New Mexico State University

Department of Mathematical Sciences

Mathematics Graduate Student Handbook

August 2017

1. Introduction

This handbook contains general information about the graduate programs in the Department of Mathematical Sciences, which might not be readily available from the university official publications, and about the departmental policies, as well as various practical administrative facts. This publication doesn't replace the Las Cruces Academic Catalog, which is the ultimate authority for official policy. The Catalog is available at http://catalog.nmsu.edu.

University's Official Documents and Resources

- Las Cruces Academic Catalog (http://catalog.nmsu.edu)

The Catalog is the primary official source of information for the rules and policies of the university.

Every student must carefully read the sections of the catalog pertaining to Essential Information for Students (https://catalogs.nmsu.edu/nmsu/essential-information-students/), to The Graduate School (https://catalogs.nmsu.edu/nmsu/graduate-school), and to Mathematical Sciences (https://catalogs.nmsu.edu/nmsu/arts-sciences/mathematical-sciences/#degreestext)

- Graduate School Resources (http://gradschool.nmsu.edu/ga-resources/)

This Graduate School webpage provides information about university regulations and policies relevant to teaching assistants:

- Guidelines on Employment for Graduate Assistants
- Graduate Assistant Handbook
- Graduate Assistant Salaries

The Graduate School webpage is available at http://gradschool.nmsu.edu.

- University Registrar's Office (https://registrar.nmsu.edu)

The University Registrar's Office webpage contains the most up-to-date information about course schedules, catalogs, final examinations schedules, as well as links to register for courses, to request transcripts or to check student records. See also this website for information on how "U.S. Citizens or U.S. Permanent Residents who are financially independent […] and can provide documentation of having resided in New Mexico for the past 12 consecutive months may be eligible to petition for residency for in-state tuition purposes":

- New Mexico Residency (https://registrar.nmsu.edu/residency/)

- NMSU Student Handbook (http://studenthandbook.nmsu.edu)

The NMSU Student Handbook contains general university rules and the university code of conduct. All students are responsible for familiarizing themselves with these policies.

Facilities

The department is housed in two adjacent buildings: Science Hall (SH) and Walden Hall (WH). All graduate teaching assistants have offices in Walden Hall.

The science and mathematics library collections are housed in Branson Library, across the street from Science Hall. In addition, a Mathematics Reading Room (MRR) is located in SH 226, where some archived journals and a collection of mathematics texts are housed.

- In order to search MRR, log in to the department website: www.math.nmsu.edu

All graduate student offices are equipped with computers. Graduate students who do not have an office should check with the Department of Mathematical Sciences about access to computer labs. University policies and guidelines for use of computers and other information technology can be found at http://ict.nmsu.edu/Guidelines/. Specific information involving copyrights, downloading and file sharing can be found at http://nmsu.libguides.com/content.php?pid=60019&sid=662811. It is very important to familiarize yourself with these policies. Students found to have violated copyright laws by illegal downloading may be subject to severe financial and legal consequences

The Science Hall building has a colloquium room (SH 107: The Carol and Elbert Walker Room), seminar rooms (SH 235, 248, 250, 252), a lounge area (SH 234) with a small kitchen, and the department main office (SH 236), where the mailboxes and the supply closet are located.

Walden Hall houses the Math Success Center.

2. Studying Mathematics at NMSU

Initial Advisor and Plan of Study

To each entering student is assigned an initial advisor whose task is to help her or him select courses and form a tentative plan of study. For master's students, this plan should cover the whole program of study. For PhD students, this plan should cover up to, and including, the comprehensive examinations.

Continuing students must register for classes during the end of the previous semester. A reminder will be sent out near the end of each semester listing the specific date by which continuing graduate students are expected to register. ***Failure to abide by this policy may result in a cut in GA salary.***
A student may change advisor at any time. Forms for changing advisor are available with Ms. Elizabeth Eres, the Graduate Program Administrative Assistant, in the main office located in SH 236.

For master's students writing a thesis and PhD students at the research portion of their studies, the advisor should be the faculty member directing the thesis.

Application to candidacy

Master's degree

As stated in the Catalog in the Programs of Study subsection of the section NMSU System Academic Regulations & Policies, every student admitted to the Graduate School needs to fill an Application for Admission to Candidacy.

