK
UNIVERSITY OF COLORADO DENVER
DEPARTMENT OF MATHEMATICAL & STATISTICAL SCIENCES

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A. DEGREES

The Department of Mathematical & Statistical Sciences at UC Denver offers the *Master of Science (M.S.) in Applied Mathematics* and the *Doctor of Philosophy (Ph.D.) in Applied Mathematics.* These degrees are designed to give candidates a contemporary, in-depth education in applied mathematics and to provide research opportunities in the special fields of computational mathematics, computational biology, discrete mathematics, mathematics of science and engineering, operations research, optimization, probability and statistics.

B. ADMISSION REQUIREMENTS FOR GRADUATE STUDIES IN APPLIED MATHEMATICS

All applicants must establish adequate preparation for graduate studies in Mathematical and Statistical Sciences as demonstrated by the following:

- A baccalaureate or master's degree (not necessarily in mathematics) from an accredited college or university, or completion of work equivalent to the baccalaureate or master's degree given at UC Denver with at least a 3.0 grade point average (GPA);

And

- Performance on the GRE or completion of at least 12 credit hours of graduate-level mathematical coursework.

In addition, students must have taken a minimum of 30 semester hours of mathematics, at least 24 of which are upper division courses with a grade of B– or better. These courses must include:

1. one semester of linear algebra
2. one semester of one of the following:
        abstract algebra
     or differential equations
     or discrete mathematics
     or probability
3. two semesters of advanced calculus or real analysis (or equivalent)

Subject to approval by the Graduate Committee, students who do not satisfy all of the above admission requirements may be admitted as a provisional degree student with the understanding that deficiencies must be removed within one year of entry into the program. Undergraduate credits earned for deficiency coursework cannot be applied to a graduate degree.

By University policy, International students must provide financial documentation and certified English translations of all records and references not in English. Applicants whose native language is not English must satisfy the English language requirement in one of the following ways:

- Submit scores from the Test of English as a Foreign Language (TOEFL) or from the International English Language Testing System (IELTS). The minimum acceptable

TOEFL scores are 525 (paper), 192 (computer), or 71 (internet based). The minimum acceptable IELTS score is 6.0.
- Complete a baccalaureate or graduate-level degree program at an accredited English-speaking college or university.
- Complete at least 2 semesters at an accredited college or university in the United States as a full-time student with a "B" average (3.0 GPA) or higher.

International students are required to submit Graduate Record Examination (GRE) scores. Additional requirements and documentation may also be required by the Office of International Education. For details and procedures, students should consult the Office of International Education.

C. TEACHING ASSISTANTSHIPS

All applicants are encouraged to apply for a Teaching Assistantship (TA). To be considered for a TA, the application packet must be accompanied by a letter indicating interest in a TA and describing prior teaching or tutoring experience. At least one letter of recommendation should address the applicant's teaching potential. When the Graduate Committee considers requests for TAs, the primary criterion that is used is academic excellence. Other factors that may be considered include ability to teach lower division mathematics courses, quality of faculty recommendations, and outside employment (the candidate cannot be employed off-campus while holding an assistantship).

Provisional students who are offered a TA must reapply for the TA to be continued into a second year of funding.

D. ADDITIONAL FACTORS FOR GRADUATE STUDIES IN APPLIED MATHEMATICS

Applicants to the doctoral program with a GPA in mathematics below 3.2 are unlikely to be accepted without strong supporting evidence. Additional factors that can strengthen the application include:

- GRE subject test in Mathematics,
- MS degree in Mathematics or related area
- Minor or second major or M.S. in an area related to student's focus,
- Research activities and experience, including publications, conference presentations, and/or software development expertise.

E. ADMISSION DEADLINES

A complete application packet (including two official transcripts, at least three letters of recommendation, GRE scores, application part I and II, and application fee) should be submitted to the Graduate Committee of the Department of Mathematical & Statistical Sciences by the following target dates to be guaranteed full consideration. International students should submit their applications one month prior to these target dates:

Target Dates for M.S. Program

March 1   for the following fall semester
November 1   for the following spring semester
March 1   for the following summer semester

Target Dates for Ph.D. Program

February 1   for the following fall semester
October 1   for the following spring semester
February 1   for the following summer semester

Applications received after the target dates may still be considered for admission, depending on space availability.

