

**GRADUATE HANDBOOK**  
**DEPARTMENT OF MATHEMATICAL SCIENCES**  
**REVISED MARCH 2024**

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1. INTRODUCTION

This handbook sets out rules and regulations that are specific to graduate study in the Department of Mathematical Sciences. University level policies and rules are set out in the University of Cincinnati Graduate School Graduate Handbook which is available online. Students are responsible for familiarizing themselves with the university requirements set out in the Graduate School's handbook.

Students should address questions concerning department policies to their advisor or to the Graduate Program Director. All requests for waivers of departmental requirements or other special consideration should be submitted in writing to the Graduate Affairs Committee.

## 2. MATHEMATICS PHD PROGRAM

### 2.1. General Description of the Mathematics PhD Program.

2.1.1. *Objectives.* The Doctor of Philosophy (PhD) in Mathematical Sciences represents achievement of a broad knowledge of the various branches of mathematics, of the ability to communicate mathematics in both written and oral form, and of a demonstrated creative ability in a particular branch of mathematics.

2.1.2. *Academic Admission Requirements.* Students applying for the program should have or be expecting to obtain a bachelor's degree either in mathematics or a related field with a strong mathematical foundation. Specifically, all students should have taken three semesters of calculus up to and including multivariate calculus, as well as semester courses in linear algebra, ordinary differential equations, calculus-based probability and statistics, and elementary set theory and logic. It is recommended applicants have taken or be taking advanced undergraduate courses in linear algebra and analysis and additional advanced courses in pure and/or applied mathematics.

A minimum score of 160 on the GRE quantitative section is expected for admission. Proficiency in English is required of international students whose native language is not English. The English proficiency requirement is met for applicants with degrees earned in English from accredited universities and colleges in the US or other English speaking countries. The Graduate School maintains a list of countries eligible for a waiver of the English Language Testing requirement. For admission, the English proficiency requirement is met by a score of at least 80 on the internet-based TOEFL, 6.5 on the International English Language Testing System (IELTS), 54 on the PEARSON Test of English (PTE), or 110 on the Duolingo English Test. To be eligible for a Graduate Assistantship, a student must achieve a TOEFL score of at least 93, IELTS overall band score of at least 7, PTE score of at least 64, or Duolingo score of at least 115.

2.1.3. *Advisors.* Students are assigned an academic advisor upon entering the PhD program. Students should meet regularly with their advisors to discuss their programs of study. All courses taken by students should be approved in advance by their advisors. After passing the Preliminary Exams, students select a dissertation advisor who will also serve as advisor from that period onward. The dissertation advisor must agree to serve in this capacity and must be a faculty member when the student makes the selection.

### 2.2. Requirements for the Mathematics PhD Program.

2.2.1. *Overview of University Requirements.* University rules and regulations concerning the PhD program are set out in the University of Cincinnati Graduate School's Graduate Handbook. We list below some of the most important requirements. It is the student's responsibility to read this document and to be aware of all university requirements concerning the PhD degree.

- Credit hour requirement: A minimum of 90 graduate credits beyond a bachelor's degree or a minimum of 60 credits beyond a master's degree, including at least 7 hours in dissertation research.
- Residency requirement: Prior to admission to doctoral candidacy, all PhD students shall complete a residency requirement by enrolling in 10 graduate credit hours per semester (12 if funded by a Graduate Assistantship) for two out of three consecutive semesters of study (including summer).
- Time restrictions: All requirements for the doctoral degree must be completed within nine consecutive years of the date of matriculation into the program.

2.2.2. *Overview of Departmental Requirements.*

- Qualifying Exam
- Preliminary Exams
- Breadth requirement
- Minimum grade point average
- Advanced Exam
- Doctoral dissertation.

2.2.3. *Qualifying Exams.* All Mathematics PhD students must pass the following two Mathematics Qualifying Exams:

- Advanced Calculus Qualifying Exam based on MATH6001;
- Abstract Linear Algebra Qualifying Exam based on MATH6002.

All incoming PhD students are required to attempt both Qualifying Exams before the beginning of their first semester. Students who do not pass both exams are placed in the appropriate 6000-level courses. Each Qualifying Exam is offered in August and May. In order to remain in the PhD program, students must pass both Qualifying Exams by the beginning of the Fall Semester following their admission into the program.

**Note:** Prior to May 2024, Mathematics PhD students took one four-hour Qualifying Exam covering both Advanced Calculus and Abstract Linear Algebra.

2.2.4. *Preliminary Exams.* All PhD students must pass four of the following Preliminary Exams:

- Complex Analysis Preliminary Exam based on MATH7001;
- Real Analysis Preliminary Exam based on MATH7002;
- Algebra Preliminary Exam based on MATH7003;
- Topology Preliminary Exam based on MATH7004;
- Ordinary Differential Equations Preliminary Exam based on MATH7005;
- Partial Differential Equations Preliminary Exam based on MATH7006;
- Probability Preliminary Exam based on MATH7032.

Each Preliminary Exam is offered twice a year. Exams based on a course given during Fall Semester are offered after the end of Spring Semester and at the beginning of the following Fall Semester. Exams based on a course given during the Spring Semester are offered at the beginning of the Fall Semester and at the beginning of the following Spring Semester.

Students are allowed to take each Preliminary Exam at most twice, but incoming PhD students who so desire may take one or more exams upon their arrival without these attempts counting against the two-attempt limit. After having completed their Qualifying Exam, students must pass all four of their Preliminary Exams within one and one-half full academic years.

**Note:** Prior to (and including) August 2018, the following five Preliminary Exams were offered twice per year in May and August:

- Analysis Preliminary Exam based on Complex Analysis MATH7001 and Real Analysis MATH7002;
- Algebra and Topology Preliminary Exam based on Rings, Fields and Galois Theory MATH7003 and Topology MATH7004;
- Differential Equations Preliminary Exam based on Ordinary Differential Equations MATH7005 and Partial Differential Equations MATH7006;
- Linear Models Preliminary Exam based on Linear Models STAT7023-4;
- Probability and Statistics Preliminary Exam, based on Statistics Theory STAT7031 and Probability STAT7032.

with students required to pass two out of the five exams.

