HANDBOOK FOR MATHEMATICS GRADUATE STUDENTS

University of Kentucky
Department of Mathematics

Director of Graduate Studies

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1 CONTENTS

2 Overview

The Department of Mathematics offers programs leading to the degrees of Master of Arts, Master of Science, and Doctor of Philosophy. Financial support for graduate students is available in the form of Teaching Assistantships, Fellowships, and Research Assistantships; these are awarded on a competitive basis. This handbook contains policies regarding graduate study in the Department of Mathematics. Additional recommendations and guidance for students can be found on the Mathematics graduate program website: https://math.as.uky.edu/grad

This handbook will be reviewed by the graduate committee at least every two years.

3 General Policies and Resources

3.1 UK Policies for Graduate Students and Programs

Students, faculty, and department administrators can obtain information regarding general policies for graduate students and programs from the following sources:

- UK Graduate School Website: https://gradschool.uky.edu/
- UK Graduate School Bulletin: https://gradschool.uky.edu/graduate-school-bulletin
- UK Graduate School DGS Policies and Procedures Manual: https://gradschool.uky.edu/directors-graduate-studies

3.2 Academic Integrity and Student Rights and Responsibilities

Students are responsible for learning and following the rules and regulations that govern academic life at the university. Students should be informed regarding their academic and non-academic rights and responsibilities, including the UK Code of Student Conduct. For details, students should consult the Dean of Students website and the Ombud website:

- https://www.uky.edu/deanofstudents/student-rights-and-responsibilities
- https://www.uky.edu/ombud/

3.3 Time Limits

The UK Graduate School has established time limits for completion of Master's degrees, completion of Doctoral Qualifying Exams, and completion of Doctoral degrees. For details, see the Graduate School Bulletin: https://gradschool.uky.edu/graduate-school-bulletin

3.4 Registration

Students are expected to register for courses during their Priority Registration Window, following consultation with their academic advisor. This avoids incurring additional student fees and ensures that graduate courses have sufficient enrollment to avoid cancellation. For Master's students and for pre-qualified Doctoral students, the Director of Graduate Studies serves as their advisor.

4 Master's Degree Programs and Requirements

The Department offers two Master's degrees, the M.A. and M.S. in Mathematics. The requirements for the M.A. and M.S. degrees are identical. The M.A. and M.S. in Mathematics are 30 hour Master's degrees offered under Plan A (thesis option) or Plan B (non-thesis option). Most students take the non-thesis option and thus the Plan B requirements are detailed in this handbook. Students interested in writing a Master's thesis under Plan A should consult with the Director of Graduate Studies and the Graduate School Bulletin for the requirements. To receive an M.S or M.A. in Mathematics, students must complete course work and a final examination. The Master's degree is not a one-year program. Most students complete the requirements for the non-thesis option in two academic years.

4.1 Coursework Requirements

Students must complete 30 hours of graduate work in Mathematics and related areas with a final grade point of 3.0 or better. Of these 30 hours, students must have:

- At least 20 hours in Mathematics courses (MA and cross-listed courses),
- At least 15 hours at the 600 level or above, with
- At least 12 hours in Mathematics courses at the 600 level or above.

There is substantial flexibility in the courses a student may take for the M.A. degree. Most students in the Ph.D. program will automatically satisfy the coursework requirements for the M.A. degree.

4.2 Master's Exam Requirements

All students in the Master's program must pass a final exam administered by a Master's committee comprised of a Master's committee chair (i.e. the Master's advisor for the student) and two other faculty. This requirement is typically fulfilled by having the student read a paper or part of a monograph and give a presentation of this material to the examination committee. The chair of the committee assists with the selection of the paper or monograph and serves as an advisor for the process of preparing for the exam. The goal of the Master's exam is to evaluate the student on the skills of reading and presenting advanced mathematics.

5 Doctoral Degree Program and Requirements

5.1 Doctoral Degree Requirements

The Doctoral Program in Mathematics has the following requirements:

- Preliminary examinations
- Minor field requirement
- Qualifying examination
- Research component
- Residency requirement

These requirements and minimal expectations for good progress are outlined in this section.

5.2 Preliminary Examination Policies

5.2.1 Basic Policies

Students must pass three written preliminary examinations. Preliminary examinations are offered in six areas: Algebra, Analysis, Discrete Mathematics, Numerical Analysis, Partial Differential Equations, and Topology. Preliminary examinations are given twice each year. There is no limit on the number of times a student may take an examination. Students are strongly encouraged to attempt a Preliminary Examination as soon as they have completed the appropriate courses for that examination.

5.2.2 Policy on Short-Term Illness and/or Emergencies

If a student is unable to take a prelim due to an illness and/or other emergency, the student should immediately inform both the Director of Graduate Studies and the prelim committee chair. An alternate exam will be scheduled at a mutually agreeable time for any absences designated as an excused absence by Senate Rule 5.2.4.2: https://www.uky.edu/universitysenate/rules-regulations

5.2.3 Policy on Long-term Illness and/or Emergencies

If a student is unable to take prelims due to major/long-term issues, e.g., long-term illness, extended family emergency, required absence from campus during prelim dates, etc., the student should inform the Director of Graduate Studies as soon as possible. The Director of Graduate Studies and the graduate committee are responsible for working with the student to plan for any resulting academic issues, e.g., by scheduling an alternate prelim date, by formally adjusting the minimal expectations for progress in the program for that student, by arranging a formal leave of absence with the graduate school, or by another method.

5.2.4 Policy on Letters of Accommodation

If a student has a letter of accommodation from the Disability Resource Center, those accommodations will be applied to the preliminary examinations.

5.2.5 Process for Requesting Alternative Preliminary Examinations Requirements

In exceptional circumstances, a student may petition the graduate committee for alternative preliminary examination requirements. To submit such a petition, it is the responsibility of the student to find a faculty member who is willing to (i) endorse the petition and (ii) agree to serve as the doctoral advisor for the student. A petition must be submitted in writing to the Director of Graduate Studies. It should include: (A) an alternative preliminary examination plan, (B) a justification for why this plan is appropriate and necessary for the academic studies of the student, and (C) a letter on official letterhead from the faculty endorser indicating their support for the proposed plan and a commitment to serving as the doctoral advisor for the student. For a petition to be approved, it must receive unanimous approval of the graduate committee.