F. ADVISING

Upon acceptance into the graduate program, each student is assigned an academic advisor. A student may request and obtain a change in advisor by informing the Graduate Program Assistant.

A required orientation for all new graduate students is held the week before the fall semester begins. The orientation provides information about the department, the faculty, graduate program requirements, expectations and realities, and an opportunity for students to meet with individual faculty advisors.

During the first semester of graduate study each student is required to set up a tentative plan of study with the advisor's help. The plan of study, which becomes part of the student's file, should include a tentative list of courses to be taken each semester. Both the advisor and the student will sign the plan, which should be reviewed at least once each year with the current advisor. All course substitutions must be approved on the study plan.

G. REQUIREMENTS FOR THE M.S. DEGREE

1. General Requirements

Students must complete at least 30 semester hours, of which at least 24 hours must be in mathematics courses numbered 5000 or above.   At most six hours may be in courses outside the Department of Mathematical & Statistical Sciences at the 4000 level or above, if approved by the student's advisor and by the Graduate Committee. The overall grade point average must be 3.0 or higher. Grades below a B- are not accepted (but they do contribute to the overall GPA).

By graduate school rules, courses taken more than five years prior to applying for candidacy (including transfer courses) must be validated by the graduate program director to ensure their content is still current. However, it is the policy of the Department of Mathematical and Statistical Sciences that the content of all mathematics courses taken at an accredited University is considered current for at least ten years. For courses taken more than ten years

prior to applying for candidacy, the validation process will require an assessment of the student's knowledge of the subject matter.

Exception: Note that the Computational Biology option has a special provision that students may take up to 9 hours outside the Department of Mathematical & Statistical Sciences. A maximum of 9 credit hours of coursework may be transferred into the M.S. program. Only courses completed with a grade of B- or better may be considered for transfer credit. Credit cannot be transferred until the student has established a satisfactory record of at least one term of full-time enrollment at UC Denver with a minimum GPA of 3.0. All transfer courses must be approved by the graduate committee. Courses taken while registered as a nondegree student are considered transfer courses.

By graduate school rules, courses taken while enrolled as a graduate student at any campus of the University of Colorado system is considered resident coursework. However, all courses taken outside of the Department of Mathematical and Statistical Sciences must be approved by the graduate committee to be applied toward the M.S. degree. In addition, courses taken at other campuses prior to enrollment in the M.S. program will be counted as part of the 9 credit hour limit on transfer courses. Courses taken outside the Department of Mathematical and Statistical Sciences while enrolled in the M.S. program should be approved in advance in order to be counted toward the M.S. degree. The following courses will **not** count toward a graduate degree in applied mathematics: Math 5000-5010, Math 5012-5015, Math 5017, Math 5198, and Math 5250.

2. Math Clinic

All students are encouraged to participate in at least one Math Clinic. With the approval of the student's advisor, a clinic may be used in lieu of a stated area requirement. Details about current and upcoming projects are available from the Clinic Director.

3. Advisory Committee

By the end of the first year of graduate study, each student must choose an advisor to chair the advisory committee. With this advisor's help, the student will choose two additional members of the advisory committee. All three members must be on the UC Denver Graduate Faculty, and at least two must be members of the Department of Mathematical & Statistical Sciences.

4. Thesis Option

Each student is encouraged to write a thesis to which 4-6 of the 30 hours of course work may be devoted. Although original work is encouraged, the thesis may be expository in nature. The topic should be within a relevant area of applied mathematics and should be chosen with the approval of the advisor. The thesis should be prepared in TeX, LaTeX, or AMSTeX, and it must comply in format with the specifications of the Graduate School. A typed copy of the thesis must be given to all members of the advisory committee at least three weeks before the defense. Eighteen days before the date of graduation, three complete copies of the thesis must be filed with the Graduate School. The student must provide a single .pdf file of the thesis with an attached statement giving the Department the right to distribute the thesis as it wishes.

5. Final Examination

All students must take and pass a final examination. The exam is given by the student's advisory committee.