> *An Application for Admission to Candidacy must be filed with the Graduate School. This must be done before the completion of 12 credits of graduate coursework. The student must have a minimum cumulative GPA of 3.0 at the time the application is submitted. The application may specify the Catalog at the time of graduation, as long as the catalog is considered active. […]*

But there is an exception to this rule:

> *[…] The Program of Study is not required for master's programs if defined within the Star Degree Audit.*

Since our master's program is defined within the Star Degree Audit, a student can fulfill this requirement by running a degree audit (easier and preferred method) or by submitting the form "Program of Study for master's Students" (available at http://gradschool.nmsu.edu/graduate-forms/) showing courses to be taken and courses currently being taken to fulfill requirements for the program.

Doctor of Philosophy Degree

As per the Catalog (Programs of Study subsection of the section NMSU System Academic Regulations & Policies):

> *Students should file the Program of Study Form once they have:*
>
> - *Completed 12 graduate credits while at NMSU that are beyond the master's degree*
> - *Successfully completed the qualifying examination*
>
> *The Program of Study Form should be completed and submitted to the Graduate School before registering for any additional courses. The individualized program of study is designed to meet the campus residency requirement and includes a minimum of 30 graduate credits beyond the master's.*
>
> *If the Doctoral degree requires a dissertation, at least 18 credits of dissertation work must be included. The professional doctoral degree includes a practicum or special project that culminates in a written report which demonstrates a command of the relevant scholarly literature and links it to the specific clinical or practical experience.*

The program of study form is available under the name Program of Study and Committee for Doctoral Students at http://gradschool.nmsu.edu/graduate-forms/

Taking Classes

Specific courses may be offered every year, every two years or only occasionally. We also sometimes offer special topics courses. **Because some courses are not offered every year, it is very important to plan carefully so to be able to take the required courses in time.** The current scheduling guidelines for regularly offered graduate-level courses are shown in the table below. A list of the titles and descriptions of the courses can be found in the Catalog: https://catalogs.nmsu.edu/nmsu/course-listings/math/

Course	Fall of even numbered years	Spring of odd numbered years	Fall of odd numbered years	Spring of even numbered years
MATH 451/501		X		
MATH 453/503		X		
MATH 454/504	See below*			
MATH 455/505				X
MATH 466/506	See below*			
MATH 457/507				X
MATH 471/517	X		X	
MATH 472/518		X		X
MATH 473/519	When resources permit			
MATH 481/525	X		X	
MATH 491/527	X		X	
MATH 492/528		X		X
MATH 531	X			
MATH 532		X		X
MATH 541	X			
MATH 542		X		
MATH 555	X			
MATH 557	See below*			
MATH 577	When resources permit			
MATH 581	X		X	
MATH 582		X		X
MATH 583	When resources permit			
MATH 584	When resources permit			

MATH 585	See below*			
MATH 586			X	
MATH 591			X	
MATH 592				X
MATH 593	X		X	
MATH 594		X		X
MATH 643	When resources permit			
MATH 655	When resources permit			
MATH 683			X	
MATH 686	When resources permit. (To follow MATH 586 when possible.)			
MATH 695	X			
STAT 470/515	X		X	
STAT 480/525		X		X
STAT 535				X
STAT 562		X		
STAT 571	X			
STAT 572		X		
STAT 581			X	
STAT 582				X

* At least one of the classes in Foundations/Logic: Math 454/504, MATH 466/506, MATH 557 and MATH 585 will be scheduled every semester, but the particular class to be offered in a specific semester will be decided on the basis of student needs.

Students should register early to prevent the possible cancellation of a course due to low enrollment.

3. Degree Requirements

Master of Science Programs

The general university requirements for the master's Degree are contained in the subsection Programs of Study of the section NMSU System Academic Regulations & Policies: https://catalogs.nmsu.edu/nmsu/regulations-policies/#academicprogramsofstudytext

Departmental Requirements

https://catalogs.nmsu.edu/nmsu/arts-sciences/mathematical-sciences/mathematics-master-science/

Minimum Requirements for the Master's Degree

1. In fulfillment of the Graduate School requirement of a minimum of 30 semester credits of course work, the student must take at least 24 credits of mathematics or statistics, numbered above 500.
2. The student must complete, transfer, or challenge MATH 525, MATH 527, MATH 528, and MATH 581.
3. In addition, 6 of the 24 Math credits must be from the following list of courses: Algebra (MATH 582), Complex Analysis (MATH 591, MATH 592), Differential Equations (MATH 531, MATH 532), Logic and Foundations (MATH 557, MATH 585), Probability and Statistics (STAT 562, STAT 571), Real Analysis (MATH 593, MATH 594) and Topology (MATH 541, MATH 542).
4. At most 6 credits of individual study courses such as MATH 540 may be used to fulfill the course requirement.
5. MATH 511 through MATH 516, and MATH 563 through MATH 569 may not be used to fulfill any of these requirements.
6. The student's program of study must be approved by the departmental Graduate Studies Committee.
7. The student must successfully complete a final master's examination.

