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1. Program Overview

Welcome

Welcome to the Department of Mathematical Sciences at NMSU and thank you for choosing our graduate program. Please, take time to read this handbook carefully and to plan well in advance each step of your graduate education. The Graduate Catalog is an essential document that contains official university rules. You should read the sections on “General Information” and “Mathematical Sciences” carefully as they contain a great deal of important information. The Graduate Assistant Handbook and Guidelines on Employment for Graduate Assistants contain information about university regulations and policies relevant to teaching assistants as well as helpful suggestions about how to teach university classes. The NMSU Student handbook prepared by the Association of Students at NMSU has general university rules and university code of conduct. All students are responsible for familiarizing themselves with these important policies. Finally, the department's Staff Manual has policies on using departmental resources and teaching. Please, contact us as often as you need. Best wishes to you from the Mathematics Graduate Studies Committee.

Highlights of Department History

Early in 1888 a group of Las Cruces citizens established Las Cruces College and installed Hiram Hadley (Hadley Hall) as the College's first president and first professor of mathematics. The next year Las Cruces College was reorganized as a land-grant institution and renamed the New Mexico College of Agriculture and Mechanic Arts. At the beginning the department was primarily a service department, teaching among other courses one called "Descriptive Geometry." In 1925 this course went to the Department of Civil Engineering and the department added a course called "Philosophy of Mathematics." In 1927 John W. Branson (Branson Library) came to head the department, serving the College as President (several times!) and as first Dean of the College of Arts and Sciences before he retired from the presidency in 1955. In 1947
Earl Walden (Walden Hall) became head of the department, after which the department began to grow into the form it has today. Under the leadership of Branson and Walden the university and the department moved away from the early emphasis on vocational training toward an emphasis on liberal studies, unifying existing undergraduate degree programs and sowing the seeds of a vital graduate program. Crowning the development of the post-war period, in 1960 the name of College was changed to New Mexico State University, and Allan B. Gray, Jr., received the Ph.D. in mathematics, the very first Ph.D. degree granted by the university. In 1965 the department won an NSF Departmental Development Grant, which funded further growth of the department and the construction of Walden Hall. Science Hall was opened for business in 1988.

**Diversity in the Department of Mathematical Sciences**

**Departmental profile:** The NMSU Department of Mathematical Sciences currently hosts students from North America, Africa and Asia. Altogether, there are about 40 graduate students in mathematics and approximately 1/3 are female and 2/3 are male. Faculty members are from North America, Asia, and Europe. Of the 20 current tenure track faculty members, 5 are female and 15 are male.

The most important aspect of recruiting new students is the departmental web page outlining our program. We also advertise nationally for new students and send a poster about our program to between 50 and 100 universities around the world. Word of mouth is another important component of our recruiting program, especially as it relates to recruiting students from UTEP or other universities in the Southwest.

Many national groups have their own student organizations on the NMSU campus. Among other things, these groups assist newcomers in adjusting to life at NMSU, inform others of their respective cultures and heritages, and participate in various special events. The most active support group within the department for minority graduate students of mathematics is the NMSU Graduate Women in Mathematics organization.
**National profile of new doctorates:** An annual survey of new doctorates performed by the American Mathematical Society provides a snapshot of diversity in the profession. From the most recent survey, we derive the following summary. In the year from July 1, 2011 to June 30, 2012 approximately 1100 Ph.D. degrees in mathematics were granted by departments of mathematical sciences in the United States. Approximately 300 were earned by women; approximately 800 were earned by men. Of the 300 earned by women, approximately 150 were earned by US citizens or permanent residents. Of the 800 earned by men, approximately 450 were earned by US citizens or permanent residents. Of the 150 earned by female US citizens or permanent residents, 1% were earned by Native Americans, 10% by Asians, 5% by African Americans, 5% by Hispanics, 1% by Hawaiians or Pacific Islanders and the rest were earned by white American women. Of the 450 earned by male US citizens, 1% were earned by Native Americans, 5% by Asians, 2% by African Americans, 8% by Hispanics, and the rest were earned by white American men.

**New Mexico Residency**

Becoming a resident of New Mexico is very important for the purpose of deciding who may pay resident tuition and who will have to pay nonresident tuition. For all the details on becoming eligible for resident tuition inquire at the Registrar's office in the Educational Services Building immediately upon your arrival in Las Cruces. The website [http://www.nmsu.edu/~registra/residency.html](http://www.nmsu.edu/~registra/residency.html) is also very helpful. Promptness in attention to the relevant matters is important, as the rule-of-thumb is that a domestic student becomes a New Mexico resident after having lived in the state for twelve months. Among the actions one takes to establish oneself in New Mexico are transferring motor vehicle registrations to New Mexico, obtaining a New Mexico driver’s license and registering to vote in the City Clerk’s Office. The City Clerk and the Department of Motor Vehicles provide receipts, which should be kept. Your rent receipts can be useful in this regard, too. Students younger than 23 years of age should also make sure that their parents no longer declare them as dependents on income tax.
forms. It goes without saying that new students will file income tax returns with the State of New Mexico as part-year residents.