2.2.5. *Breadth Requirement.* The student, together with a graduate advisor, plans a program of study which will ensure the breadth of knowledge necessary for a professional mathematician. This program should include:

- At least five of the following 7000-level courses :
  - MATH7001 Complex Analysis
  - MATH7002 Real Analysis
  - MATH7003 Rings, Fields and Galois Theory
  - MATH7004 Topology
  - MATH7005 Ordinary Differential Equations
  - MATH7006 Partial Differential Equations
  - MATH7011 Advanced Mathematical Modeling
  - MATH7015 Numerical Linear Algebra
  - MATH7032 Probability
- At least four of the following 8000-level and 9000-level courses:

- MATH8001 Geometric Function Theory
- MATH8002 Geometric Analysis
- MATH8003 Functional Analysis
- MATH8004 Operator Theory
- MATH8005 Introduction to Algebraic Geometry
- MATH8006 Algebra and Cryptography
- MATH8007 Advanced Stochastic Processes
- MATH8008 Stochastic Differential Equations
- MATH8009 Advanced Partial Differential Equations
- MATH8010 Advanced Numerical Analysis
- MATH8011 Scientific Computation
- MATH8012 Applied Mathematics Methods
- MATH8048 Topics in Mathematics\*
- MATH9001 Advanced Financial Mathematics

\*With the approval of the Graduate Program Director.

On the approval of the Graduate Affairs Committee, graduate courses from other disciplines may be counted towards the breadth requirement if they are relevant to the student's program of study. A GPA of 3.3 or better is required in the breadth requirement courses.

2.2.6. *Minimum Grade Point Average.* Graduating students must satisfy the following requirements:

- A minimum GPA of 3.3 in all courses used to satisfy degree requirements.
- A minimum GPA of 3.3 in all courses used to satisfy the breadth requirement.

2.2.7. *Advanced Exams.* An Advanced Exam in the area of specialization of the student is required. To apply for an Advanced Exam, a student must have successfully completed the required number of Preliminary Exams and must have chosen an area for the dissertation. An Advanced Exam may either be a written exam, a presentation, or a series of presentations. A pass on the Advanced Exam should indicate that a student has gained the appropriate mathematical maturity and advanced knowledge of the student's field of research to write a successful PhD thesis. The exam will be administered by a committee assembled along the lines of a Dissertation Committee (see Section 2.2.9 below). Generally this committee will form the student's Dissertation Committee but this is not a requirement. The Advanced Exam must be scheduled at least a month in advance of the proposed date by the student's advisor. The advisor will provide the Graduate Program Director with the names of the proposed committee members and the proposed format and date of the exam. The exam will then be officially scheduled by the Graduate Program Director. If a student does not pass an Advanced Exam, then at least one month must pass before another attempt is scheduled. The Advanced Exam must be passed within four years of entrance into the PhD program.

2.2.8. *Admission to Candidacy.* After completing the Preliminary Exams, the breadth requirement, and the Advanced Exam the student will be admitted to candidacy. At this point the student works full-time on dissertation research. This part of the program usually requires 2-3 years of study. All students must register for at least one graduate credit hour each academic year in order to maintain graduate student and candidacy status.

2.2.9. *Dissertation.* A student is required to present a dissertation which demonstrates high scholarly achievement through original and independent research.

After a Ph.D. student has passed the required number of preliminary Exams, the student should select a dissertation advisor who will also serve as advisor from that period onward. The dissertation advisor must agree to serve in this capacity and must be a faculty member at the time the student makes the selection. The research topic is to be selected by the student in consultation with the dissertation advisor.

At the time a student is admitted into Candidacy, the Dissertation Committee is formed by the Graduate School on the recommendation of the Graduate Program Director in consultation with the dissertation advisor and the student. The committee consists of 3-5 persons admissible under the rules of the Graduate School set out in the UC Graduate Handbook. At least three of the committee members must be tenure-track members of the Department of Mathematical Sciences, with at least two of these three tenured. The chair of the committee must be a tenure-track member of the Department of Mathematical Sciences. However, the chair of the committee does not need to be the sole, or even the primary dissertation advisor. Any subsequent

changes in the Dissertation Committee will also be made by the Graduate School upon recommendation of the Graduate Program Director in consultation with the committee chair and student. Students have the right to request a change in the committee but must do so in consultation with the Graduate Program Director.

When the student and the advisor deem the dissertation to be complete, a copy of it is submitted to each committee member for critical evaluation. The Committee can make recommendations to the student concerning extensions or other avenues of research related to the dissertation problem at this time or can recommend that the defense be scheduled. Students should not schedule a dissertation defense before receiving the approval of the committee.

At least two weeks before the open defense, electronic copies of the dissertation in the proposed final form should be distributed to all Dissertation Committee members. The defense of the dissertation is open to the general public. The candidate gives an oral presentation of the dissertation, after which those present may pose questions or make comments. Once the time for questions from the general audience has finished, the committee may continue questioning the candidate in a closed session. After the committee members have completed their questioning, the committee will withdraw, make a decision with regard to the acceptability of the dissertation and its defense, and report its decision to the candidate. At least three-quarters of the voting members of the Dissertation Committee must approve the dissertation.

### 2.3. Program Standards for the Mathematics PhD Program.

2.3.1. *Minimum Academic Performance and Probation.* All PhD students must:

- Pass both Qualifying Exams by the beginning of the second academic year. Students who fail to do so will be dismissed from the PhD program.
- Pass four Preliminary Exams within one and one-half academic years of passing the Qualifying Exam. Students who fail to do so will be dismissed from the PhD program.

Furthermore, PhD students are expected to:

- Maintain a GPA of at least 3.3 in graduate courses in mathematical sciences.
- Take a standard course load comprised of courses appropriate to the student's program of study. For PhD students who have passed their Qualifying Exams but have not yet advanced to candidacy, this must include at least one regular course from the Department of Mathematical Sciences at the 7000 level or higher each semester.
- Complete the breadth requirement and the Advanced Exam and advance to Candidacy within four years of entering the program.
- Make adequate progress on the dissertation. Students entering the program with a master's degree are expected to complete the program within 5 years; those entering with only a bachelor's degree are expected to complete the program in 6 years.

Students who do not maintain minimum academic performance as outlined above will be placed on probation. The Graduate Program Director will send the student a letter outlining the reasons for the probation, the steps required to rectify the situation, and the resulting consequences for failure to achieve the required performance standards within specified time limits. These consequences may include non-renewal of financial support or dismissal from the program.

2.3.2. *Annual Review.* Each year at the end of the Fall Semester, PhD students will receive a written annual review of their progress from the Graduate Program Director in consultation with the student's advisor. For students who are also Graduate Assistants, reviews will also contain a report on the performance of their GA duties.

### 3. STATISTICS PhD PROGRAM

#### 3.1. General Description of the Statistics PhD Program.

3.1.1. *Objectives.* The Doctor of Philosophy (PhD) in Statistics represents achievement of a broad knowledge of statistics, of the ability to communicate statistics in both written and oral form, and of a demonstrated creative ability in a particular branch of statistics.