The Master's Final Examination

The master's final examination is an oral examination administered by the student's committee and covers the student's coursework. The student's committee consists of at least three departmental members and a Graduate faculty member from another department who serves as the Dean's representative. If the student has a minor area of study, then a member must come from the minor department. The examination is restricted to coursework presented in the student's program of studies. When a master's thesis has been written, the master's final exam will be in part an oral defense of the thesis and in part a general examination of the candidate's course work. The oral exam must be completed at least 10 days prior to the end of the semester in which the candidate wishes to receive the degree.
Students should note that the master's final examination can serve as the PhD Qualifying examination for students continuing with the PhD program in the department, as specified in the Catalog:

> *[...] For students who earn their master's degree at New Mexico State University and will continue in the same department, the department may allow the master's final examination to serve as the doctoral qualifying examination or may require a separate examination.*
> *Based on the result of the qualifying examination, the department will take one or more of the following actions:*
>
> - *Admit the student to further work toward the doctorate*
> - *Recommend that the program be limited to the master's degree*
> - *Recommend a re-evaluation of the student's progress after the lapse of one semester*
> - *Recommend a discontinuation of graduate work*

Graduate Minor

According to the Catalog:

> *A graduate minor is based on at least 9 graduate credits in courses that encompass a recognized field of study outside the student's major. Departments may require certain courses be a part of a minor and may exclude other courses.*
>
> *Graduate Concentrations*
>
> *A concentration is a collection of coursework in a specific area that is part of a degree program of study at NMSU. At the graduate level at least 9 of these 12 credits must be numbered 500 or above. Only approved concentrations within a students' department or program may be noted on a transcript.*
>
> *Concentrations will not be added to a transcript after a degree is awarded. In order for the approved concentration to be noted on the student's transcript, the following conditions must be met:*
>
> - *Request the concentration at the time they file their official program of study.*
> - *Identify the concentration on their official Application for Degree.*

Professional Master of Financial Mathematics

The Master in Financial Mathematics Program prepares students for successful careers in the financial industry, including banks, insurance companies, investment and securities firms. The program provides students with a solid mathematics and statistics background complemented by studies in financial management and financial mathematics, including sophisticated problems directly originating from the financial industry. Financial mathematicians are expected to work in financial product development and pricing, risk management, and portfolio management. Potential employers include not only financial institutions but also energy companies, utilities and corporations with exposure to exchange rate or commodities risk, such as money center banks, securities firms, insurance companies, investment companies, energy companies and utilities and multinationals.

This program is designed for:

1. Students who are already in the profession.
2. Students majoring in the sciences or engineering who want to prepare for the profession with an interdisciplinary graduate degree.
3. Students majoring in business or mathematics that want to complete a graduate program involving both disciplines.

Applicants should have a good working knowledge of Calculus, Linear Algebra, Elementary Differential Equations, Probability, Statistics and Finance. Some facility with a programming language such as C, C++, S-PLUS or SAS is also recommended.

Curriculum: number of credits: 30.

Core courses:

1. MATH 521: Financial Mathematics I
2. MATH 522: Financial Mathematics II

3. MATH 577: Numerical Analysis or approved substitution
4. FIN 511: Financial Futures Markets
5. FIN 535: Investment Concepts
6. FIN 545: Money and Capital Markets
7. STAT 525: Statistics: Theory and Applications
8. MATH 518: Fourier Series and Boundary Value Problems
9. STAT 535. Elementary Stochastic Processes
10. Elective course: FIN 590: Financial Markets: Structure and Trading, or any FIN course numbered 500 and above with consent of advisor, or MATH 523: Numerical Optimization and Applications to Financial Mathematics.

Doctor of Philosophy Program

The general university requirements for the PhD Degree are contained in the subsection Programs of Study of the section NMSU System Academic Regulations & Policies: https://catalogs.nmsu.edu/nmsu/regulations-policies/#academicprogramsofstudytext

Departmental Requirements

https://catalogs.nmsu.edu/nmsu/arts-sciences/mathematical-sciences/mathematics-doctor-philosophy/

Candidates for the Ph.D. degree in the Department of Mathematical Sciences must pass a qualifying examination, three comprehensive written examinations, a basic mathematical reading knowledge test in a language other than English, a comprehensive oral examination, a series of courses, and a final oral doctoral thesis examination.