5.3 Preliminary Examination Areas

5.3.1 Algebra

Basic Courses: MA 565, MA 561, and MA 661

Suggested texts:

- *Abstract Algebra*, *3rd edition,* D.S. Dummit and R.M. Foote
- *Algebra, 3rd edition*, S. Lang
- *Algebra*, T. Hungerford
- Lecture Notes from MA 565 (see also *Linear Algebra, 2nd edition*, Hoffman/Kunze)

Topics:

- *Linear Algebra:* Basic definitions of vector spaces, matrices and linear maps, determinants, eigenvectors and eigenvalues, characteristic and minimal polynomial, inner product spaces with unitary and self-adjoint maps, Jordan normal form (see Lecture Notes or Hoffman/Kunze: Chapters 1-8).
- *Group Theory:* Basic definitions, isomorphism theorems, permutation groups, structure of finitely generated abelian groups, group actions, Sylow theorems, solvable groups (Dummit/Foote: Chapters 1-5).
- *Ring Theory:* Basic definitions, isomorphism theorems, principal ideal domains, Euclidean domains, unique factorization domains, polynomial rings (Dummit/Foote: Chapters 7-9).
- *Field Theory and Galois Theory:* Algebraic extensions, separable and purely inseparable extensions, splitting fields, algebraic closure, constructions with straightedge and compass, cyclotomic polynomials and cyclotomic extensions, Fundamental Theorem of Galois Theory, finite fields, symmetric polynomials, Galois group of polynomials, solvable and radical extensions (Dummit/Foote: Chapters 13-14).

5.3.2 Analysis

Students choose one of two focus areas for their examination: (i) Advanced Calculus and Real Analysis, or (ii) Advanced Calculus and Complex Analysis. Students who pass the analysis examination in one area are expected to complete the basic course for the other area. Students with previous graduate coursework in analysis may request an exemption to this policy from the DGS.

Advanced Calculus

Basic Course: MA 575

Suggested Texts:

- *Analysis: An Introduction, Richard Beals,* Cambridge University Press, Chapters 1-8.
- *Principles of Mathematical Analysis,* W. Rudin, McGraw-Hill, Chapters 1-7.
- *Advanced Calculus*, R. C. Buck, McGraw-Hill, Chapter 1, 2, Section 3.3, 4.1-4.3.

Topics:

- The field of complex numbers **C**; the real number system **R** as an ordered field; the extended real number system.
- Basic topology: finite, countable, and uncountable sets, metric spaces with an emphasis on $\mathbf{R}^n$, compactness and connectedness, Heine-Borel and Bolzano-Weierstrass theorems.
- Sequences and series: convergence criteria, Cauchy sequences, convergence and completeness, manipulations with series.
- Continuity: Limits and continuity for real-valued functions with an emphasis on functions *f* from *U to* $\mathbf{R}^m$ where *U* is a subset of $\mathbf{R}^n$. Intermediate Value Theorem.
- Differentiation of functions of one variable: mean value theorems, Taylor's theorem, l'Hopital's rule, differentiation of vector-valued functions.
- Integration of functions of one variable: definition, existence and properties of the Riemann-Stieltjes integral, integration of vector-valued functions.
- Sequences and series of functions: uniform convergence of series and continuity, integration and differentiation of functions defined as series. Equicontinuous families, the Arzela-Ascoli Theorem, and the Stone-Weierstrass Theorem for continuous functions on a finite interval.

Real Analysis

Basic Course: MA 676

Suggested texts:

- *Real Analysis*, E. M. Stein and R. Shakarchi, Princeton University Press.
- Chapter 1-7 of *Measure and Integral*, R.L. Wheeden and A. Zygmund, Marcel Dekker (1977).
- *Real Analysis*, H.L. Royden, Macmillan (1968).
- *Real and Complex Analysis*, W. Rudin, McGraw-Hill.

Topics:

- Lebesgue measure on Euclidean space: outer measure, measurable sets, measurable functions, Cantor ternary set, Cantor ternary function. Egorov Theorem, Lusin Theorem.
- The Lebesgue integral: convergence theorems and their relation to integration, Fubini Theorem, the relation between Lebesgue integration and Riemann integration, examples and counterexamples that illustrate the above.
- Differentiation: Lebesgue Differentiation Theorem, differentiation of monotone functions, functions of bounded variation, absolutely continuous and singular functions.

Complex Analysis

Basic Course: MA 671

Suggested texts:

- Complex Analysis, E. Stein and R. Shakarchi, Princeton University Press, 2003.
- Functions of One Complex Variable, John Conway, Springer-Verlag, 1978.
- Complex Analysis, 3rd edition, L. Ahlfors, McGraw-Hill, 1979.

Topics:

- Analytic Functions and Equivalent Conditions; e.g. limit of the difference quotient, Cauchy-Reimann equations, Morera's theorem, power series.
- Series and sequences of analytic functions, Weierstrass M-test, power series, region of convergence, and boundary behavior.
- Cauchy's theorem, Cauchy integral formula, Cauchy's estimates and consequences, e.g., Liouville's theorem, open mapping property, Schwarz lemma, Argument principle, and Rouché's theorem.
- Definition and mapping properties of elementary functions, e.g., exponential, logarithmic, trigonometric, and rational functions, special properties of linear fractional transformations.
- Singularities: removable singularities, poles, essential singularities, branch points, theory of residues, and applications to contour integrals.

5.3.3 Discrete Mathematics

Basic Courses: MA 514 and MA 614

Suggested Texts:

- J.H. van Lint and R.M. Wilson, *A Course in Combinatorics, second edition,* Cambridge University Press, 2006. Chapters 1-7, 10, 33
- R. P. Stanley, *Enumerative Combinatorics, Vol. 1, second edition.* Cambridge Studies in Advanced Mathematics, 49, Cambridge University Press, 2011. Chapters 1-3.
- R. P. Stanley, *Enumerative Combinatorics, Vol. 2,* Cambridge Studies in Advanced Mathematics, 62, Cambridge University Press, 2001. Chapter 5.

Additional References:

- J.H. van Lint and R.M. Wilson, *A Course in Combinatorics, second edition*, Cambridge University Press, 2006, Chapters 13-15, 24, Appendix 2.
- Laszlo Lovász, *Combinatorial Problems and Exercises, second edition*, American Mathematical Society, 2007.
- H. S. Wilf, *Generatingfunctionology, second edition,* Academic Press, Inc., 1994.

Topics:

Combinatorial Structures and Techniques

- Graphs. Terminology of graphs and digraphs, Eulerian circuits, Hamiltonian circuits.
- Trees. Cayley's theorem, spanning trees and the greedy algorithm, search trees, strong connectivity.
- Colorings of graphs and Ramsey's theorem. Brooks' theorem, Ramsey's theorem and Ramsey numbers, probabilistic techniques, the Erdős-Szekeres theorem.
- Turán's theorem and extremal graph theory.
- Systems of distinct representatives. Bipartite graphs, Hall's condition, SDRs, König's theorem, Birkhoff's theorem.