For students choosing the thesis option, the exam consists of a one-hour thesis defense. The advisory committee may declare the thesis defense successful, but request further changes in the thesis and specify a deadline and the manner in which the revised thesis will be reviewed. In that case, the student does not need to register for further thesis credit hours, but the requirements for the master's degree are not satisfied until the final version of the thesis is approved by the student's advisory committee and the Graduate School. If no member of the advisory committee raises further questions or objections within 30 days after the revised thesis has been received by the committee, the thesis is considered approved.

Students choosing the non-thesis option will submit a written report, give an oral presentation and answer questions on a relatively specific topic that has been selected in consultation with the advisor and has been approved by the student's advisory committee. The report and presentation should demonstrate a level of content mastery commensurate with a 6000 level mathematics course, delve into mathematics not covered in coursework, and should demonstrate proficiency in communicating mathematics as well as the ability to synthesize mathematical concepts. The written report should be submitted to the advisory committee at least two weeks prior to the oral presentation. Students completing a master's degree while pursuing a Ph.D. degree are encouraged to choose a topic that will advance their Ph.D. research.

By graduate school rules, a student who fails the exam on the first attempt may take it again after three months; however, the retake must be completed by the end of the next academic semester. Guidelines for oral presentations and thesis defenses are available in the Department of Mathematical & Statistical Sciences.

6. Time Limits for Completion of Degree

By graduate school rules, Master's degree students have five years from the date of admission to complete all degree requirements.

7. Leave of Absence

A student may request up to a one-year leave of absence from the M.S. program. The student must be in good standing, indicate the return date, give justification for the leave of absence, and agree to contact his/her advisor and the Graduate Committee at least once per semester. Each petition must be approved by the Graduate Committee.

A leave of absence pauses the clock, but does not extend deadlines automatically; extension of deadlines requires a separate petition to the Graduate Committee. Students who leave a graduate program for more than three consecutive semesters must reapply for admission.

8. Course Requirements by Area

The core courses, Math 5070 (Applied Analysis) or Math 6131 (Real Analysis) and Math 5718 (Applied Linear Algebra) are required of all M.S. students. In addition, the requirements in one of the following areas must be satisfied. Substitutions may be made with the advisor's written approval. One course cannot be used to fulfill two requirements.

a. Applied Statistics

Math 5387 Regression Analysis, Modeling and Time Series
Math 6330 Workshop in Statistics Consulting (This course can be taken more than once.)
Math 6388 Advanced Statistical Methods for Research
Math 7381 Mathematical Statistics I
Math 7382 Mathematical Statistics II

b. Applied Probability

Math 5310 Probability
Math 5792 Probabilistic Modeling
Math 6380 Stochastic Processes
And, one of the following two courses:
  Math 6131 Real Analysis
  Math 7381 Mathematical Statistics I

c. Discrete Mathematics

Four of the following twelve courses:
  Math 5410 Modern Cryptology
  Math 5490 Network Flows
  Math 5793 Discrete Math Modeling
  Math 6404 Applied Graph Theory
  Math 7405 Advanced Graph Theory
  Math 7409 Applied Combinatorics
  Math 7419 Mathematical Coding Theory
  Math 7410 Combinatorial Structures
  Math 7413 Modern Algebra I
  Math 7421 Projective Geometry
  Math 7821 Topics in Projective Geometry
  Math 7823 Topics in Discrete Math

Other suggested courses:
  Math 5110 Theory of Numbers
  Math 5593 Linear Programming
  Math 7414 Modern Algebra II
  Math 7594 Integer Programming

d. Mathematics of Engineering and Science

Three of the following seven courses:
      Math 5387 Regression Analysis, Modeling and Times Series
      Math 5779 Math Clinic
      Math 5791 Continuous Modeling
      Math 5792 Probabilistic Modeling
      Math 5793 Discrete Math Modeling
      Math 5794 Optimization Modeling
      Math 6735 Continuum Mechanics
And, two of the following six courses:
      Math 5660 Numerical Analysis I
      Math 5661 Numerical Analysis II
      Math 5733 Partial Differential Equations
      Math 6653 Intro to Finite Element Methods
      Math 7663 Numerical Solution of PDEs
      Math 7665 Numerical Linear Algebra

e. Numerical Analysis

Math 5660 Numerical Analysis I
Math 5661 Numerical Analysis II
And, three of the following ten courses:
      Math 5593 Linear Programming
      Math 5733 Partial Differential Equations
      Math 6595 Computational Methods in Nonlinear Programming
      Math 6653 Intro to Finite Element Methods, formerly Math 7172
      Math 6735 Continuum Mechanics
      Math 7667 Intro to Approximation Theory
      Math 7663 Finite Difference Methods for PDEs
      Math 7665 Numerical Linear Algebra
      Math 8664 Iterative Methods in Numerical Linear Algebra
      Math 8660 Math Foundations of Finite Element Methods
Students in this area are also encouraged to take graduate-level computer science and/or parallel computing courses.