- **Qualifying examination:** Every student admitted to the Ph.D. program must complete the Ph.D. oral qualifying examination. Its purpose is to determine the areas in which the student shows strength or weakness, as well as the ability to assimilate subject matter presented at the graduate level. Students who complete their mathematics master's degree at NMSU may request, at the time of applying for their master's oral final examination, that the master's examination also fulfill the Ph.D. qualifying examination requirement. In all other cases, towards the end of the student's first semester in the Ph.D. program, the student and his or her advisor will convene an oral examination with three examiners, the examiners being the advisor and some of the student's current or past instructors. As a result of the qualifying examination, the department will take one of the following actions: (1) admit the student to further work toward the Ph.D.; (2) recommend that the student's program be limited to a master's degree; (3) recommend a reevaluation of the student's progress after the lapse of one semester; or (4) recommend a discontinuation of the student's graduate program in mathematics.

- **Written comprehensive examinations:** Candidates for the Ph.D. degree must pass written comprehensive examinations in three of the seven areas of algebra, complex analysis, differential equations, logic and foundations, real analysis, statistics, and topology. To ensure adequate breadth, a combination of three comprehensive examinations must include real analysis, and at least one of algebra and topology.

The seven examinations are based on the following comprehensive examination sequence courses: Algebra (MATH 525, MATH 581, MATH 582), Complex Analysis (MATH 517, MATH 591, MATH 592), Differential Equations (MATH 518, MATH 531, MATH 532), Logic and Foundations (MATH 504, MATH 557, MATH 585), Real Analysis (MATH 527, MATH 528, MATH 593, MATH 594), Probability and Statistics (STAT 562, STAT 571), and Topology (MATH 541, MATH 542).

Full time students should complete the comprehensive written exams in the first two years. Those who have not made substantial progress towards completion of their written exams at the start of the fifth semester may be removed from the program. Students who have not completed the written exams by the start of the sixth semester will normally have any departmental funding revoked.

Exams are offered every August and January. A student must register to take exams in the semester prior to taking the exams. A student has three consecutive examination periods to complete the written comprehensive exam requirements (Example: if s/he starts in August, s/he has the August, January and August examination periods to complete the exams). This does not extend the time limit mentioned above. Students will normally not be given more than two attempts at any one exam.

- **Course requirements:** Before graduation, a student must pass a total of four comprehensive exam sequences, but needs to take the comprehensive examinations in only three of them. In addition, a student must pass four more (one-semester) MATH/STAT courses from the seven comprehensive exam sequences listed above.

  A student may pass any of the four comprehensive examination sequences before enrolling as a Ph.D. student, but the four additional courses have to be passed after enrolling as a Ph.D. student.

  The following courses will not count towards the course requirements: Any course below MATH 501, MATH 511 through MATH 516, and MATH 563 through MATH 569, MATH 540/STAT 540, MATH 598/STAT 598, MATH 599, MATH 600, MATH 700.

  Students and advisors are encouraged to consider further courses beyond this minimum.

- **Foreign language examination:** no longer required.

- **Oral Comprehensive Exam:** The student must take this exam at the end of the semester after completing the written comprehensive exams. The student should present a proposed direction for thesis work.

- **Final Oral Exam:** This should be an exam over the student's thesis and administered by the same committee of the oral comprehensive exam.

4. Syllabi for Written Comprehensive Examinations

The examinations will be mainly based on the material described in the syllabi listed below. **Sample of past Ph.D. Comprehensive exams are available at: http://sierra.nmsu.edu/dept/.**

Algebra

Groups: definition, permutations, Lagrange's theorem, homomorphisms, quotient groups, group actions, fundamental theorem of finite abelian groups, Sylow theorems, solvable groups.

Commutative Rings: polynomial rings, homomorphisms, principal ideal domains, quotient rings, non-commutative rings, prime and maximal ideals, Noetherian rings, unique factorization domains.

Modules: free, projective, injective, tensor products, Hom, localization.

Fields: field extensions, splitting fields, Galois theory, separable polynomials, finite fields, solvability of polynomials, ruler and compass constructions.

Linear Algebra: vector spaces, determinants, eigenvalues and eigenvectors, Jordan and rational canonical forms, Cayley-Hamilton theorem.

Basic Courses: 525, 581, 582.

References: *Abstract Algebra*, by D. S. Dummit and R. M. Foote, *Introduction to Abstract Algebra* by E. A. Walker, *Topics in Algebra* by I. Herstein, *Algebra* by T. Hungerford, *Field and Galois Theory* by P. Morandi, *Introduction to Commutative Algebra* by M.F. Atiyah and I.G. Macdonald, *Advanced modern algebra* by J. Rotman, *Linear Algebra* by K. Hoffman and R. Kunze, *A first course in abstract algebra* by J. Fraleigh.