**Facilities**

The department is housed in two adjacent buildings, Science Hall (SH), built in 1988 and Walden Hall (WH), built in 1966 and renovated in 1987. 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 is located in SH 226, where some archived journals and a collection of mathematics texts are housed.

During the departmental orientation you will have your picture taken for our Rogue's Gallery. The computer labs are SH 118, and 222. Computers are also provided in TA offices. A Math Dept user account will be set up for you once you have activated your My.NMSU.edu account. Your password for this account will be emailed to you.

University policies and guidelines for use of computers and other information technology can be found at [http://ict.nmsu.edu/Guidelines/](http://ict.nmsu.edu/Guidelines/). Specific information involving copyrights, downloading and filesharing can be found at [http://nmsu.libguides.com/content.php?pid=60019&sid=662811](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. If you have questions about your computer account, please talk to our Computer Operations Manager, Mark Leisher, SH 174.

The department buildings have classrooms, a colloquium room (SH 107: The Carol and Elbert Walker Room), seminar rooms (SH 235, 248, 250, 252), and a lounge area (SH 234) with a small kitchen.
Refreshments are served in SH 234 at 3:30 pm, before every colloquium talk. Colloquia are very important for your mathematical enrichment. Don’t miss them!

**Graduate Student Organization**

The goal of the organization is to:

- Further professional development of graduate students within the Department
- Facilitate communication among graduate students and Departmental faculty
- Foster fellowship among graduate students within and among Departments
- Encourage attendance at conferences and professional meetings to improve scientific communication through oral and poster presentations and networking skills

See [http://aces.nmsu.edu/academics/fws/graduate-student-organiz.html](http://aces.nmsu.edu/academics/fws/graduate-student-organiz.html) for more information including current contact information.

### 2. Studying Mathematics at NMSU

**Advising**

Before classes start for your first semester, you will meet with an advisor who has been assigned to you by the department to form a tentative plan of study. For Master’s students, this plan should cover your whole program of study. Advisement forms for the Master’s degree can be found at [http://sierra.nmsu.edu/dept/MS_advise.pdf](http://sierra.nmsu.edu/dept/MS_advise.pdf), and for the Doctoral degree at [http://sierra.nmsu.edu/dept/PhD_advise.pdf](http://sierra.nmsu.edu/dept/PhD_advise.pdf). For PhD students, this plan should cover up to, and including, your comprehensive examinations. This plan can be changed at any time, and we expect most students will change their plan. But it is better to have a plan that may change, than have no plan at all.

It is important for us to know approximate enrollments of graduate classes as early as possible in order to prevent needed graduate classes from being canceled due to low enrollment. Therefore, continuing students are expected to 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.

You may select another advisor at any time. You should make sure the advisor you select is someone you feel comfortable with and who agrees to be your advisor. Forms for changing advisor are available with the graduate secretary in the Math department office.

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. Choosing an advisor for this role is vital, and it may take several semesters before you can make such a choice. The classes you take, seminars you attend, and conversations you have outside school may all help in this important choice.

Program of study document

It is recommended that during the first semester of enrollment, each graduate student beginning studies toward a degree prepare a complete tentative program of study in consultation with the student's advisor. This tentative program should be kept in the student's file within the department and is not to be considered as the "Application for Admission to Candidacy," which contains the permanent program.

Application to candidacy

The admission of a student to the Graduate School does not imply admission to candidacy for an advanced degree nor guarantee that the student will be awarded a graduate assistantship or other financial aid. The major department in which the student intends to become a candidate for a master's degree must be satisfied as to the student's sound basic training and the ability to pursue studies at the graduate level.