f. Operations Research

Math 5593 Linear Programming
Math 5792 Probabilistic Modeling or Math 6380 Stochastic Processes
And, two of the following courses:
      Math 5390 Game Theory
      Math 5490 Network Flows
      Math 5779 Math Clinic, with approval
      Math 5794 Optimization Modeling
      Math 6595 Computational Methods in Nonlinear Programming
      Math 7825 Topics in Optimization
      Math 7593 Advanced Linear Programming
      Math 7594 Integer Programming

Math 7595 Advanced Nonlinear Programming

g. Computational Biology

Math 5396 Bayesian Statistics
Math 5610 Computational Biology
C SC 5451 Algorithms
Biol 5099 Biology for Computer Scientists, Engineers and Mathematicians
Math 5840 Independent Study - Advanced Project (subject to approval)
Two additional graduate mathematics courses
And, one elective from the pre-approved courses listed below:
      Math 5060 Exploratory Data Analysis
      Math 5576 Mathematical Foundations of Artificial Intelligence
      Math 5593 Linear Programming
      Math 5791 Continuous Modeling
      Math 6404 Applied Graph Theory
      Math 6595 Computational Methods in Nonlinear Programming
      C SC 5559 Database Systems
      C SC 5582 Artificial Intelligence
      Biol 5124 Molecular Biology
      Biol 5550 Cell Signaling
      Chem 5810 General Biochemistry I

H. REQUIREMENTS FOR THE PH.D. DEGREE

1. Admission to the Ph.D. Program

Prerequisites for admission to the Ph.D. program are described in the section titled *Admission Requirements for Graduate Studies in Applied Mathematics*, at the beginning of this document.

2. Graduation Requirements

There are six phases to the Ph.D. program. A candidate must fulfill course requirements, pass the preliminary examinations, meet the academic residency and participation requirements, pass the comprehensive examination, give an oral thesis proposal, and write and defend a thesis.

3. Course Requirements

Ph.D. students must complete 42 credit hours of non-dissertation graduate courses. The following courses will **not** count toward a graduate degree in applied mathematics: Math 5000-5010, Math 5012-5015, Math 5017, Math 5198, and Math 5250. By graduate school rules, courses taken more than five years prior to applying for candidacy (including transfer courses) must be validated by the graduate program director to ensure their content is still current. For mathematics courses taken within ten years of applying for candidacy, the validation request will be automatically approved. For courses taken more than ten years prior to applying for candidacy, the validation process will require an assessment of the student's knowledge of the subject matter.

The following courses are required as a part of the formal course work:

- Math Clinic (Math 5779) (3 hours)
- 3 Readings Courses (Math 7921-7926) (1 credit hour each.)

The Readings Courses are one-hour seminar courses that are announced prior to the start of each semester. All courses should be chosen in consultation with an advisor. Course replacements and equivalencies should be approved by the Graduate Committee.
Within the coursework requirement, students must satisfy a breadth requirement by completing six graduate math courses from the following categories. No more than three of these courses can come from any one category:

1. Computational Mathematics
2. Discrete Mathematics
3. Operations Research (including Probability)
4. Statistics
5. General

A list of which courses are included in each of the areas is available on the Department web page. (See Graduate Courses by Area). The breadth courses must be formal courses excluding Math 5070 (Applied Analysis), Math 5718 (Applied Linear Algebra), Math 5779 (Math Clinic), readings courses, and independent studies. Transfer courses and/or courses earned at another campus of the University of Colorado system may be used to satisfy this requirement, with consent of the student's advisory committee and approval by the graduate committee.