Complex Analysis

Complex Differentiation and Integration: derivatives, antiderivatives, Cauchy-Goursat Theorem, Morera's theorem, isolated singularities and residues, Cauchy's integral formula, Rouché's theorem.

Properties of Analytic Functions: identity theorem, maximum modulus principle Liouville's theorem, mapping properties of analytic functions.

Sequences of Analytic Functions: preservation of properties under normal convergence.

Series and Product Representations: Taylor and Laurent expansions, classification of singularities, Blaschke and Weierstrass products, Mittag-Leffler's theorem.

Mapping in the Extended Plane: conformality, the Riemannian sphere, Möbius transformations, chordal and hyperbolic metrics, Riemann mapping theorem.

Analytic Continuation: connectivity and multiple-valued functions, continuation by rearrangement of series, singularities.

Basic Courses: 517, 591, 592.

References: *Complex Analysis* by T. W. Gamelin, *Complex Analysis* by L. V. Ahlfors, *Functions of One Complex Variable* by J. B. Conway, *Theory of Functions of a Complex Variable* by I. A. Markushevich, *Real and Complex Analysis* by W. Rudin, and *Complex Analysis* by Sansone and Gerretson, *Classical Complex Analysis* by Liang-Shin Hahn and Bernard Epstein, *Complex Analysis* by R. Nevanlinna and V. Paatero, and *Analytic Function Theory* by E. Hille.

Differential Equations

Linear Systems. Eigenvalues and eigenvectors, primary decomposition, Jordan form, matrix exponentials and their computations, qualitative theory of linear equations.

Fundamental theory for ordinary differential equations. Existence and uniqueness of solutions using the Picard method, smooth dependence on initial conditions and parameters, maximal intervals of definition, flows.

Dynamical systems. Equilibria and their stability. Stable and unstable manifold theorem. Applications of the center manifold theorem.

Basic notions for partial differential equations. Separation of variables, Fourier series solutions, characteristic forms, characteristic manifolds, the Cauchy problem, the Cauchy- Kovalevskaya theorem.

Elliptic partial differential equations: Laplace's equation, harmonic functions, Green's functions, Poisson's equation, Newtonian potentials, Dirichlet and Neumann problems.

Parabolic differential equations: Heat equation, existence, uniqueness and regularity of solutions, heat kernels, energy estimates, the maximum principle, initial boundary problems.

Hyperbolic differential equations: Wave equation; D'Alembert's formula; domains of dependence, influence and propagation; method of spherical means; method of descent.

Basic Courses: Math 518, Math 531, Math 532.

References: *Differential Equations and Dynamical Systems* by Lawrence Perko, *Differential Equations, Dynamical Systems and Linear Algebra* by M. Hirsch and S. Smale, *Applications of center manifold theory* by J. Carr, *Partial Differential Equations* by F. John, *Partial Differential Equations* by L.C. Evans, *Introduction to Partial Differential Equations* by G.B. Folland, *Partial Differential Equations* by J. Jost.

Logic and Foundations

Lattices: closure systems, Galois connections, Boolean algebras, distributive lattices, Heyting algebras, modular lattices.

Logic: classical, intuitionistic, and modal propositional logics. Predicate calculus; the completeness and compactness theorems, Löwenheim-Skolem theorems, elementary equivalence, ultraproducts.

Universal Algebra: isomorphism theorems, subdirect products, varieties, free algebras, Birkhoff theorems, Jónsson's lemma.

Set Theory: axioms of ZF set theory, ordinals, cardinals, transfinite induction and recursion, axiom of choice.

Basic Courses: 504, 506, 557, 585.

References: *A course in Universal Algebra* by S. Burris and H. P. Sankappanavar, *Mathematical Logic* by H. D. Ebbinghaus, J. Flum and W. Thomas, *Mathematical Logic* by J. Shoenfield, *Algebraic Theory of Lattices* by P. Crawley and R. P. Dilworth, *Lattice Theory* by G. Gratzer, *Introduction to Set* Theory by K. Hrbacek and T. Jech, *Set Theory: An Introduction to Independence Proofs* by K. Kunen.

Probability and Statistics

Probability: probability spaces, conditional expectations, random variables/vectors.

Limit Theorems: law of large numbers, central limit theorem, law of iterated logarithm, weak convergence of probability measures.

Statistics: multivariate normal distributions, samples from the multivariate normal distributions, Wishart and multivariate Beta distributions.