3.1.2. *Academic Admission Requirements.* Students applying for the program should have or be expecting to obtain a bachelor's degree in statistics or a closely related area. Specifically, all students should have taken three semesters of calculus up to and including multivariate calculus, as well as semester courses in linear algebra and calculus-based probability and statistics. It is recommended applicants have taken or be taking courses in pure and applied statistics similar to STAT6021-6022 and STAT6031-6032.

A minimum score of 160 on the GRE quantitative section is expected for admission. Proficiency in English is required of international students whose native language is not English. The English proficiency requirement is met for applicants with degrees earned in English from accredited universities and colleges in the US or other English speaking countries. The Graduate School maintains a list of countries eligible for a waiver of the English Language Testing requirement. For admission, the English proficiency requirement is met by a score of at least 80 on the internet-based TOEFL, 6.5 on the International English Language Testing System (IELTS), 54 on the PEARSON Test of English (PTE), or 110 on the Duolingo English Test. To be eligible for a Graduate Assistantship, a student must achieve a TOEFL score of at least 93, IELTS overall band score of at least 7, PTE score of at least 64, or Duolingo score of at least 115.

3.1.3. *Advisors.* Beginning graduate students are assigned a graduate advisor who is a member of the Statistics Graduate Faculty (see Section 3.1.4). Students should meet regularly with their advisors to discuss their programs of study. All courses taken by students should be approved in advance by their advisors. After passing the Preliminary Exam, students select a dissertation advisor who will also serve as advisor from that period onward. The dissertation advisor must agree to serve in this capacity and must be a Graduate Faculty member of the Department of Mathematical Sciences when the student makes the selection. The dissertation advisor does not need to be a member of the Graduate Faculty in Statistics.

3.1.4. *Graduate Faculty in Statistics.* The Graduate Faculty in Statistics consists of those faculty members who:

- (1) are tenured or tenure-track faculty with primary appointment in the Department of Mathematical Sciences,
- (2) are members of the UC Graduate Faculty, as determined by the Graduate School, and
- (3) have taught at least one STAT course at the 5000 level or higher in the past three years.

#### 3.2. Requirements for the Statistics PhD Program.

3.2.1. *Overview of University Requirements.* University rules and regulations concerning the PhD program are set out in the University of Cincinnati Graduate School's Graduate Handbook. We list below some of the most important requirements. It is the student's responsibility to read this document and to be aware of all university requirements concerning the PhD degree.

- Credit hour requirement: A minimum of 90 graduate credits beyond a bachelor's degree or a minimum of 60 credits beyond a master's degree, including at least 7 hours in dissertation research.
- Residency requirement: Prior to admission to doctoral candidacy, all PhD students shall complete a residency requirement by enrolling in 10 graduate credit hours per semester (12 if funded by a Graduate Assistantship) for two out of three consecutive semesters of study (including summer).
- Time restrictions: All requirements for the doctoral degree must be completed within nine consecutive years of the date of matriculation into the program.

3.2.2. *Overview of Departmental Requirements.*

- Qualifying Exam
- Preliminary Exam
- Required core courses
- Required supplementary courses

- Breadth requirement
- Minimum grade point average
- Advanced Exam
- Doctoral dissertation

3.2.3. *Qualifying Exam.* All students must pass the Statistics Qualifying Exam based on the two two-semester sequences STAT6021-6022 (mathematical statistics) and STAT6031-6032 (applied statistics). The Statistics Qualifying Exam is offered twice a year, once after the end of the Spring Semester and once before the start of the Fall Semester.

All incoming PhD students are required to take the Qualifying Exam before the beginning of their first semester. Students who pass this exam at the PhD level upon entry may be declared exempt from taking the STAT6021-6022 sequence or the STAT6031-6032 sequence. In order to remain in the PhD program, students must pass the Qualifying Exam at the PhD level by the beginning of the Fall Semester following admission into the program.

3.2.4. *Preliminary Exam.* All students must pass the Statistics Preliminary Exam based on the two courses STAT7024 Linear Models and Multivariate Analysis II and STAT7031 Statistical Theory. The Statistics Preliminary Exam is offered twice a year, once after the end of the Spring Semester and once before the start of the Fall Semester.

Students must pass the Preliminary Exam within two academic years of entering the PhD program. Students are allowed to take the Preliminary Exam at most twice, but incoming PhD students who so desire may take the Preliminary Exam upon their arrival without that attempt counting against the two-attempt limit.

A student who passes the Preliminary Exam upon arrival but does not pass the Qualifying Exam at the PhD level must take the required Qualifying Exam Courses STAT6021, STAT6022, STAT6031, and STAT6032 and pass the Qualifying Exam at the PhD level by the beginning of the Fall Semester following admission into the program. The student does not need to take STAT7024 or STAT7031 or retake the Preliminary Exam.

3.2.5. *Required Core Courses.* All students must satisfy the following course requirements. An average GPA of at least 3.3 is required in these courses.

A. Qualifying Exam Courses. The following four courses are required:

- STAT6021 Mathematical Statistics I
- STAT6022 Mathematical Statistics II
- STAT6031 Applied Statistics I
- STAT6032 Applied Statistics II

These four courses are preparation for the Statistics Qualifying Exam. All students must attempt the Qualifying Exam upon entering the program. Students who pass the Qualifying Exam upon entry will be told if they need to take the STAT6021-6022 sequence or the STAT6031-6032 sequence.

B. Required 7000-Level Courses. The following four courses are required:

- STAT7023 Linear Models and Multivariate Analysis I
- STAT7024 Linear Models and Multivariate Analysis II
- STAT7031 Statistical Theory
- STAT7032 Probability

A student who passes the Preliminary Exam is exempt from taking STAT7024 and STAT7031.

C. Advanced Theory of Statistics. The following course is required:

- STAT8021 Advanced Theory of Statistics.

D. Advanced Core Courses. Three of the following four courses are required:

- STAT8022 Advanced Bayesian Analysis
- STAT8023 Advanced Statistics Computing
- STAT8024 Advanced Statistical Modeling
- STAT8025 Spatial Statistics

3.2.6. *Required Supplementary Courses.* All students must satisfy the following course requirements.

A. Professional Development. One of the following two courses is required:

- STAT6051 Statistical Consulting

- STAT8026 Practicum in Applied Statistics
- B. Statistics Seminar. The following course is required each semester until a student advances to candidacy:
- STAT9081 Statistics Seminar

3.2.7. *Breadth Requirement*. Students must take at least three of the following courses, with at least one at the 7000 or 8000 level. Courses used to satisfy the Required Core or Required Supplementary Courses requirements cannot be used for the breadth requirement. A GPA of 3.3 or higher is required in the breadth requirement courses.