- Dilworth's theorem and extremal set theory. Partially ordered sets, Dilworth's theorem, Sperner's theorem, symmetric chains, the Erdős-Ko-Rado theorem.
- Flows in networks. The Ford-Fulkerson theorem, the integrality theorem, a generalization of Birkhoff's theorem, circulations.
- The chromatic polynomial and deletion-contraction

Enumerative Combinatorics

- Bijective proof techniques.
- Generating functions.
- Stirling numbers of the first and second kind.
- Permutations and permutation statistics.
- q-analogues.
- The twelvefold way.
- Exponential generating functions.
- The exponential formula.
- Tree enumeration.
- Lagrange inversion formula.
- Principle of inclusion-exclusion.
- Sign-reversing involutions.
- Partially ordered sets and lattices.
- The fundamental theorem of distributive lattices.
- The incidence algebra.
- The Möbius inversion formula.
- The Möbius function and computational techniques.
- The Möbius algebra.
- Semi-modular lattices and hyperplane arrangements.
- The zeta polynomial.
- Rank-selection.
- R-labelings.
- Eulerian posets.

5.3.4 Numerical Analysis

Basic Courses: MA 522 and MA 537

Suggested Texts:

- MA 522
  - *Applied Numerical Linear Algebra*, J. Demmel, SIAM, Philadelphia, 1997.
  - *Matrix Computations, 2nd ed*, G. Golub and C. van Loan, The Johns Hopkins Univ. Press, 1989.
- MA 537
  - *Numerical Analysis*, Mathematics of Scientific Computing, 3rd Edition, D. Kincaid and W. Cheney, Brooks/Cole, 2002. (Sections 3.1-3.4, Sections 6.1-6.4, 6.8, 6.9, Sections 7.1-7.4, Sections 8.1-8.9.)
  - *Numerical Methods using MATLAB*. J.H. Mathews & K.D. Fink, Prentice Hall. (Chapter 2, Chapter 4, Chapter 6, Chapter 7, Chapter 9.)
  - Additional reference: *Introduction to Numerical Analysis,* J. Stoer & R. Bulirsch, Springer-Verlag

Topics:

Numerical Linear Algebra - MA 522

- Basic Matrix Analysis: norms, orthogonality, projection, finite precision. (Ref: Demmel 1.3-1.7 or Golub-van Loan 2.1-2.5)
- Linear Systems of Equations: Gaussian elimination and its variations, error analysis, perturbation analysis, special linear systems: symmetric, band, block tridiagonal matrices. (Ref: Demmel 2.2-2.5, 2.7 or Golub-van Loan 3.1-3.5, 4.1-4.5)
- Linear Least Squares Problem and Orthogonalization: Gram-Schmidt orthogonalization, QR factorization. The full rank and rank deficient least squares problems, perturbation theory. (Ref: Demmel 3.2-3.6 or Golub-van Loan 5.1-5.5)
- Eigenproblems and Singular Value Decomposition: Properties and decompositions, QR-like numerical algorithms, perturbation theory. (Ref: Demmel 4.2-4.4, 5.2-5.4 or Golub-van Loan 7.1-7.5, 8.1-8.4)

Numerical Analysis - MA 537

- The Solution of Nonlinear Equations:
    - Fixed-point iterations, Newton's method
- Interpolation and Polynomial Approximation:
    - Lagrange and Newton interpolation polynomials, Chebyshev polynomials, Padè approximation, Splines
- Numerical Differentiation and Integration
    - Newton-Cotes quadrature rules, Gaussian quadrature
- Solution of Differential Equations
    - One-step methods for ODEs, Predictor-corrector schemes, Multi-step methods, Errors and stability

5.3.5 Partial Differential Equations

The preliminary examination in partial differential equations covers the fundamental aspects of the theory of partial differential equations as taught in the two-semester sequence MA 533 and MA 633. The first semester is devoted to the basic theory: first order quasilinear equations, the method of characteristics and the Cauchy problem, the fundamental properties of elliptic, parabolic and hyperbolic equations, emphasizing the classical equations of mathematical physics, the Laplace, wave, and heat equations. The second semester covers the theory of second order elliptic equations emphasizing the theory of Sobolev spaces, existence and uniqueness of weak solutions to elliptic equations, and the regularity of solutions.

Basic Courses: MA 533 and MA 633.

Suggested texts:

- *Partial differential equations,* 2nd edition, L.C. Evans, American Mathematical Society, 2010: Chapters 1-2, Section 3.2, Chapters 5, 6.
- *Elliptic Partial Differential Equations of Second Order,* 2nd edition, D. Gilbarg and N. Trudinger, Springer 1983: Chapters 2--8
- *Partial Differential Equations*, 4th edition, Fritz John, Springer 1981: Chapters 1, 3, 4, 7.

Topics:

1. Representation formulas for solutions
    a. The transport equation
        i. Initial value problem
        ii. Nonhomogeneous problem
    b. Laplace's equation
        i. Fundamental solution
        ii. Mean--value formulas
        iii. Green function in the ball
        iv. Energy method
    c. Heat equation
        i. Fundamental solution and the initial value problem in Rn
        ii. Mean--value formula
        iii. Properties of solutions, the maximum principle
        iv. Energy methods
    d. The wave equation
        i. Solution by spherical means
        ii. Inhomogeneous problem, Duhamel's principle
        iii. Energy methods
    e. First-order equations
        i. Method of characteristics for quasilinear equations
2. Sobolev spaces
    a. Weak derivatives
    b. Approximation of Sobolev functions
    c. Extension and traces of Sobolev functions
    d. Sobolev and Morrey inequalities
    e. Compactness
    f. Poincaré inequalities
3. Existence and regularity for second-order elliptic equations
    a. Lax-Milgram Theorem
    b. Neumann and Dirichlet boundary conditions
    c. Regularity, Caccioppoli inequality
    d. Maximum principles, Harnack inequality
    e. Eigenvalues

5.3.6 Topology

Basic courses: MA551, MA651

Suggested Texts:

- *Introduction to Topological Manifolds,* Lee
- *Algebraic Topology (Chapter 1)*, Hatcher
- *Topology, Second Edition*, Munkres

Topics:

- Topological spaces (and metric spaces); continuous functions
- Subspaces, quotient spaces, product spaces, disjoint unions
- The compact-open topology
- Connectedness and related concepts
    - local connectedness
    - path connectedness and local path connectedness
- Compactness and related concepts
    - local compactness
    - the Tychonoff theorem
    - compactness in metric spaces
    - one-point compactification
- The Hausdorff property
- Topological groups and group actions
- CW complexes
- The fundamental group and applications (including important examples like the circle, projective spaces, and surfaces)
- Covering spaces
    - classification of covering spaces
    - group of covering transformations and the relation to the fundamental group of the base
- Seifert-van Kampen theorem and applications
- Singular homology with integral and field coefficients
- The Hurewicz theorem in dimension 1
- Long exact sequence for a pair, excision and the Mayer-Vietoris sequence
- Classification of surfaces and Euler characteristic

5.4 The Minor Requirement

The minor requirement may be satisfied in one of the following three ways.