The document “Program of Study and Committee for Master’s Students”, which formally lists the curriculum requirements for the student’s program of studies must be filed with
Graduate Students Services by Master's students by the time 12 credits of graduate work have been completed. The document “Program of Study and Committee for for Doctoral Students" which formally lists the curriculum requirements for the student's program of studies, must be filed with Graduate Student Services by Doctoral students by the time 12 credits of graduate work and the Qualifying Exam have been successfully completed for PhD students entering directly into the PhD program from a Bachelor's program, and by the time 12 credits of graduate work beyond the Master's degree and the Qualifying Exam have been successfully completed by students in the PhD program with a Master's degree. These forms can be obtained from the website of the Graduate School: http://gradschool.nmsu.edu/

At the time the "Application for Admission to Candidacy" is submitted, the student must have a cumulative graduate grade point average of 3.0. The application may specify the particular Graduate Catalog whose rules will govern the student's studies. This can be the catalog in effect at the time of matriculation, or any catalog in effect at any time the student is enrolled at NMSU provided that the catalog is not more than seven years old. By default, the current Graduate Catalog will be used. The student's program listed in the "Application for Admission to Candidacy" must (1) meet the requirements of the chosen catalog, including the regulations of the Graduate School and of the major department, (2) include undergraduate deficiencies and required courses specified on the student's "Certificate of Admission," (3) be certified by the student, the student's advisor, heads of departments offering major and minor fields, and the relevant deans, and (4) list each course number and abbreviated title with the credit hours earned and grades. If the program is not satisfactory in the judgment of the graduate dean, it may be returned to the department for revision. When the "Application for Admission to Candidacy" has been approved by the graduate dean, the student will be formally admitted to candidacy for the particular degree.

For Doctoral students, the program of study should be designed to meet the campus residency requirement described in "Residency" and should include a minimum of 30
credit hours from graduate courses (from NMSU or other approved graduate programs) plus 18 credits of dissertation work (700-level course). Master's students who are experienced education professionals who are seeking a Specialist in Education degree must also meet similar residency requirements. See the Graduate Catalog for further details.

**Taking Classes**

Courses may be offered every year, every two years or only occasionally. We also sometimes offer special topics courses. There are many reasons for you to take courses in as many areas of mathematics as you can. **Because some courses are not offered every year, it is very important that you plan carefully to ensure you are able to take the required courses you need by the time you need to have taken them.** 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 NMSU Graduate Catalog.

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall of even numbered years</th>
<th>Spring of odd numbered years</th>
<th>Fall of odd numbered years</th>
<th>Spring of even numbered years</th>
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<td>MATH 473/519</td>
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<td>MATH 481/525</td>
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<td>MATH 491/527</td>
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<td>MATH 492/528</td>
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<td>MATH 583</td>
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<td>MATH 594</td>
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<td>MATH 643</td>
<td>When resources permit</td>
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<td>MATH 655</td>
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<td>MATH 683</td>
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<td>MATH 686</td>
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<td>MATH 695</td>
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<td>STAT 582</td>
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* 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 Degree**

New Mexico State University offers both academic and professional master's degrees.

If the student's undergraduate program fails to provide a proper foundation for advanced work in the chosen field or department, the student may be required to take classes to correct those deficiencies, consequently resulting in a longer period of residence than would otherwise be required.

**Credit Hour Requirements**

A minimum of 30 semester credits are required for the master's degree in Mathematics, 24 of which must be Mathematics or Statistics courses numbered over 500. Master's programs involving a thesis include no more than six and no fewer than four credits of thesis. (See the section on "Thesis" for further guidelines.) Additional credits may be selected from other fields to fit into a logical, justifiable program. Courses used to remove deficiencies or satisfy prerequisites cannot be counted as part of the requirements for the master's degree.

Students must take coursework from a variety of faculty. Students may not take more than half of the minimum credits required for a master's degree (excluding thesis credits) with the same professor. Short courses of less than one summer session or one
semester duration cannot constitute more than one-fourth of the total course requirements for a master's degree

Transfer Credits

University policy allows for a limited number of graduate credits to be transferred from other institutions. See the Graduate Catalog for details. Final approval for transfer credits is made by the Department Head in consultation with the Graduate Studies Committee. Students seeking to transfer credits must submit a detailed proposal to the Graduate Studies Committee including the specific courses and specific institutions for which transfer credit is sought. The Graduate Studies Committee will review such requests and issue a response. In general, the committee is unlikely to approve transfer credit to substitute for our core departmental courses.

Thesis Option

A thesis in the major field is recommended. Not more than six nor fewer than four thesis credits may be counted toward the requirements for a master's degree.

Continuous Enrollment

Having once registered for thesis, a student must continue to register for a minimum of one credit in thesis or graduate course work each regular semester until the thesis is approved by the Graduate School and the copies have been accepted by the binding section in Branson Library. A student who fails to abide by this regulation will be considered withdrawn from the university and, in order to resume studies, must formally apply for readmission and satisfy the requirements in effect at the time of reapplication.