- STAT6041 Time Series
- STAT6042 Survival Analysis and Logistic Regression
- STAT6043 Applied Bayesian Analysis
- STAT6044 Nonparametric Statistics
- STAT6045 Statistical Computing
- STAT6051 Statistical Consulting
- STAT6071 Statistics and Machine Learning
- STAT7020 Topics in Applied Statistics
- STAT8022 Advanced Bayesian Analysis
- STAT8023 Advanced Statistics Computing
- STAT8024 Advanced Statistical Modeling
- STAT8025 Spatial Statistics

**Note 1:** A student who is exempted from taking Qualifying Exam Courses or Preliminary Exam Courses by passing the corresponding exam does not need to take additional courses to satisfy the breadth requirement. However, all students must take a minimum of 90 graduate credits beyond a bachelor's degree or 60 credits beyond a master's degree.

**Note 2:** STAT7020 is a special-topics course whose syllabus may vary from year to year. It may be taken and counted up to two times towards the breadth requirement, subject to the approval of the GPD.

3.2.8. *Minimum Grade Point Average*. Graduating students must satisfy the following requirements:

- A minimum GPA of 3.3 in all courses used to satisfy degree requirements.
- A minimum GPA of 3.3 in all required core courses.
- A minimum GPA of 3.3 in all courses used to satisfy the breadth requirement.

3.2.9. *Advanced Exam*. An Advanced Exam in the area of specialization of the student is required. To apply for an Advanced Exam, a student must have successfully completed the Preliminary Exam and must have chosen an area for the dissertation. An Advanced Exam may either be a written exam, a presentation, or a series of presentations. A pass on the Advanced Exam should indicate that a student has gained the appropriate mathematical maturity and advanced knowledge of the student's field of research to write a successful PhD thesis. The exam will be administered by a committee assembled along the lines of a Dissertation Committee (see Section 3.2.11 below). Generally this committee will form the student's Dissertation Committee but this is not a requirement. Advanced Exams must be scheduled at least a month in advance of the proposed date by the student's advisor. The advisor will provide the Graduate Program Director with the names of the proposed committee members and the proposed format and date of the exam. The exam will then be officially scheduled by the Graduate Program Director. If a student does not pass an Advanced Exam, then at least one month must pass before another attempt is scheduled. The Advanced Exam must be passed within four years of entrance into the PhD program.

3.2.10. *Admission to Candidacy*. After completing the Preliminary Exam, the required core and supplementary courses, the breadth requirement, and the Advanced Exam the student will be admitted to candidacy. At this point the student works full-time on dissertation research. This part of the program usually requires 1-3 years of study. All students must register for at least one graduate credit hour each academic year in order to maintain graduate student and candidacy status.



3.2.11. *Dissertation.* A student is required to present a dissertation which demonstrates high scholarly achievement through original and independent research.

After a Ph.D. student has passed the Preliminary Exam, the student should select a dissertation advisor who will also serve as advisor from that period onward. The dissertation advisor must agree to serve in this capacity and must be a Graduate Faculty member of the Department of Mathematical Sciences at the time the student makes the selection. The dissertation advisor does not need to be a member of the Graduate Faculty in Statistics. The research topic is to be selected by the student in consultation with the dissertation advisor. The dissertation topic may be interdisciplinary and include a statistical methodology and application specific to another discipline. In this case, it may be appropriate for the dissertation committee to include an expert in that discipline. This expert could be internal or external to UC. A student's dissertation may include work done as a research assistant or intern.

At the time a student is admitted into Candidacy, the Dissertation Committee is formed by the Graduate School on the recommendation of the Graduate Program Director in consultation with the dissertation advisor and the student. The committee consists of 3-5 persons admissible under the rules of the Graduate School set out in the UC Graduate Handbook. At least three of the committee members must be tenure-track members of the Department of Mathematical Sciences, with at least two of these three tenured members of the Graduate Faculty in Statistics. The chair of the committee must be a tenure-track member of the Department of Mathematical Sciences. However, the chair of the committee does not need to be the sole, or even the primary dissertation advisor. Any subsequent changes in the Dissertation Committee will also be made by the Graduate School upon recommendation of the Graduate Program Director in consultation with the committee chair and student. Students have the right to request a change in the committee but must do so in consultation with the Graduate Program Director.

When the student and the advisor deem the dissertation to be complete, a copy of it is submitted to each committee member for critical evaluation. The Committee can make recommendations to the student concerning extensions or other avenues of research related to the dissertation problem at this time or can recommend that the defense be scheduled. Students should not schedule a dissertation defense before receiving the approval of the committee.

At least two weeks before the open defense, electronic copies of the dissertation in the proposed final form should be distributed to all Dissertation Committee members. The defense of the dissertation is open to the general public. The candidate gives an oral presentation of the dissertation, after which those present may pose questions or make comments. Once the time for questions from the general audience has finished, the committee may continue questioning the candidate in a closed session. After the committee members have completed their questioning, the committee will withdraw, make a decision with regard to the acceptability of the dissertation and its defense, and report its decision to the candidate. At least three-quarters of the voting members of the Dissertation Committee must approve the dissertation.

### 3.3. Program Standards for the Statistics PhD Program.

3.3.1. *Minimum Academic Performance and Probation.* All PhD students must:

- Pass the Qualifying Exam by the beginning of the second academic year. Students who fail to do so will be dismissed from the PhD program.
- Pass the Preliminary Exam within two academic years of entering the PhD program. Students who fail to do so will be dismissed from the PhD program.

Furthermore, PhD students are expected to:

- Maintain a program GPA of at least 3.3.
- Take a standard course load comprised of courses appropriate to the student's program of study. For PhD students who have passed their Qualifying Exams but have not yet advanced to candidacy, this must include at least one regular course from the Department of Mathematical Sciences at the 7000 level or higher each semester.
- Complete the breadth requirement and the Advanced Exam and advance to Candidacy within four years of entering the program.
- Make adequate progress on the dissertation. Students entering the program with a master's degree are expected to complete the program within five years; those entering with only a bachelor's degree are expected to complete the program in six years.

Students who do not maintain minimum academic performance as outlined above will be placed on probation. The Graduate Program Director will send the student a letter outlining the reasons for the probation, the steps required to rectify the situation, and the resulting consequences for failure to achieve the required performance standards within specified time limits. These consequences may include non-renewal of financial support or dismissal from the program.