A maximum of 30 credit hours of graduate coursework (including courses applied to a Master's degree), may be transferred into the Ph.D. program. Up to 6 credit hours of this 30 may be awarded for a Master's thesis. Only graduate courses completed with a grade of B- or better may be considered for transfer credit. Credit cannot be transferred until the student has established a satisfactory record of at least one term of full-time enrollment at UC Denver with a minimum GPA of 3.0. All transfer courses must be approved by the graduate committee. Courses taken while registered as a nondegree student are considered transfer courses. By graduate school rules, courses taken while enrolled as a graduate student at any campus of the University of Colorado system is considered resident coursework. However, all courses taken outside of the Department of Mathematical and Statistical Sciences must be approved by the graduate committee to be applied toward the Ph.D. In addition, courses taken at other campuses prior to enrollment in the Ph.D. program will be counted as part of the 30 credit hour limit on transfer courses. Courses taken outside the Department of Mathematical and Statistical Sciences while enrolled in the Ph.D. program should be approved before they are taken in order to be counted toward the Ph.D. degree.

All Ph.D. course work must be completed with at least a 3.25 grade point average. Grades below a B- are not acceptable for the Ph.D. A student who receives a grade of C+ or lower, or whose overall GPA as a doctoral student falls below 3.25 will be reviewed by the Graduate Committee and may be put on probation or suspended.

4. Preliminary examinations

Each student must pass two preliminary exams: one in Applied Analysis and one in Applied Linear Algebra. These are four-hour written exams that cover material roughly at the level of first-year graduate study. The exams are offered twice a year, from 10:00 am to 2:00 pm. The first set of exams are offered in January. The Applied Linear Algebra preliminary exam will be held the Monday in the week prior to the start of classes, and the Applied Analysis exam is offered the Friday before the start of classes. The second exam offerings follow the spring semester. The Applied Analysis exam is held the Friday before the start of the summer semester, and the Applied Linear Algebra exam is offered the first Friday of the summer semester.

A student wishing to take a preliminary exam must sign up with the graduate program assistant at least one month prior to the administration of the exam. Students who cannot take the exam as planned must give notice of withdrawal at least one week prior to the exam. Students have a maximum of three attempts to pass each exam (including attempts prior to enrolling in the Ph.D. program). The time limit clock starts the first semester a student is admitted into the Ph.D. program.

- Students entering the Ph.D. program without a master's degree in mathematics have three years to pass both preliminary exams.
- Students entering the Ph.D. program with a master's degree in mathematics have two years to pass both preliminary exams.

No appeals will be considered if a student fails the respective exam a third time.

5. Ph.D. Advisory Committee

Each student must choose an advisor and, with the advisor's help, select other members of the Ph.D. advisory committee. This committee assumes the dual responsibility for advising and testing the student. In particular, under the direction of the advisor, each member of this commitee will:

1. Design and evaluate the Comprehensive Exam;
2. Advise on research and serve as the examining committee for the student's dissertation defense.

The advisor must seek and have received approval from the Graduate Committee for the composition of the advisory committee at least 30 days before the student takes the comprehensive exam. After formation the chair, advisor or student may petition for changes to the committee membership; however, approval must be provided by the Graduate Committee at least 30 days before the date of the thesis defense. No changes to the Ph.D. advisory committee will be allowed during the 30 days prior to the comprehensive exam and until the conclusion of the comprehensive exam. Similarly, no changes to the Ph.D. advisory committee will be allowed during the 30 days prior to the thesis proposal and thesis defense.

The Ph.D. advisory committee consists of five graduate faculty members, one of whom is the student's advisor. At least one committee member must have their primary and prior affiliations outside of the Department of Mathematical & Statistical Sciences. At least three

committee members will be regular faculty members of the Department of Mathematical & Statistical Sciences. Exceptions to this must be approved by the graduate committee. Committee members may be from outside the CU system, but must be granted special membership on the graduate faculty for this purpose. The chair of the Ph.D. advisory committee must be a regular faculty member of the Department of Mathematical & Statistical Sciences. The primary purpose of the committee chair is to ensure unbiased evaluation of the student's work. Hence, the advisor cannot be the chair of the committee. In addition, the chair will ensure that all administrative requirements are followed. The advisor must be a Regular Member of the Graduate School.