- Pass three preliminary examinations and complete two additional graduate courses beyond the basic courses in one of the examination areas. These two additional courses must be in an area that is distinct from the planned dissertation topic.
- Pass three preliminary examinations and complete the basic courses in a fourth preliminary examination area, plus complete one additional graduate course beyond the basic courses in one of these four areas. This additional course must be in an area that is distinct from the planned dissertation topic.
- Pass three preliminary examinations and complete a two-course sequence at the graduate level in a department outside of mathematics but related to mathematics, e.g., Statistics, Physics, Biology, Economics, STEM Education, or another related discipline. These courses must have the prior approval of the Director of Graduate Studies.

5.5 The Qualifying Exam

The Qualifying Examination cannot be taken until after the student has passed three preliminary examinations. In consultation with their doctoral advisor, the student will form an Advisory Committee, for which their advisor serves as chair. With the guidance and approval of the student's Advisory Committee, the student will choose a topic in the area of proposed research and prepare an oral presentation on this topic. Following a 30-to-45-minute lecture by the student, the Advisory Committee will examine the student over the topic. The lecture and questioning together should not exceed two hours.

5.6 MA 767 Grading Policy

Following the completion of the Qualifying Exam, students enroll in MA 767 for their residency credit. The Director of Graduate Studies (DGS) is the instructor of record for all mathematics students enrolled in MA 767. For each student enrolled in MA 767, every semester the doctoral advisor is required to submit to the DGS a brief written summary of the activities for the student, including a written statement indicating whether this work is satisfactory. This written summary is the basis for the assignment of a passing grade for MA 767.

5.7 Residency Requirement

Students must satisfy the residency requirement as specified in the Graduate School Bulletin: https://gradschool.uky.edu/graduate-school-bulletin This includes both pre- and post-qualifying residency requirements.

5.8 Research Component

After having passed their qualifying examination, each student will pursue a course of study leading to the writing of a doctoral dissertation. The dissertation is expected to be a significant contribution of original mathematical research. The dissertation must be of sufficient depth and quality to satisfy the Advisory Committee. In general, it is expected that a dissertation in mathematics will consist of research that is acceptable for publication in an appropriate scholarly journal.

5.9 Expectations for Academic Progress Toward Doctoral Degree Completion

It is important to distinguish between recommended progress toward the doctoral degree and minimal expectations that must be met for a teaching assistantship to be renewed. Graduate students begin their studies with a wide range of backgrounds. Thus, different students can successfully complete the program on a range of different timelines for making progress. However, the department has observed

that our typical doctoral graduates progress through their degree requirements faster than the minimal expectations required for renewal of a teaching assistantship.

In this section, we provide a set of recommended goals for students and a set of minimal progress expectations. As specified in Section 7.5, the minimal progress expectations are required for annual renewal of a teaching assistantship.

As written, these goals and expectations apply to graduate students who begin their program of study in a Fall semester. Any graduate student who begins their program of study in a Spring semester will be evaluated for TA renewal as if they had started during the subsequent Fall semester.

5.9.1 Recommended Progress Toward Degree

The following table indicates recommended goals for graduate students. Graduate students should strive to meet or exceed the recommended goals for progress to degree. A graduate student meeting these goals would pass three prelims by the beginning of their third year and would complete their qualifying exam by the beginning of their fourth year.

By the beginning of:	Total Credit Hours Completed	Total Prelims Attempted	Total Prelims Passed	Other
February of 2nd semester	9			
September of 3rd semester	18	2	1	
February of 4th semester	27	3	2	
September of 5th semester	36	5	3	
February of 6th semester	36+			(Master's Exam Recommended)
September of 7th semester	36+			Qualifying Exam

5.9.2 Minimal Expectations for Progress to Degree

By the beginning of the third semester, students are expected to have earned and maintain a cumulative GPA of at least 3.0. The following table indicates minimal expectations for progress to degree.

By the beginning of:	Total Credit Hours Completed	Total Prelims Attempted	Total Prelims Passed	Other
February of 2nd semester	6			
September of 3rd semester	15	1		
February of 4th semester	24	2		
September of 5th semester	33	4		
February of 6th semester	36+	5	1	
September of 7th semester	36+	7		(Master's Exam recommended)
February of 8th semester		8	3	
September of 9th semester				
February of 10th semester				Qualifying Exam

It is expected that students in the doctoral program will pursue their degree as a full-time student, i.e., with a full academic load. In the rare situation when a graduate student chooses to change from full-time to part-time status, the student should discuss this with the Director of Graduate Studies prior to changing status. In this case, the Director of Graduate Studies and the graduate committee will provide the student with written minimal expectations for further progress based on the existing record of progress.

5.9.3 Graduate School Requirements

The graduate school has established academic requirements for all graduate students at UK. These include a GPA requirement, a maximum number of allowed attempts for the qualifying exam, pre- and post-qualifying time limits, and other policies. These can be found in the Graduate School Bulletin: https://gradschool.uky.edu/graduate-school-bulletin

6 Graduate Advising Policy

Graduate advising and mentoring is a collaborative process founded on clear communication and clear expectations between advisors and advisees. In this document, we outline recommended practices for both graduate advisors and graduate advisees in the UK Department of Mathematics. Further, we outline our procedure for managing and resolving issues that arise in the context of graduate advising within the department.

6.1.1 Recommendations for Graduate Advisors and Advisees

Graduate advisors should:

- Serve as both intellectual advisors and professional mentors to their students;
- Understand the university and department policies that pertain to graduate students;
- Assist students in preparing for future employment in academia, industry, business, and/or government;
- Be aware of and, when necessary, direct students to university resources to support them through challenges; and
- Interact with students in a respectful and professional manner and maintain a high level of overall professionalism.

Graduate advisees should:

- Inform themselves about policies and requirements regarding their degree program, research activities, and financial support;
- Seek clarification from faculty or staff when needed regarding requirements and policies;
- Inform themselves about the role played by faculty advisors in graduate study, as outlined above;
- Be aware of limits to requests for time and resources made to faculty and staff; and
- Interact with faculty in a respectful and professional manner and maintain a high level of overall professionalism.