3.3.2. *Annual Review.* Each year at the end of the Fall Semester, PhD students will receive a written annual review of their progress from the Graduate Program Director in consultation with the student's advisor. For students who are also Graduate Assistants, reviews will also contain a report on the performance of their GA duties.

## 4. MASTER OF SCIENCE IN MATHEMATICAL SCIENCES

**4.1. General Description.** The Master of Science (MS) in Mathematical Sciences degree program is a three-semester course of study that develops the student's understanding of mathematics beyond that obtained in a standard undergraduate program. A graduate of the MS program is prepared to enter the workforce as a professional mathematical scientist. An appropriate choice of courses will also prepare students to pursue a PhD

**4.2. Admission Requirements.** Students applying for the program should have or be expecting to obtain a bachelor's degree either in mathematics or in a related area with a strong mathematical foundation. Specifically, students should have taken:

- Three semesters of calculus up to and including multivariate calculus
- A semester course in ordinary differential equations
- A semester course in linear algebra

Students should have a grade point average of at least 3.0 (a "B" average) in these courses.

A minimum score of 155 on the GRE quantitative section is expected for admission. However the GRE requirement may be waived if taking the GRE creates a financial hardship for the applicant. Proficiency in English is expected of international students whose native language is not English. A minimum score of 80 on the internet-based TOEFL is required for admission. Also acceptable for admission are an overall band score of 6.5 on the International English Language Testing System (IELTS), a score of 56 on the PEARSON Test of English (PTE), or a score of 105 on the Duolingo English Test. The English proficiency requirement is met for applicants with degrees earned in English from accredited universities and colleges in the US or other English speaking countries. The Graduate School maintains a list of countries eligible for a waiver of the English Language Testing requirement.

**4.3. Program Requirements.**

**4.3.1. Total Credit Hours.** A minimum of 30 graduate credits are required with a GPA of 3.0 or higher. All credits must be approved by an advisor and at least 24 of these should be graduate mathematics or statistics courses. Of the courses taken to fulfill the 30 credits, at least three should come from the following list:

- MATH7001 Complex Analysis
- MATH7002 Real Analysis
- MATH7003 Rings, Fields and Galois Theory
- MATH7004 Topology
- MATH7005 Ordinary Differential Equations
- MATH7006 Partial Differential Equations
- MATH7011 Advanced Mathematical Modeling
- MATH7015 Numerical Linear Algebra
- MATH7032 Probability
- MATH8001 Geometric Function Theory
- MATH8002 Geometric Analysis
- MATH8003 Functional Analysis
- MATH8004 Operator Theory
- MATH8005 Introduction to Algebraic Geometry
- MATH8006 Algebra and Cryptography
- MATH8007 Advanced Stochastic Processes
- MATH8008 Stochastic Differential Equations
- MATH8009 Advanced Partial Differential Equations
- MATH8010 Advanced Numerical Analysis
- MATH8011 Scientific Computation
- MATH8012 Applied Mathematics Methods
- MATH9001 Advanced Financial Mathematics

**4.3.2. Tracks.** Students must choose between three tracks: Pure Mathematics, Applied Mathematics, and Financial Mathematics. Each track has a core of courses that the students must take. The remaining credits are chosen from a list of electives. In exceptional circumstances a student may substitute a course not on the

list of electives. All such substitutions must be approved in advance and in writing by the student's advisor and the Graduate Program Director.

#### 4.3.3. *Pure Mathematics.*

- Required Core\*:
  - MATH6001 Advanced Calculus I
  - MATH6002 Advanced Calculus II
  - MATH6003 Abstract Linear Algebra
- Restricted Electives (three courses are required):
  - MATH6004 Group Theory
  - MATH6005 Introduction to Complex Analysis
  - MATH7001 Complex Analysis
  - MATH7002 Real Analysis
  - MATH7003 Rings, Fields and Galois Theory
  - MATH7004 Topology
  - MATH7005 Ordinary Differential Equations
  - MATH7006 Partial Differential Equations
  - MATH7032 Probability
- Other Electives:
  - MATH6006 Numerical Analysis
  - MATH6007 PDE and Fourier Analysis
  - MATH6008 Applied Probability and Stochastic Processes
  - MATH8001 Geometric Function Theory
  - MATH8002 Geometric Analysis
  - MATH8003 Functional Analysis
  - MATH8004 Operator Theory
  - MATH8005 Introduction to Algebraic Geometry
  - MATH8006 Algebra and Cryptography
  - MATH8007 Advanced Stochastic Processes
  - MATH8008 Stochastic Differential Equations
  - MATH8009 Advanced Partial Differential Equations
  - STAT6021 Mathematical Statistics I
  - STAT6022 Mathematical Statistics II

\*Students have the option of taking the Mathematics PhD Qualifying Exam before entering the program. Students passing this exam are not required to take MATH 6001 or MATH 6003, but still must complete 30 graduate credits.

#### 4.3.4. *Applied Mathematics.*

- Core Courses (four courses are required):
  - MATH6006 Numerical Analysis
  - MATH6007 PDE and Fourier Analysis
  - MATH6008 Applied Probability and Stochastic Processes
  - MATH6012 Applied Linear Algebra
  - MATH6015 Mathematical Programming
  - MATH6051 Applied Ordinary Differential Equations
- Restricted Electives (three courses are required):
  - Core courses not used to satisfy the core course requirement
  - MATH6019 Nonlinear Optimization
  - MATH7015 Numerical Linear Algebra
  - MATH8010 Advanced Numerical Analysis
  - MATH8011 Scientific Computation
  - MATH8012 Applied Mathematics Methods
- Other Electives:
  - MATH6001 Advanced Calculus I
  - MATH6002 Advanced Calculus II

- MATH6005 Introduction to Complex Analysis
- MATH7005 Ordinary Differential Equations
- MATH7006 Partial Differential Equations
- Up to six graduate credits from other departments, approved in advance by the student's advisor

#### 4.3.5. *Financial Mathematics.*

- Required Core:
  - MATH6010 Probabilistic Aspects of Financial Modeling
  - MATH6011 Computational Financial Mathematics
  - STAT6031 Applied Regression Analysis (Applied Statistics I prior to Fall 2021)
- Restricted Electives (three courses are required):
  - MATH6006 Numerical Analysis
  - MATH6007 PDE and Fourier Analysis
  - MATH6008 Applied Probability and Stochastic Processes
  - MATH6019 Nonlinear Optimization
  - MATH7006 Partial Differential Equations
  - MATH8008 Stochastic Differential Equations
  - MATH9001 Advanced Financial Mathematics
  - STAT6041 Time Series
- Other Electives:
  - MATH6012 Applied Linear Algebra
  - MATH6015 Mathematical Programming
  - MATH7015 Numerical Linear Algebra
  - MATH7032 Probability
  - Up to six graduate credits in finance and economics, approved in advance by the student's advisor.