After the student has been admitted to candidacy and has presented the research proposal, the advisory committee will meet with the student at least once per year to assess progress. Written records of the advisory committee meetings and the student's progress must be kept in the student's file. Students who have not had an advisory committee meeting for the previous 12 months will not be allowed to register. If progress is unsatisfactory, the committee will write a written report to the student and the graduate program director specifying steps to be taken to rectify the situation. If the student does not achieve an acceptable level of progress within six months after receipt of this report, the student will be terminated from the program. A thesis defense is scheduled upon recommendation of the Ph.D. advisory committee.

6. Residency and Participation

By Graduate School rules, all doctoral students must be enrolled for a minimum of six (6) semesters of full time scholarly work beyond the attainment of a bachelor's degree. Two of these six semesters may be replaced by a master's degree in mathematics from another institution; however, at least four (4) semesters of credit must be earned for work performed while enrolled at UC Denver. For this purpose a full course load is defined to be five semester hours of course work.

Ph.D. students are expected to participate in the life of the department by attending colloquia, seminars, orientations and other department activities and by spending time on campus interacting with other students and faculty outside of normal class hours. Students should discuss with their advisors how to fulfill the spirit of this requirement.

7. Comprehensive Examination

Application for candidacy to the Ph.D. program must be made at least two weeks before the comprehensive examination is taken. Candidacy will be granted after at least three semesters of residence have been earned, an advisory committee has been selected, all preliminary and comprehensive examinations have been passed, and essentially all course requirements (including the breadth requirement) have been satisfied.

The comprehensive exam has the following objectives: to determine mastery of graduate level mathematics, capacity to synthesize mathematical concepts, and ability to embark upon doctoral thesis research. The comprehensive exam has two parts:

1. The first part consists of a written exam of roughly (but not limited to) six hours. The written exam covers material from the student's intended area of research. The choice of area and the extent of coverage within that area will be determined by the student's

advisory committee. The advisory committee will prepare and conduct the exam and determine the outcome.

2. The second part of the exam consists of an oral follow-up, not to exceed two hours in length. The student will be given a copy of the scored written exam, no later than seven days after that exam, and a list of topics in which the committee found the student deficient. The oral follow-up will cover but need not be limited to questions on the written exam and topics on the list provided to the student. The oral exam is open to the faculty of the Department of Mathematical and Statistical Sciences and must be scheduled and advertised to all department faculty through the graduate program assistant at least two weeks prior to the exam. The oral must be given within four weeks of returning the graded exam to the student.

The committee decides by majority vote on one of the possible outcomes of the comprehensive exam: pass, conditional pass, or failure. If a student receives a conditional pass, the committee will clearly define the requirements for the student to receive an unconditional passing grade and these requirements must be completed to the satisfaction of the examination committee within four months. In the event of failure of the comprehensive exam, the student's advisory committee will determine the next step (dismissal from the program, retake of the oral follow-up and/or a retake of the written exam are possible outcomes). If a retake is allowed, the retake must be completed within 12 months. The Graduate Committee will hear grievances and appeals of the outcome of the comprehensive exam.

All members of the advisory committee must be present for the oral exam; however, a minority of members, but not the chairperson nor the student, may participate by interactive video. In the event of an emergency that prevents one committee member from attending the exam, the exam can proceed with the faculty who can attend. However, the student will need to meet with the absent committee member at an alternate time.

Admission to candidacy follows successful completion of the two parts of the comprehensive exam.

8. Thesis Proposal

Within six months of successful completion of the written exam and/or oral follow-up, the student must give an oral research proposal before the advisory committee. The purpose of this presentation is to determine the feasibility of the student's proposed thesis topic. The research proposal is open to the public and must be scheduled and advertised through the graduate program assistant at least two weeks prior to the presentation. The student will be provided a detailed summary of the committee's assessment and recommendations. At the discretion of the advisory committee, a student may be asked to give a subsequent oral proposal at a later date.

9. Thesis

Each student must complete at least 30 hours of thesis credit. Not more than 10 of these hours may be taken in any one semester. Not more than 10 thesis hours taken prior to the semester of the comprehensive examination may be applied to this requirement.