Estimations and Hypothesis Testing: Estimation in multivariate normal distributions, generalized T^2-statistic, distribution of sample covariance matrix and sample generalized variance, testing the general hypotheses.

Basic Courses: Stat 562 and Stat 571.

References: *A First Course in Probability and Statistics* by H. Nguyen and T. Wang, *Probability: Theory and Examples* by Richard Durrett, *Fundamentals of Probability* by Saeed Ghahramani, *An Introduction to Multivariate Statistical Analysis* by T. W. Anderson, and *Aspects of Multivariate Statistical Theory* by Robb J. Muirhead.

Real Analysis

Arzela-Ascoli and Weierstrass Theorems.

Measure Theory: σ-algebras, measures, properties of measures, outer measures, Lebesgue measure, measurable functions.

Integration: Lebesgue integral, relationship between Lebesgue and Riemann Integral, Convergence Theorems (Fatou, MCT, LDCT), modes of convergence (for example, almost everywhere, in measure…), product measures, Tonelli and Fubini Theorems.

Differentiation: Lebesgue Differentiation Theorem, functions of Bounded Variation, Absolutely Continuous functions, and their properties.

Function Spaces: L^p spaces (Hölder inequality, Minkowski's inequality, containment between L^p spaces, completeness, dense subspaces of L^p, duality, Riesz representation theorem, l^p spaces)

Basic Courses: 527, 528, 593, 594.

References: Real Analysis: *Introduction to Real Analysis* by J. DuPree and C. Swartz, *Principles of Mathematical Analysis* by W. Rudin, *Real Analysis: Modern Techniques and Their Applications*, by G. B. Folland, *Real Analysis* by H. L. Royden, *Real and Complex Analysis* by W. Rudin, and *Integration and Function Spaces* by C. Swartz

Topology

Topological Spaces: separation and countability axioms; connectedness, compactness, Tychonoff's theorem.

Homotopy Theory: homotopy equivalence, fundamental group, Seifert-van Kampen theorem, covering spaces, higher homotopy groups.
Homology Theory: singular homology groups, Brouwer's fixed point theorem, invariance of domain, Jordan-Brouwer separation theorem, homology of cell complexes.

Manifolds: classification of surfaces, real and complex projective spaces.

Basic Courses: 541, 542.

References: *Topology* by J. Dugundji, *Algebraic Topology* by A. Hatcher,*Topology* by J. Munkres, *A Basic Course in Algebraic Topology* by W. S. Massey, *Homology Theory* by J. Vick, *Topology* by H. Schubert, *A First Course in Algebraic Topology* by C. Kosniowski

5. Employment as a Graduate Assistant

Expectations

New GAs are typically asked to assist in the Mathematics Success Center (MSC) and/or teach calculus laboratory sections, while more advanced students typically have two assignments: to teach a section of a multi-section course under the supervision of a faculty member and to either teach a lab section or to work an additional five hours per week in the MSC. The workload for a full GA is 20 hours per week.

General guidelines for expectations of graduate teaching assistants are described in the Graduate Assistant Handbook provided by the Graduate School, and available at http://gradschool.nmsu.edu/ga-resources/.

A good resource is the publication: *Teaching Mathematics: A Handbook for Graduate Teaching Assistants by Eileen Shugart,* as edited by the department, which is available with Ms. Eres in the main office located in SH 236.

General Regulations

Detailed guidelines on employment of GAs are available online at the link: http://gradschool.nmsu.edu/ga-resources/. In particular, it should be noted that according to these guidelines to be eligible for appointment a

[…] student must meet criteria for a regular full time student:

1) *be enrolled in 9 graded credits during an academic semester (fall or spring semester with only one class below level 450),*
2) *have a 3.0 cumulative GPA,*
3) *have not exhausted years of state level of support […], and in the case of international students, pass the NMSU International Teaching Assistant screening tests administered by the Center for English Language Program or another unit of NMSU. In cases where international students do not pass NMSU English language screening tests, the student must be enrolled in the designated courses.*

As part of 1), it should be stressed that

No audits can be taken as part of the 9 minimum credits. Only 3 of the 9 credits may be taken as an S/U option. A graduate assistant may not enroll for more than 15 credits each semester.

Additionally, **students with GAs need to petition the Graduate Studies Committee to take more than 4 credits of coursework outside the department in a given semester.**

Note that 2) is a very important point: if a GA's cumulative GPA falls below 3.0 in any semester, she or he is placed on academic probation and cannot hold a GA the following semester.