4.3.6. *Master's Thesis.* A student may write a Master's thesis on a topic chosen in consultation with the student's advisor in lieu of 4 credits of formal course work. An expository thesis is acceptable for the MS. A formal thesis defense is optional and may be used to replace the Oral Exam (see below).

4.3.7. *Oral Exam.* Students must pass an Oral Exam which tests their ability to communicate orally the fundamental concepts of the core courses in their track. The oral exam lasts one hour and may be taken at any time after the student has taken and passed the core courses. It begins with a 20 minute presentation by the students on a subject of their choice from their core courses and is followed by a question and answer session. The exam committee consists of three faculty members usually chosen from those who taught courses taken by the examinee. Students who write and defend a master's thesis are exempt from the Oral Exam.

4.4. **Minimum Academic Performance.** Students must maintain a minimum academic performance at all times while in the MS program. Minimum academic performance includes

- maintaining a GPA of at least 3.0 in graduate courses in mathematics;
- taking courses appropriate to the student's program of study;
- taking an appropriate course load.

Failure to maintain a satisfactory performance may result in probation, non-renewal of financial aid or dismissal from the program.

4.5. **Examples of Programs of Study.** Each student in the program is assigned a graduate advisor. In consultation with this advisor, the student selects a program of courses designed to provide basic training in mathematics at the graduate level and in-depth study in areas of special interest. Listed below are some *sample* programs.

Pure Mathematics Sample Program

Year 1		Year 2
Fall	Spring	Fall
MATH6001 Adv. Calc. I MATH6003 Abstract Lin. Alg. MATH6005 Intro. Complex *Elective	MATH6002 Adv. Calc. II MATH6004 Group Theory MATH7001 Complex Analysis *Elective	MATH6008 Appl. Prob. Stoch. MATH7002 Real Analysis MATH7005 ODE *Elective

\*One additional elective is required that can be taken in any term.

Students entering the Pure Mathematics track may take the PhD Qualifying Exam in August before classes start. If they successfully pass the Qualifying Exam they will not have to take the corresponding courses and can create a more challenging curriculum that includes more 7000-level and 8000-level courses.

Pure Mathematics Sample Program (Qual Passed on Entry)

Year 1		Year 2
Fall	Spring	Fall
MATH6005 Intro. Complex MATH7002 Real Analysis MATH7005 ODE *Elective	MATH6004 Group Theory MATH7003 Rings and Fields MATH7032 Probability *Elective	MATH7004 Topology MATH7006 PDE MATH8003 Funct. Analysis *Elective

\*One additional elective is required that can be taken in any term.

Applied Mathematics Sample Program

Year 1		Year 2
Fall	Spring	Fall
MATH6006 Num. Analysis MATH6012 Appl. Lin. Alg. MATH6051 Appl. ODE *Elective	MATH6007 PDE and FA MATH6015 Math. Programming MATH8012 Appl. Math. Meth. *Elective	MATH6008 Appl. Prob. Stoch. MATH7005 ODE MATH7015 Num. Lin. Alg. *Elective

\*One additional elective is required that can be taken in any term.

Financial Mathematics Sample Program

Year 1		Year 2
Fall	Spring	Fall
MATH6006 Num. Analysis MATH6008 Appl. Prob. Stoch. STAT6031 Appl. Regression *Elective	MATH6010 Prob. Fin. Mod. MATH6011 Comp. Fin. Math. MATH7032 Probability *Elective	MATH6019 Nonlin. Opt. MATH7006 PDE MATH8008 Stoch. Diff. Eq. *Elective

\*One additional elective is required that can be taken in any term.

4.5.1. *Preparation for the PhD Program.* Entrance into the PhD program requires a strong background in theoretical mathematics. All PhD students must pass the Qualifying Exam in Advanced Calculus and Linear Algebra at the PhD level by the end of their first year. A student in applied or financial mathematics wishing to continue into the PhD program should be sure to gain competency in these subjects.

## 5. MASTER OF SCIENCE IN STATISTICS

**5.1. General Description.** The Master of Science (MS) in Statistics degree program is intended to prepare students for careers as statisticians or for entry into a PhD program in Statistics. A student entering with the minimum requirements should expect to take two years to complete the program. Students entering the program with a stronger background in statistics may be able to complete the program in three or even two semesters.

Students applying for the program should have or be expecting to obtain a bachelor's degree in either mathematics or statistics, or in a related area with a strong mathematical foundation. Specifically, applicants should have taken:

- Three semesters of calculus up to and including multivariate calculus
- A semester course in linear algebra
- A semester course in calculus-based probability and statistics

Applicants should have a grade point average of at least 3.0 (a “B” average) in these courses.

A minimum score of 155 on the GRE quantitative section is expected for admission. However the GRE requirement may be waived if taking the GRE creates a financial hardship for the applicant. Proficiency in English is expected of international students whose native language is not English. A minimum score of 80 on the internet-based TOEFL is required for admission. Also acceptable for admission are an overall band score of 6.5 on the International English Language Testing System (IELTS), a score of 56 on the PEARSON Test of English (PTE), or a score of 105 on the Duolingo English Test. The English proficiency requirement is met for applicants with degrees earned in English from accredited universities and colleges in the US or other English speaking countries. The Graduate School maintains a list of countries eligible for a waiver of the English Language Testing requirement.

**5.2. Requirements.**

**5.2.1. Course requirements.** A minimum of 30 graduate credits are required with a GPA of 3.0 or higher. The following courses are required:

- STAT6021 Mathematical Statistics I
- STAT6022 Mathematical Statistics II
- STAT6031 Applied Regression Analysis (Applied Statistics I prior to Fall 2021)
- STAT6032 Design and Analysis of Experiments (Applied Statistics II prior to Fall 2021)
- STAT7023 Linear Models and Multivariate Analysis I
- STAT7024 Linear Models and Multivariate Analysis II or STAT7020 Topics in Applied Stats

Moreover students must have a GPA of 3.0 or higher on this set of six courses. Two further courses must be chosen from the following list:

- STAT6041 Time Series
- STAT6042 Survival Analysis and Logistic Regression
- STAT6043 Applied Bayesian Analysis
- STAT6044 Nonparametric Statistics
- STAT6045 Statistical Computing with SAS and S-plus
- STAT6051 Statistical Consulting
- STAT6071 Statistics and Machine Learning
- STAT7020 Topics in Applied Statistics
- STAT7024 Linear Models and Multivariate Analysis II

At least four additional graduate credits may be chosen from graduate statistics (STAT) or mathematics (MATH) courses (excluding STAT Readings), or from approved graduate courses from the Division of Biostatistics and Bioinformatics of the Department of Environmental Health, the Center for Business Analytics of the College of Business, or the Department of Electrical Engineering and Computer Science of the College of Engineering. The Graduate Colloquium, Research, and the Proseminar in the Teaching of College Mathematics credits cannot be applied toward the degree. At most, 4 credits of Readings or Individual Work can be applied toward the degree and then only upon written recommendation of both the supervisor of the readings and the Graduate Program Director. Students working on an approved internship may apply

up to six hours credit (STAT8026 Practicum in Applied Statistics) towards their degree conditional on the approval of their advisor.