Candidates for the Ph.D. degree are required to write a dissertation containing original contributions and evidence of significant scholarship. The thesis is written under the guidance of the student's advisor, who is a Regular Member of the Graduate School, or a secondary advisor. The thesis must comply in format with the specifications of the Graduate School and must be prepared in TeX, LaTeX, or AMSTeX (see CLAS thesis guidelines). Six weeks before the date of graduation, the Graduate School must be notified by the candidate of the dissertation title. Thirty days before the final thesis defense, the thesis must be available in written form. Eighteen days before the date of graduation, three complete copies of the thesis must be filed with the Graduate School. The student must provide the Department with a .pdf file of the thesis with an attached statement giving the Department the right to distribute the thesis.

At least thirty days before the date of graduation, the candidate must present and defend the dissertation before the student's advisory committee. The defense is open to the public and must be scheduled and announced through the graduate program assistant at least two weeks prior to the exam to the graduate school and on the department website. All members of the advisory committee must be present for the defense; however, a minority of members, but not the chairperson nor the student, may participate by interactive video. In the event of an emergency that prevents one committee member from attending the exam, the exam can proceed with the faculty who can attend. However, the student will need to meet with the absent committee member at an alternate time. The outcome of the defense can be "pass", "conditional pass", or "fail", as determined by a strict majority vote of the committee. If the student receives a conditional pass, the examining committee will define requirements that the student must satisfy to pass the defense. These requirements must be completed to the satisfaction of the committee within 60 days. Any extensions to this deadline requires a recommendation from the graduate committee and approval by the graduate school.

The committee may declare the thesis defense successful, but may request further minor changes in the thesis and specify a deadline and the manner in which the revised thesis will be reviewed. In that case, the student does not need to register for additional thesis hours, but the requirements for the Ph.D. are not satisfied until the final version of the thesis is approved by the advisory committee and the Graduate School. If no member of the committee raises further questions or objections within 30 days after the revised thesis has been received by the advisor, the thesis will be considered approved by the advisory committee.

In the event of failure, by graduate school rules, the student will be dismissed from the program. Any exceptions to this will require approval from the Dean of the Graduate School.

10. Language Requirement

The University of Colorado permits each department to decide whether or not to implement a foreign language requirement. The Department of Mathematical & Statistical Sciences has approved the following policy:

Recognizing that the need of a foreign language to do research varies from no languages in many areas to one or two languages in a few areas, the department has no formal language requirement. Instead, the necessity for some level of proficiency in a foreign language is left to the discretion of each student's advisor, as is the case for other matters related to a student's preparation for research.

11. Time Limits

Students must pass both preliminary exams within two years of entering the Ph.D. program, unless they are admitted with deficiencies. Students who are admitted with deficiencies must pass both preliminary exams within three years of entering the Ph.D. program.

Students must select an advisor and a Ph.D. advisory committee by the end of the semester in which all preliminary exams have been passed. Students must pass the comprehensive examination by the end of the fourth year in the Ph.D. program. All requirements for the Ph.D. degree must be completed within four years of passing the comprehensive examination and within eight years of entering the Ph.D. program.

It is recognized that flexibility is necessary, especially for transfer and part-time students; hence petitions for exceptions will be considered by the Graduate Committee. The four year deadline for passing the comprehensive exam and the eight-year deadline for completing the Ph.D. is imposed by the Graduate School and exceptions require approval of the Dean of the Graduate School.

12. Leave of Absence

A student may request up to a one-year leave of absence from the Ph.D. program. The student must be in good standing, indicate the return date, give justification for the leave of absence, and agree to contact his/her advisor and the Graduate Committee at least once per semester. Each petition must be approved by the Graduate Committee.

A leave of absence pauses the clock, but does not extend deadlines automatically; extension of deadlines requires a separate petition to the Graduate Committee. A leave of absence does allow the student to interrupt registration for thesis hours following the comprehensive exam. Students who leave a graduate program for more than three consecutive semesters must reapply for admission.

I. Transitional Rules

All current M.S. and Ph.D. students have the option of graduating under the current rules or under the rules in effect when they were admitted, except that changes that are the consequence of an external entity (such as accreditation) apply to all students. See the Graduate Handbook Archive for earlier versions of the rules.

J. Exceptions

Unless otherwise stated, exceptions to these rules must be approved by the graduate committee. In cases where an exception can be made while still satisfying all requirements of the graduate school, the graduate committee may approve the request with consultation of the students advisory committee. In cases involving exceptions to graduate school rules, the graduate committee, if it approves the exception, will submit a petition to the graduate school, which will then either approve or deny the exception.