More precisely, according to the Graduate School guidelines:

Students with provisional status can work as either a research assistant or course grader. Provisional students are defined below:

I. *A continuing graduate student whose cumulative grade point average at the close of any term is less than a 3.0.*
II. *A beginning graduate student who does not have an overall 3.0 grade point average or 3.0 in the last half of undergraduate work, but who does have at least a grade-point average of 2.5 […]*

A student admitted provisionally must complete the first three courses totaling at least eight credits of graduate work, with an average of at least a 3.0. A provisional student who does not meet the 3.0 grade-point average is subject to dismissal after their first semester. Provisional students cannot work as teaching assistants.

Point 3) outlines another policy to keep in mind: the Graduate School places limits on the number of years a student may receive state support:

a. Students enrolled in a 2-year master's degree program (less than 40 required credits):
Only 2 years of support should be awarded from the New Mexico State General Fund. Departments can appeal for a 5th semester of support. Funding for additional semesters should come from other sources of support.
[…]
c. Entering Ph.D. students without a master's degree in the field of study: For those students entering doctoral programs without a master's degree in their field of study, no more than 5 years

of support should come from New Mexico State General Fund. Departments can appeal for a 6th year of support. Funding for additional years should come from other sources.
d. Entering Ph.D. students with a master's degree in the field of study: For those students entering doctoral programs with a master's degree in their field of study, a limit of 4 years of support should come from New Mexico State General Fund. Departments can appeal for a 5th year of support. Support for additional years should come from other sources.

These funding limits make it imperative to make a proper plan for the completion of the degree. It is the responsibility of the student to keep track of her or his years of support, and if a petition is deemed necessary to discuss the matter with his or her advisor well in advance.

For 2016-2017 the stipends for full-time 9 month GAs are as follows:
Level I: $17,800
Level II: $18,200
Level III: $18,400
Partial summer support may also be available, but cannot be guaranteed.

English Proficiency Requirements for Graduate Assistants

According to the Catalog:

International students that wish to become teaching assistants must demonstrate that they are proficient in the English language. This is done by participating in an International Teaching Assistant Screenings (ITAS). The purpose of the ITAS exercise is to determine whether candidates will be required to take ***COMM 485*** *International Teaching Assistant Development before being allowed to be assigned a teaching assistant position.*
The ITAS requires that a teaching assistant candidate deliver a short, ten minute teaching demonstration of a typical introductory undergraduate level course in a specific area relevant to the his or her area of studies. The demonstration is observed by CELP faculty and an actual undergraduate student.

Based on the results of this exercise, a full report by the CELP observers will be presented to the head of the department in which the graduate student wishes to be a teaching assistant.

- *COMM 485 International Teaching Assistant Development not required*
- *COMM 485 International Teaching Assistant Development recommended, but not required*
- *COMM 485 International Teaching Assistant Development required*

Ultimate authority to enforce the recommendation lies with the Department Head.

Preferably during Summer Session II, or before the start of the first semester of enrollment, all international students that wish to be considered for a teaching assistantship must take the ITAS, which is administered by the CELP. The ITAS can be waived for international students who hold a degree from an accredited university in the United States, or a country where English is the official language of instruction. Departments also have the discretion to allow waivers for special circumstances.

(See https://catalogs.nmsu.edu/nmsu/graduate-school/#internationaltext)

What to do if in case of illness or absence

It is very important for students to make arrangements to cover their GA assignments in the event of illness or if otherwise cannot be where they are assigned to be (whether that is in the tutoring center or a classroom). In case of need, students should try to find a qualified replacement, and must call the departmental office (at 575-646-3901) to inform the department of the situation. **A GA who will miss class because traveling must arrange for a replacement well in advance, and inform the department of these plans well before leaving town.**

5. International Students

- International graduate students who are employed by the department need to participate in the International Assistant Screenings that is offered by the Center for English Language Program. See the English Requirements for Graduate Assistants section above.
- According to the Graduate Catalog: "All international graduate students on F-1 or J-1 visas are required to comply with Department of Homeland Security regulations governing maintenance of status related to full-time enrollment and making normal progress toward completing a degree. Therefore, all international graduate students are required to enroll in nine or more credits (exclusive of audited work) during fall and spring semesters."

6. Miscellaneous

Awards and Funding

The Graduate School has information about some local awards and funding opportunities at http://gradschool.nmsu.edu/awards__fellowships/

Professional travel

There are some funds available from the department and the university to support professional travel for conferences or collaboration. A student must speak to her or his advisor and the department head to request departmental funds. The university travel awards information is available at the link above. You should plan well ahead and try to line up support several months before you plan to travel.

Graduate students are encouraged to attend the department's colloquium series. Refreshments are served in SH 234 at 3:30 pm, before every colloquium talk.