At the start of the advising relationship, advisors and advisees should:

- Discuss program and degree requirements.
- Discuss tentative advisee career goals and corresponding goals in the program.
- Discuss recommended activities for the advisee to support reaching their career goals.
- Discuss a tentative timeline for completing degree requirements and other activities.
- Discuss and agree on expectations for the advising relationship (examples of advising styles are provided at the end of this subsection). Note that advising styles typically develop and change throughout the advising relationship.
- Discuss and agree on acceptable/expected means of communication (email, text, phone, etc) and expected frequency of communication.

Throughout the advising relationship, advisors and advisees should:

- Hold regularly scheduled meetings.
- Discuss expectations regarding what the advisee and the advisor will each do to prepare for meetings.
- Discuss updates to advisee career goals and corresponding goals in the program.
- Review progress toward degree at least every 9-12 months and discuss an updated timeline for completion of degree requirements.
- Provide members of the doctoral committee with progress updates at least annually.

6.1.2 Procedure for Issue Management and Resolution

Establishing clear communication and setting clear expectations can prevent many problems that arise in the advising process. In the case that an issue does arise, for either the advisor or the advisee, the following process should be used.

1. The advisor and advisee should attempt to resolve the matter together.
    a. If one or both individuals are not comfortable raising this issue with the other, then members of the student's doctoral committee and/or the Director of Graduate Studies can be informally consulted for advice and guidance.
2. The individual requesting assistance in resolving the issue should contact the Director of Graduate Studies and request a meeting.
    a. During this meeting, the individual should communicate the issue at hand and what attempts have been previously taken to address it.
    b. The DGS will assist with developing strategies for the advisor and advisee to resolve the issue. If needed, the DGS will informally consult with the graduate committee and/or the department chair to develop these strategies.
3. If the issue cannot be resolved working with the DGS, then the individual should contact the Department Chair and request a meeting.
    a. During this meeting, the individual should communicate the issue at hand and what attempts have been previously taken to address it.
    b. The Chair will assist with developing strategies for the advisor and advisee to resolve the issue.
4. If the issue cannot be resolved working with the Department Chair, then the individual should contact the Arts & Sciences Associate Dean for Graduate Studies and request a meeting.
    a. During this meeting, the individual should communicate the issue at hand and what attempts have been previously taken to address it.
    b. The Associate Dean will assist with developing strategies for the department to resolve the issue.

6.1.3 Examples of Advising Styles (not math-specific)

The examples below are adapted from "Advising and Supervising." Gordon B. Davis. In *Research in Information Systems: A handbook for research supervisors and their students.* Butterworth-Heinemann, 2005. Preprint at http://misrc.umn.edu/workingpapers/fullpapers/2004/0412_052404.pdf

Style	Advisor Role and Behavior	Student Role and Behavior
Strong master/apprentice style	Advisor is research director. Advisor has a well specified domain of expertise and set of problems within it.	Student is an apprentice working for the advisor. Student works on advisor's problems.
Collegial master/apprentice style	Advisor is expert who limits advising to problems that are within scope of his or her research skill set but will work on student's problem.	Student develops a problem within advisor's domain and skills and works under the advisor to develop the research plan and procedures.
Collegial development style	Advisor is senior colleague who will respond to student research problem and extend his or her advising domain to include new problems and new skills.	Student takes initiative to introduce new problem that requires new skill set and works as a junior colleague with advisor in joint development of new domain.
Guidance and suggestion style	Advisor is a senior colleague who gives good general guidance over a wide range of problems and methods but does not have personal skill in all of them.	Student is an independent, junior colleague who takes initiative for presenting problems and research plans for discussion and guidance. Student develops required skills.
Passive hands-off style	Advisor has quality control role and responds only to requests or documents and performs only general quality control review.	Student is an independent researcher who takes initiative for developing problem, developing skills, and presenting research plans for general review and approval.

7 Policy on Expectations for Teaching and Research Assistants

This policy sets expectations for graduate students supported on an assistantship (teaching, research, or other). We use the abbreviations TA and RA, respectively, for Teaching Assistant and Research Assistant. We use the term *course coordinator* to refer to the overall coordinator of large multi-section courses, the term *supervisor* to refer to the direct faculty supervisor for an assistant, and the term *Mathskeller coordinator* to refer to the faculty director of the Mathskeller (math tutoring center).

7.1 Basic Expectations

7.1.1 Graduate School Requirements, Time Commitment, and Direct Supervisor

Each assistant must meet the appropriate eligibility requirements for their assignment as specified by the UK Graduate School. Requirements for TAs can be found at https://gradschool.uky.edu/ta-types-teaching-credentials, including requirements regarding credit hours and oral language screening scores.

Standard assistantships require a commitment of service for not more than an average of 20 hours per week, whether recitation leader, primary instructor, grader, or other assignment. Normally a single half-time appointment should require no more than 20 hours per week of assigned duties. Each assistant is assigned a faculty member (typically a course coordinator or faculty supervisor) to serve as the direct supervisor for the assistant.

7.1.2 TA Training, Payroll Inquiries, and General Information

Each TA must complete MA 601 within their first two semesters of employment as a TA. All TAs are required to attend mandatory start-of-semester TA meetings unless prior approval is obtained from their course coordinator and/or course supervisor. All TAs must be familiar with legal obligations related to their assignment, e.g., FERPA, Title IX mandatory reporting, etc.

Inquiries regarding payroll should be sent to either the Department Manager or the Administrative Assistant to the Director of Graduate Studies. All assistants need to be familiar with department policies regarding printing, syllabi, textbooks, web pages, travel requests, computer support, etc. These policies can be found in the Mathematics Department Manual, which is updated and distributed each fall by the Department Manager.

7.1.3 Communication with Students, Faculty, and Peers

During business hours, assistants are expected to respond promptly (generally within 24 hours) to electronic communications (email, Canvas, etc.) from faculty, students, and colleagues. Assistants are expected to be on time and prepared for any scheduled meetings. If an assistant will be unavailable for two or more business days, they should notify their supervisor/coordinator(s).

7.1.4 Professionalism

Assistants must interact with students, colleagues, faculty, and staff in a respectful and professional manner and maintain a high level of overall professionalism.

7.1.5 Course Meetings, Office Hours, and Mathskeller

TAs must be on time and prepared for class. Being prepared for class includes working through student activities prior to class, preparing presentation or lecture material, and having a plan for the structure of class each day. Office hour requirements will be specified by your course coordinator and/or supervisor. TAs must be on time and prepared for office hours. If TAs need to cancel office hours, they are required to announce this to their students in advance. TAs will be assigned a required number of Mathskeller hours each semester. TAs must be on time for their required Mathskeller office hours and must stay for their entire assigned time. TAs are expected to assist any student in the Mathskeller, not only students in their own recitation or course.