Students entering the program having already taken courses such as 6031-6032 (applied statistics) may have such requirements waived but are still required to take 30 graduate credits of statistics courses. In this situation, students may be recommended to take courses offered by the departments listed above. Up to six such credits are allowed on approval of the student's advisor.

5.2.2. *Qualifying Exam.* A Qualifying Exam in Statistics takes place every year in May and August. It is based on the two two-semester sequences STAT6021–6022 (mathematical statistics) and STAT6031–6032 (applied statistics). There are three possible outcomes for the exam: pass at the PhD level; pass at the MS level; and fail. All full-time students must pass the Qualifying Exam in Statistics at least at the MS level by the end of their first year. A pass at the PhD level exempts the student from the oral exam.

5.2.3. *Oral Exam.* Students must pass a comprehensive Oral Exam based on the material covered in the courses taken in fulfillment of the degree requirements. MS Statistics students should contact the Statistics MS Oral Exam Coordinator to arrange an exam committee. Knowledge of linear algebra is expected of all students who earn an MS degree and questions on this subject may be asked on the Oral Exam. The exam committee consists of three faculty members usually chosen from those who taught courses taken by the examinee. Students who pass the Qualifying Exam at the PhD level or defend a master's thesis are exempt from the Oral Exam requirement.

5.2.4. *Master's Thesis.* A student may write a Master's thesis on a topic chosen in consultation with the student's advisor in lieu of 4 credits of formal course work. An expository thesis is acceptable for the MS. The thesis must be of sufficient quality to earn the grade of B. A formal thesis defense is optional and can be held in lieu of an Oral Exam.

5.3. **Minimum Academic Performance.** Students must maintain a minimum academic performance at all times while in the MS program. Minimum academic performance includes

- maintaining a GPA of at least 3.0 in graduate courses in statistics;
- taking courses appropriate to the student's program of study;
- taking an appropriate course load.

Failure to maintain a satisfactory performance may result in probation, non-renewal of financial aid or dismissal from the program.

5.4. **Examples of Programs of Study.** Each student in the program is assigned a graduate advisor. In consultation with this advisor, the student selects a program of courses designed to provide basic training in mathematics at the graduate level and in-depth study in areas of special interest.

Listed below are some sample programs for students with different backgrounds.

5.4.1. *Basic Statistical Background.* The following sample program is appropriate for a student with the minimum entrance requirements. The program can be completed in 3 or 4 semesters.

Year 1		Year 2
Fall	Spring	Fall
STAT6021 Math. Stat. I STAT6031 Appl. Regression MATH6012 Appl. Lin. Alg. *Elective	STAT 6022 Math. Stat. II STAT6032 Design of Exp. STAT6041 Time Series *Elective	STAT6045 Stat. Comp. STAT7020 Topics Appl. Stat. STAT7023 Linear Models I *Elective

\*One additional elective is required that can be taken in any term.

5.4.2. *Strong Statistical Background.* The following sample program is appropriate for a student who enters the program with a strong background in statistics. In particular the student must have successfully completed the equivalent of the introductory 6000-level sequences in mathematical and applied statistics. A student in this situation should be able to complete the program in three semesters of full-time study.



Year 1		Year 2
Fall	Spring	Fall
STAT6044 Non-Parametric STAT6045 Stat. Comp. STAT7023 Linear Models I *Elective	STAT6043 Appl. Bayesian STAT7024 Linear Models II STAT7032 Probability *Elective	STAT6042 Survival Analysis STAT 7020 Topics Appl. Stat. STAT7031 Stat. Theory *Elective

\*One additional elective is required that can be taken in any term.

## 6. GRADUATE CERTIFICATE IN STATISTICAL SCIENCE

**6.1. General Description.** The Graduate Certificate in Statistical Science is a two-semester course of part-time study that equips students with applied statistical techniques beyond those covered in a standard undergraduate program. A graduate of the certificate program is prepared to perform statistical data analysis in a variety of professional contexts.

**6.2. Admission Requirements.** Students applying for the program should have or be expecting to obtain a bachelor's degree in a discipline that employs data analysis. Furthermore, students should have taken STAT 2037 and STAT 3038 or equivalent courses (i.e., two semesters of calculus-based probability and statistics) with a grade of B or higher in each course. Students who are currently enrolled in good standing in the Statistics M.S. or Statistics Ph.D. degree programs at the University of Cincinnati, or those who have previously completed either degree at the University of Cincinnati, are not eligible for admission to the certificate program.

**6.3. Requirements.** A minimum of 12 graduate credits are required with a GPA of 3.0 or higher with no individual course grade lower than B-. The following courses are required:

- STAT6031 Applied Regression Analysis
- STAT6032 Design and Analysis of Experiments\*
- STAT6045 Statistical Computing with SAS and S-Plus

One further course must be chosen from the following list:

- STAT6041 Time Series
- STAT6042 Survival Analysis and Logistic Regression
- STAT6043 Applied Bayesian Analysis
- STAT6044 Nonparametric Statistics
- STAT6051 Statistical Consulting
- STAT6071 Statistics and Machine Learning
- Any other graduate (6000-level or higher) STAT course, with advisor approval.
- Any other graduate (6000-level or higher) course with significant statistical content, with approval of the Graduate Program Director.

Students entering the program with appropriate background may have specific course requirements waived but are still required to complete 12 graduate credits of statistics courses.

\*If appropriate for the student's educational goals, STAT 6032 may be replaced by another STAT course at the 6000-level or higher with permission of the Graduate Program Director.

**6.4. Financial Support.** It is university policy that students enrolled only in a graduate certificate program are not eligible for tuition or stipend support with University funds.