During the departmental orientation students can have their picture taken for the display case outside the department main office located in SH 236.

7. A survival guide

Petitions

It's very important to work closely with your advisor to develop your plans for coursework and exams. To retain your standing and successfully complete the program in a timely fashion, be sure to follow the requirements in the Graduate Catalog. Any deviation from these requirements requires approval of the Graduate Studies Committee.

In the exceptional event you need to petition the committee, you should do so according to the following guidelines.

1. The petition must be in writing and in the format of the template available with Ms. Eres in the main office located in SH 236.
2. The petition must be sent through your advisor (see template).
3. A copy of the petition must be directed to Ms. Eres, since the petition will be included in your file.

Please keep in mind that petition requests for waivers of existing requirements will be granted *only in extraordinary circumstances*, so plan accordingly with your advisor so as not to jeopardize your success in the program.

Your studies

Essential Techniques:

- Be aware that you have full time studies and .50 FTE workload—20 hours, so time management is important.
- Be prepared for class.
- Always keep your goals in mind; be familiar with your degree requirements, choose the right courses. Talk to your advisor.
- Remember that your main task here is your studies; it will take work hard to succeed.
- Many students find that it is better to study by yourself or pair-up with someone. A study group of 3 can hinder your productivity.

Useful Recourses:

- Take advantage of your professors' office hours. Don’t forget to check-in with your advisor.
- Consult with senior grad students.

- Use the materials in the libraries and Math Reading Room.

- Request a Learning & Study Skills Workshop online from Student Success Center: http://ssc.nmsu.edu/services/workshops/

- The Writing Center offers free one-on-one tutoring on writing: http://english.nmsu.edu/writingcenterresources/

- NMSU Thesis and Dissertation Guidelines: https://gradschool.nmsu.edu/theses-dissertations/ Search http://lib.nmsu.edu/findinfo.shtml for samples, also you may want to consult Library Subject Specialist for Mathematical Sciences.

Work

A. Science Hall: Computer Labs (SH222), Math Reading Room (SH226), Lounge Area/Math Tea Hour (SH234), Seminar Room (SH 235, 248, 250,252), and Main Department Office (SH236): Supply closet, Mailbox.

B. Walden Hall: Math Success Center: Kitchen, Testing Center, Supply closet. Basement offices are for graduate students.

Math Success Center (MSC)

* First time international grad students supported by full-time graduate assistantships, usually work in the MSC for 20 hours a week during their first semester.

* MSC training:

- Learn how to use a graphing calculator; students often make mistakes inputting data, especially with order of operations.

- Be familiar with Web Assign (online homework tool); each question in Web Assign has many corresponding questions in the textbook.

- Very important: Do not give out wrong solutions; if you are not sure of a problem, ask others, check the solution manual and/or the textbook.

- Remember to wear your nametag.

- Be aware of the tutor policies. Of particular note: students can be rude. It is your job to stay calm and treat them politely. If you have a particularly unruly student, see the coordinator on-duty or the MSC director.

- The kitchen in the tutoring room is there for your convenience. Be considerate of others and clean up after yourself.

- Be familiar with the Testing Center, with its hours and policies.

Some Tips for Teaching

- Prepare well - practice beforehand.
- Ask open-ended questions.
- Relate math to real-world applications.
- Talk in details. Write down everything if possible.
- Be firm about class rules; treat the students fairly and in the same manner.
- Be aware that there are many different cultures represented on campus; we must be sensitive to them in order to minimize misunderstandings.

Resources

1. The Teaching Academy serves NMSU educators through training, mentoring, and networking: http://teaching.nmsu.edu/events/
2. Faculty and Staff: http://www.math.nmsu.edu/people/index.html

Contacts

* Dr. Joseph Lakey (SH237), Department Head

* Dr. Ernest Barany (SH238), Associate Department Head

* Dr. Abby Train (WH118), MSC Director

* Ms. Maria Sanchez (SH236), secretary to the department head, responsible for textbook orders, Math Reading Room, keys, and unusual problems.

* Ms. Elizabeth Eres (SH236), graduate secretary, can help with every graduate inquiries such as those about pay.

* Mr. Alex Alvarado (WH101), Coordinator in the MSC, responsible for scheduling of tutors.

*Graduate Studies Committee:

Dr. Tiziana Giorgi, Chair, SH 260, 575-646-2717, tgiorgi@nmsu.edu
Dr. Guram Bezhanishvili, SH 245, 575-646-2837, gbezhani@nmsu.edu
Dr. Bruce Olberding, SH 251, 575-646-2234, olberdin@nmsu.edu