7.1.6 Proctoring and Grading

Many TA assignments include proctoring duties for evening exams. Every TA needs to review the course exam schedule at the beginning of the semester to ensure their availability for proctoring. TAs must be on time for all proctoring assignments and plan to stay through the end of the exam. If a TA has a scheduling conflict on an exam day, they need to inform their supervisor/coordinator at least two weeks in advance and arrange an alternative work assignment.

Many TAs are expected to attend grading sessions for their courses. If a TA has a scheduling conflict on an exam grading day, they need to inform their supervisor/coordinator at least two weeks in advance and arrange an alternative work assignment.

TAs must grade and return all student work in a timely manner, including any written homework, quizzes, and exams. TAs must meet deadlines set by their coordinator and/or supervisor. If a TA is unable to return a graded assignment by the deadline specified by their coordinator and/or supervisor, the TA must inform their supervisor/coordinator and agree on a revised deadline. TAs are expected to meet reasonable grading deadlines; faculty supervisors and/or course coordinators should be mindful to set reasonable deadlines for completion of grading.

7.1.7 Expectations for TAs Assigned as Course Graders

TAs who are assigned to serve as a grader for a course need to coordinate with their faculty supervisor at the start of the semester to determine what assignments they are responsible for grading and what the grading deadlines are. TA graders are expected to meet reasonable grading deadlines; faculty supervisors should be mindful to set reasonable deadlines for completion of grading. TAs assigned to be course graders should keep a log of their grading time.

7.1.8 Expectations for TAs with a Split Assignment

It is sometimes necessary for TAs to be given a "split assignment", i.e., an assignment involving teaching and/or grading and/or another assignment for more than one course. In these cases, TAs are not expected to work more than their 20-hour-per-week commitment. TAs with a split assignment should communicate with the Director of Service Courses regarding expectations for their assignment and workload.

7.1.9 Record-Keeping

RAs are responsible for following all legal requirements regarding secure storage and confidentiality of research data. Prior to conducting research, RAs must consult with their supervisor regarding any requirements regarding data management.

TAs must maintain student grade records following course coordinator/supervisor instructions. TAs must follow all legal requirements regarding secure storage and confidentiality of student records. TAs are expected to record course grades in Canvas and/or myUK as appropriate; if a TA is unable to access course rosters or grading tools, they must immediately inform their supervisor/coordinator. TAs must ensure that grade records and final exams (if applicable) remain available to the department for the required length of time after the course ends (typically 12 months).

7.1.10 Academic Integrity Violations

If a TA suspects an academic integrity violation involving one or more of their students, they must immediately discuss their concerns to their supervisor/coordinator. If the TA and supervisor believe that the evidence might warrant an investigation, they will next review the evidence with the department chair or Director of Service Courses, as indicated by the UK Academic Offense Procedures: https://www.uky.edu/ombud/academic-offense-procedures

7.1.11 Additional Tasks

TAs are expected to complete reasonable course-related tasks specified by their supervisor and/or coordinator, up to but not exceeding their 20-hour-per-week time commitment.

7.2 Absence and Cancellation Policy

7.2.1 Cancellation Policy

University of Kentucky policy is that instructors may not cancel class. Thus, the procedures in this section must be followed for obtaining a substitute in the case of an absence.

7.2.2 Short-term Absences

If you are unable to teach your class (for one week or less) or perform your duties due to a short-term illness or other unforeseen circumstances, follow this procedure:

- Inform your supervisor and coordinator (if applicable) that you will be missing class. Provide the reason for your absence.
- Discuss with your supervisor and/or coordinator(s) the plan for covering other duties, such as office hours, grading, proctoring, or Mathskeller hours, as appropriate.
- If you arrange a suitable TA or faculty member in the mathematics department to substitute (preferably a TA who has experience teaching your course):
    - Provide the substitute with a clear lesson plan.
    - Provide your supervisor and coordinator with the name and contact information of the person substituting for you.
- If you are not able to arrange a substitute:
    - Immediately inform your supervisor, course coordinator, and the Director of Service Courses that you need their assistance finding a substitute.

7.2.3 Extended Absences Due to Illness

If you are unable to teach your class for an extended time (more than one week) for medical reasons, follow this procedure:

- Inform your supervisor and coordinator (if applicable).
- Provide the Director of Graduate Studies and Department Chair with documentation from your doctor.
- Consult with the Director of Graduate Studies and the Department Chair to arrange an alternative work assignment.

7.2.4 Absences Due to Travel

If you are planning professional travel, follow this procedure:

- Find a suitable TA or faculty member in the mathematics department to substitute (preferably a TA who has experience teaching your course). Provide the substitute with a clear lesson plan.

- Inform your supervisor and/or coordinator, in writing, at least two weeks in advance. Provide the reason for your absence, the dates you will be gone, and the name and contact information of the person(s) substituting for you.
- Discuss with your supervisor and/or coordinator(s) the plan for covering other duties, such as office hours, grading, proctoring, or Mathskeller hours, as appropriate.
- Absences for professional travel are limited to two weeks total per semester, at most one week at a time, during Fall and Spring and one week during a summer course. If an exception to this rule is required, a written request must be sent by the advisor for the student, at least three weeks in advance, to the Department Chair.

7.2.5 Other Absences

Any other predictable absences not covered by the previous sections must be approved at least three weeks in advance, in writing, by your supervisor or course coordinator.

7.3 Evaluations of Assistants

7.3.1 Teaching Assistants

Each TA with classroom responsibilities will be formally observed by a faculty member each semester. For each TA, a separate end-of-semester TA evaluation will be completed by their faculty supervisor and/or course coordinator. These evaluations are added to the permanent graduate school file for the TA. The evaluation forms used for these evaluations can be found on the Math Department TA Professional Development Website: https://math.as.uky.edu/ta-professional-development Each TA with an assignment that does not involve classroom teaching will be evaluated by their supervisor.

If desired, a TA may submit a written request to the TA Professional Development Coordinator or the Director of Graduate Studies for an additional informal evaluation from a faculty member in the department.

7.3.2 Research and Other Assistants

Graduate students employed in an RA or other assistantship will be provided with a letter of evaluation from their faculty supervisor at the end of each semester. This letter should identify areas of strength and suggested areas for growth (if needed). These letters will be included in the department student records maintained by the DGS and/or Administrative Assistant to the DGS. Each semester, an RA has the option (not required) to provide a letter of response to their evaluation, to be included in their department student records.