## 7. FINANCIAL SUPPORT

## 7.1. University Graduate Awards.

7.1.1. *Graduate Assistantships.* Graduate Assistantships (UGA) are financial stipends awarded for services rendered to the department. Students who are not eligible to assume direct instructional duties (international students who have not passed the OEPT requirement) receive the base stipend. Pre-candidacy students who are eligible to assume direct instructional duties receive the regular stipend, which is higher than the base stipend. PhD students who have advanced to candidacy receive an increased stipend, starting with the semester following advancement to candidacy. Graduate Assistants are expected to perform duties for the Department as detailed in Section 7.2.4 below. All students with GAs are required to pass the Proseminar in the Teaching of College Mathematics (MATH 9040) as soon as possible after being awarded the GA.

7.1.2. *Fellowships.* A variety of fellowships are available to graduate students. More details on fellowship opportunities are available on the department's website. Advanced PhD students are expected to apply for the Taft Graduate Fellowships. Note that fellowships that are accompanied by a GCS (see below) are subject to Ohio's 174 credit hour rule described in Section 7.2.2.

7.1.3. *Graduate Assistant Scholarships.* The Graduate Assistant Scholarship (GAS) is a university-funded scholarship that covers all of a full-time student's tuition and fees, except those fees specifically excluded by the University. All Graduate Assistants receive GASs, as do Research Assistants funded through University grants and contracts.

Students receiving a GAS must be registered for at least 12 graduate credit hours in each semester for which they are receiving support. Audited courses and withdrawn courses (after the withdrawal date) do not count toward the registration requirement. Students registered for more than 18 credits in a semester will be billed tuition and general fees on a per-credit-hour rate for each credit over the 18. If a student withdraws from a course and falls below the required minimum number of registered graduate credit hours, the GAS is cancelled immediately and the student is responsible for the tuition balance, based on the date of withdrawal.

7.1.4. *Graduate Incentive Awards.* The Graduate Incentive Award (GIA) is a university-funded scholarship that covers part of a full-time student's tuition and fees. Students receiving a GIA must be registered for at least the number of graduate credit hours covered by the GIA in each semester for which they are receiving support. Audited courses and withdrawn courses (after the withdrawal date) do not count toward the registration requirement. Students registered for more than 18 credits in a semester will be billed tuition and general fees on a per-credit-hour rate for each credit over the 18. If a student withdraws from a course and falls below the required minimum number of registered graduate credit hours, the GIA is cancelled immediately and the student is responsible for the tuition balance, based on the date of withdrawal.

7.1.5. *Internships and External Support.* Students supported by employment through a University grant or contract (called an "internship" below) are eligible for a 90% GIA provided the support satisfies the following conditions:

- (1) The internship should have a character that is similar to a research assistantship funded by an external grant.
- (2) The work performed under the internship should be aligned with the academic interests and career trajectory of the student.
- (3) The internship should involve 16-20 hours work per week for 15 weeks each semester during which a GIA is awarded, and should be remunerated at a rate at least equivalent to a graduate assistantship.

All such internships must be approved by the Graduate Program Director in order for a GIA to be awarded. Interns should register for at least 10 graduate credit hours, unless the GIA is specifically awarded for a lesser amount. As with other Graduate Incentive Awards, audited courses and withdrawn courses (after the withdrawal date) do not count toward the registration requirement.

7.1.6. *Summer Support.* There are a number of opportunities for summer financial support. Each year the department offers some summer teaching opportunities for graduate students. More details on fellowship opportunities are available on the department's website. Continuing PhD students with strong academic records may apply for the competitive summer research fellowships awarded by the University Research Council (URC) and for Maita Levine Summer Research Fellowships awarded by the department.

7.1.7. *Miscellaneous Financial Support.* The Graduate Program Director may introduce other student award programs besides the ones listed above if funds are available to support them. Decisions on these awards will be made by the Graduate Program Director in consultation with the Graduate Students Evaluation Committee.

## 7.2. Conditions of Financial Aid.

7.2.1. *Award Criteria.* Decisions on the award of Graduate Assistantships are made by the Graduate Students Evaluation Committee (GSEC). Awards to beginning students are made on the basis of academic merit. All awards are renewed annually provided the student has made satisfactory progress has performed required duties in a satisfactory fashion.

In general, decisions for renewal of financial aid are made by April. Decisions are delayed if a student needs to satisfy certain conditions in order to stay in the program (e.g., pass Preliminary Exams, improve the GPA, improve performance of required duties, or some probationary condition). A decision of the GSEC not to renew the current level of financial aid to a student can be appealed to the Graduate Affairs Committee.

7.2.2. *Time Restrictions.* Financial support for PhD students is limited by the state of Ohio's 140/174 credit hour rule outlined in the University Graduate Handbook. Here "financial support" means support of any kind from the University of Cincinnati and includes Graduate Assistantships, Graduate Assistant Scholarships and Graduate Incentive Awards.

7.2.3. *University Requirements.* The University requirements for recipients of graduate awards are outlined in the University Graduate Handbook available online at the Graduate School's website [grad.uc.edu](http://grad.uc.edu). It is important that all students familiarize themselves with these rules.

7.2.4. *Graduate Assistant Duties.* Nearly all GA duties are instructional. Typically, a GA holds 4 office hours in the Math and Science Support Center, conducts problem sessions and grades for two or three courses while courses are in session, for an average of not more than 16 hours a week. International GAs who have not yet passed UC's Oral English Proficiency Test are generally given grading duties. More experienced GAs may be assigned full instructional responsibility for a course.

GAs are expected to perform their duties to the best of their capabilities and according to acceptable procedures, with punctuality, reliability, and a spirit of helpfulness to fellow teachers and students. GAs should act responsibly and with integrity at all times. If for a compelling reason they cannot perform some tasks (for example due to illness or conflict with the student's own academic obligations), they must minimize the disruption to others by finding substitutes, informing the department in a timely manner, and taking whatever other initiatives are appropriate for the situation.

7.2.5. *Oral English Proficiency Testing (OEPT).* All GAs whose native language is not English must pass the University's Oral English Proficiency Test with a score of 3.0 or above before they are allowed to have any direct instructional contact with students such as teaching, assisting in a course, holding office hours, etc. International GAs who have not satisfied this requirement by the end of March of their second year will not be eligible for renewal of their assistantship and GAS.

Students who have scored 26 or higher on the speaking section of the TOEFL IBT, 7.5 or higher on the speaking portion of the IELTS, or 50 or higher on the Test of Spoken English (TSE) do not need to take the OEPT. The English proficiency requirement is also met for students with degrees earned in English from accredited universities in the US or other English speaking countries. The Graduate School maintains a list of countries eligible for a waiver of the English Language Testing requirement.