7.4 Procedure for Issue Management and Resolution

7.4.1 Issues Related to Discrimination, Harassment, Sexual Misconduct, or ADA Compliance

If any department member encounters an issue related to discrimination, harassment, sexual misconduct, or Americans with Disabilities Act compliance, they should follow the reporting procedures provided by the UK Office of Institutional Equity and Equal Opportunity: https://www.uky.edu/eeo/

7.4.2 Issues Encountered by Teaching Assistants

If a TA encounters any issue, for example (but not restricted to) a difficult situation with a student, excessive workload, lack of communication from peers or faculty, etc., the following process should be used.

1. The TA should report the issue to their faculty supervisor and/or coordinator(s). The TA and supervisor and/or coordinator should attempt to resolve the issue together.
    a. If there is an issue *involving* the supervisor and/or coordinator(s) which the TA is not comfortable discussing directly, the TA may skip to the next step.
2. If the issue cannot be resolved by the TA and supervisor and/or coordinator(s), then the TA should report the issue to the Director of Service Courses and the Director of Graduate Studies.
    a. The TA should communicate the issue at hand and what attempts have been previously taken to address it.
    b. The DSC and/or DGS will assist with developing strategies to resolve the issue. If needed, the DSC and/or DGS will informally consult with the graduate committee and/or undergraduate committee and/or the department chair to develop these strategies.
3. If the issue cannot be resolved working with the DSC and/or DGS, then the TA should report the issue to the Department Chair.
    a. The TA should communicate the issue at hand and what attempts have been previously taken to address it.
    b. The Chair will assist with developing strategies to resolve the issue.

If steps 2-3 in this process are reached, the Director of Service Courses will keep a record of the issue and the process through which the issue was managed.

7.4.3 Issues Encountered by Research Assistants

If an RA encounters any issue, for example (but not restricted to) issues with data privacy, excessive workload, lack of communication from research team members, etc., the following process should be used.

1. The RA should report the issue to their faculty supervisor. The RA and supervisor should attempt to resolve the issue together.
    a. If there is an issue involving the supervisor which the RA is not comfortable directly discussing, the RA may skip to the next step.
2. If the issue cannot be resolved by the RA and supervisor, then the RA should report the issue to the Director of Graduate Studies.
    a. The RA should communicate the issue at hand and what attempts have been previously taken to address it.
    b. The DGS will assist with developing strategies to resolve the issue. If needed, the DGS will informally consult with the graduate committee and/or the department chair to develop these strategies.
3. If the issue cannot be resolved working with the DGS, then the RA should report the issue to the Department Chair.

a. The RA should communicate the issue at hand and what attempts have been previously taken to address it.
b. The Chair will assist with developing strategies to resolve the issue.

If steps 2-3 in this process are reached, the Director of Graduate Studies will keep a record of the issue and the process through which the issue was managed.

7.4.4 Issues Regarding Satisfactory Completion of Duties by Teaching Assistants

If a faculty supervisor and/or course coordinator and/or Mathskeller coordinator encounters an issue regarding satisfactory completion of duties by a teaching assistant, the following process should be used.

1. The supervisor and/or coordinator(s) should inform the TA of the issue. The supervisor and/or coordinator(s) and the TA should attempt to resolve the issue together.
2. If the issue cannot be resolved by the supervisor and/or coordinator(s) and TA, the supervisor and/or coordinator(s) should report the issue to the Director of Service Courses and Director of Graduate Studies.
    a. The supervisor and/or coordinator(s) should communicate the issue at hand and what attempts have been previously taken to address it.
    b. The DGS and/or DSC will assist with developing strategies to resolve the issue. If needed, they will informally consult with the graduate and/or undergraduate committee and/or the department chair to develop these strategies.
3. If the issue cannot be resolved working with the DSC and/or DGS, then the coordinator(s) and/or supervisor should report the issue to the Department Chair.
    a. The coordinator(s) and/or supervisor should communicate the issue at hand and what attempts have been previously taken to address it.
    b. The Chair will assist with developing strategies to resolve the issue.

If steps 2-3 in this process are reached, the Director of Service Courses will keep a record of the issue and the process through which the issue was managed.

7.4.5 Issues Regarding Satisfactory Completion of Duties by Research Assistants

If a faculty supervisor encounters an issue regarding satisfactory completion of duties by a research assistant, the following process should be used.

1. The supervisor should inform the RA of the issue. The supervisor and the RA should attempt to resolve the issue together.
2. If the issue cannot be resolved by the supervisor and RA, the supervisor should report the issue to the Director of Graduate Studies.
    a. The supervisor should communicate the issue at hand and what attempts have been previously taken to address it.
    b. The DGS will assist with developing strategies to resolve the issue. If needed, the DGS will informally consult with the graduate committee and/or the department chair to develop these strategies.

3. If the issue cannot be resolved working with the DGS, then the supervisor should report the issue to the Department Chair.
    a. The supervisor should communicate the issue at hand and what attempts have been previously taken to address it.
    b. The Chair will assist with developing strategies to resolve the issue.

If steps 2-3 in this process are reached, the Director of Graduate Studies will keep a record of the issue and the process through which the issue was managed.

7.4.6 Other Issues

For other issues encountered by TAs, RAs, faculty supervisors, or others related to TA/RA duties, the following process should be used.

1. The individual encountering the issue should contact the Director of Graduate Studies and report the issue.
    a. The DGS will assist with developing strategies to resolve the issue. If needed, the DGS will informally consult with the graduate committee and/or the department chair to develop these strategies.
    b. If the issue is related to a teaching assignment, the DGS will inform the Director of Service Courses regarding the issue.
2. If the issue cannot be resolved working with the DGS, then the RA should report the issue to the Department Chair.
    a. The individual should communicate the issue at hand and what attempts have been previously taken to address it.
    b. The Chair will assist with developing strategies for the advisor and advisee to resolve the issue.

The Director of Graduate Studies will keep a record of the issue and the process through which the issue was managed.

7.5 Criteria for Performance-Based Renewal and Non-Renewal of Assistantships

7.5.1 TA Renewal

TA renewals are determined in a meeting of the mathematics faculty each Spring. To be eligible for a TA renewal, a TA must (A) meet the basic expectations for academic progress in the graduate program and (B) have completed their previous TA assignments in a satisfactory manner.

7.5.2 TA Non-Renewal

Graduate student Teaching Assistantships are typically not renewed beyond the maximum length of time specified in their initial acceptance and TA offer letter. Thus, graduate students who reach their maximum length of support should not expect a renewal of their TA position.

Performance-based non-renewal of a graduate student TA position can occur for two reasons. First, if said graduate student has not met the basic expectations for academic progress in the graduate

program, as specified by the UK Graduate School, the Mathematics Department Graduate Handbook, and/or their previous TA renewal letter, their TA position might not be renewed. Second, their TA position might not be renewed if said graduate student has a record of unsatisfactory performance based on any of (A) regular evaluations, (B) additional evaluations, and/or (C) department documentation of unsatisfactory performance following from our procedure for issue management and resolution. If a graduate student will not have their TA position renewed, they will be informed by the department in writing.

7.5.3 RA Renewal and Non-Renewal

For grant-funded RA positions, RA renewal and non-renewal decisions are made at the discretion of the Principal Investigators for the award, subject to any conditions for such decisions stipulated by the grant proposal or funding agency.

8 Financial Support Rules and Policies

8.1 SACS Requirements for Teaching Assistants

A SACS (the accrediting body for University of Kentucky) requirement is that graduate students must meet minimum qualifications regarding graduate credit hours and/or degree status in order to serve as a primary instructor. These requirements are specified here: https://gradschool.uky.edu/ta-types-teaching-credentials

8.2 Outside Employment for Teaching Assistants

The Mathematics Department awards financial support (Teaching Assistantships, Fellowships, Research Assistantships) as part of a program to train students to become professional mathematicians. It is expected that students will devote their time to this process. While students may accept outside employment, we request that students notify the DGS when accepting other employment, such as private tutoring, independent consulting, etc., during their Assistantship/Fellowship.

8.3 Parental Leave for Graduate Students

The UK Graduate School has a parental leave policy for graduate students. Details can be found here: https://gradschool.uky.edu/assistantships#Parental%20Leave

8.4 Scholastic Probation

Students must maintain a minimum GPA specified by the graduate school to avoid being placed on scholastic probation. Students placed on scholastic probation are not eligible for fellowships or tuition scholarships and may not sit for doctoral qualifying or final examinations, or master's final examinations. Further information regarding scholastic probation is available in the UK Graduate School Bulletin: https://gradschool.uky.edu/graduate-school-bulletin

8.5 SUMMER SUPPORT

The Mathematics department traditionally offers two types of financial support for graduate students over the summer: summer research fellowships and summer teaching assignments. The Mathematics Department can usually offer summer support to most, but not all, of the students who request it. We can support as summer TAs only those students who have met the SACS requirements for Teaching Assistants.

The department will notify the applicants for summer TA support that they have been placed in one of three categories: those who are offered a Summer Teaching Assistantship; those on the waiting list; those who will not be supported.

Whether a person on the waiting list is supported depends primarily on the number of undergraduates enrolling in summer school. Frequently, this is unknown until shortly before the opening of summer classes.

8.5.1 Priority for Summer Fellowships

The Mathematics Department places a high priority on offering summer research fellowships to doctoral students who have completed at most four years, who plan to graduate by the end of the following year, and who have not received summer fellowship support in previous years. Students who receive summer fellowship support should receive the approval of the DGS before accepting other support for the summer.

The graduate program committee will consider all qualified doctoral students each spring, and, based on CVs, research statements, and consultation with advisors, provide the department chair with a ranked list of candidates.

Advisors with research grants that provide summer support for students are strongly encouraged to provide full summer support for their students. In cases where a grant only provides partial support, the Department may provide a partial fellowship.

The goal is to support advanced students who are ready to take advantage of a summer without teaching duties. Awarding fellowships to students who have completed at most four years should help students to graduate in at most five years.

8.5.2 Priority for Summer Teaching

A limited number of teaching assignments are available in summer sessions 1 and 2. Students interested in such positions will be ranked according to the number of years they have completed in the program. Within each year, priority for course assignments will be made based on a consideration of previous teaching experience, summer courses being offered, and academic record. Exceptions to these rankings might be made in the following cases.

- Students who have not completed their previous teaching duties in a satisfactory manner meeting the basic expectations for teaching assistants.
- Students who have not met the minimum SACS requirements for teaching assistants will not be eligible for primary instructor positions.
- Students who have other summer support will not be considered for summer teaching.

The list below gives the priority based on the number of years completed in the program. Students who receive a degree in May are eligible for teaching positions in the summer immediately following their graduation. The list is in order of decreasing priority.

- PhD students who have completed five years
- PhD students who have completed four years
- PhD students who have completed three years
- PhD students who have completed two years
- PhD students who have completed one year
- PhD students who have completed six years
- Master's students
- PhD students who have completed their seventh year
- Students who are leaving the program without a degree (PhD or Master's)

The Department Chair or a delegate maintains a ranked list of students who have requested summer teaching and assigns summer teaching as positions become available. The number of positions is dependent on enrollment; thus, the last few positions may not be assigned until late in the process.

8.6 Travel Funding Policy

The Department supports graduate student travel as much as our budget allows. The Department generally provides partial support for graduate student travel in the following situations:

- Students who have substantial matching funds. This may be from the conference or workshop, or from the advisor's grant, or from some other competitive award.
- Students who are invited to speak at a workshop or conference.
- Students who are attending the annual Joint Math Meeting in the year of their graduation and who are conducting a job search.

In general, the student should be qualified and working with an advisor towards their doctoral degree. Exemptions may be made on the advice of the Graduate Program Committee.

In all cases, students and advisors should make every effort to obtain some funding for the trip. In many cases, conferences will provide housing expenses for doctoral students. It is the student's responsibility to make sure deadlines for applications are met.

8.7 Tuition Scholarships and Fees

Students supported by a Teaching Assistantship receive tuition scholarships and health insurance as specified by their admissions letters. Students are responsible for paying various fees that are not covered by tuition scholarships, as specified by the Graduate School: https://gradschool.uky.edu/assistantships#Tuition

Students supported by a research assistantship or other fellowship do not receive an automatic tuition scholarship. Students and faculty interested in pursuing funding other than teaching assistantships should consult with the Director of Graduate Studies regarding the tuition implications for their funding.

8.8 Academic Load Requirements (Full-time Load)

Students supported by Teaching or Research Assistantships are expected to maintain a full academic load, i.e., to take 9 credit hours of courses per semester. Students enrolled in MA 748 (0 hr), MA 749 (0 hr) or MA 767 (2 hr) are considered at full load. Information regarding Academic Loads, including implications for international students on visas, are given in the following documents:

- UK Graduate School Bulletin: https://gradschool.uky.edu/graduate-school-bulletin
- UK Graduate School DGS Policies and Procedures Manual: https://gradschool.uky.edu/directors-graduate-studies