Time Limit

The graduate program leading to the master's degree must be completed within seven years (or eight successive summers) including completion of the master's thesis or final
project. Any course work more than seven years old at time of the final examination will not be included in the program.

**Minors**

A candidate for a master's degree may select up to two approved minors in addition to the major. A minimum of nine credits of graduate work is necessary for a minor at the master's level. (See "Graduate Degree Programs, Specializations/Concentrations, and Approved Minors" for a list of approved minors.) To record a minor on a student's permanent record, the minor must be listed on the "Application for Admission to Candidacy," and this form must be signed by the head of the department offering the minor program. At the oral examination, a committee member may move to remove the designation of a minor with the concurrence of the committee.

A minor will not be awarded after the degree has been posted to the transcript.

**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 pass with a B or better, 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, 592), Differential Equations (MATH 531, 532), Logic and Foundations (MATH 557, 585), Probability and Statistics (STAT 562, 571), Real Analysis (MATH 593, 594) and Topology (MATH 541, 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 516, and MATH 563 through 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.
Professional Master of Financial Mathematics

The Professional Master in Financial Mathematics Program prepares students for successful careers in the financial industry or energy sector, including banks, insurance companies, investment and securities firms, energy companies, utilities, and corporations with exposure to exchange rate or commodities risk. 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. Course Requirements for the Professional Master's Degree are

1. MATH 518, MATH 521, MATH 522, MATH 577
2. STAT 525, STAT 535
3. FIN 511, FIN 535, FIN 545
4. FIN 590, or any additional FIN course numbered 500 and above with consent of advisor, or MATH 523.

The Doctoral Degree

Doctor of Philosophy Degree

The degree of doctor of philosophy requires distinguished attainment in both scholarship and original research. The degree is granted chiefly in recognition of the candidate's high attainments and ability in the special field, as shown by work on the required examinations covering both the general and the special fields, and by the preparation of a dissertation.
Requirements for the Doctoral Degree

Qualifying Examination

Doctoral students must pass a 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.

Scheduling the qualifying examination is based on the following criteria: (a) for students who enter the Graduate School with little or no previous graduate experience but wish to proceed directly to the doctorate, the qualifying examination should be taken after 12 credits of graduate work; (b) for students who enter with a master's degree or equivalent from another university, or another department, the qualifying examination should be taken before the completion of one semester of graduate work.

The department may allow the master's final examination to serve as the doctoral qualifying examination or may require a separate examination for students who earn their master's degree at New Mexico State University, and will continue in the same department. It is important to stress that passing the Master's final exam does not automatically imply that the student also passes the qualifying exam.

Based on the result of the qualifying examination, the department will take one or more of the following actions: (a) admit the student to further work toward the doctorate; (b) recommend that the program be limited to the master's degree; (c) recommend a re-evaluation of the student's progress after the lapse of one semester; or (d) recommend a discontinuation of graduate work. In all cases, Graduate Student Services shall be notified of the results of the qualifying examination. Upon passing the qualifying examination, the student will be admitted to the doctoral program.

Comprehensive Examination

Before admission to candidacy for a doctoral degree, the student must pass a comprehensive examination intended to test the student's broad knowledge of the
mathematics. The examination has both a written and an oral part. The student will be admitted to the written part of the examination after completion of adequate course work to the satisfaction of the major department and the Graduate School. The results of the oral examination will be reported to Graduate Student Services.

Graduate Student Services should receive the "Program of Study and Committee for Doctoral Students" after the student passes the qualifying examination and before the comprehensive examination. The written comprehensive exams are scheduled by the department twice a year, in August before the Fall semester begins and in January before the Spring semester begins. Students will receive notices in October and in March asking which students wish to sign up for comprehensive exams in the coming January and August, respectively. The oral part of the examination is scheduled after the student passes the written part and the foreign language exam. The oral examination form must be on file at Graduate Student Services at least ten working days prior to the proposed date for the examination.

The student must be duly registered for three credits of graduate course work in the Graduate School during the semester prior to taking the comprehensive examination. A student taking an oral examination during the summer must enroll for at least one credit for that term.

In general, there should be a time lapse of at least one year between the comprehensive and final oral examination. However, due to the type of research required in some departments and the method of administering the written comprehensive in other departments, such a time lapse is not always practical. In all cases there must be one semester between the comprehensive and the final oral examinations.
Time Limit

If more than five years have elapsed since the date of the comprehensive examination, the candidate will be required to take another comprehensive examination before admission to the final examination.

Advancement to Candidacy

A student will be formally advanced to candidacy for the Doctoral degree upon the successful completion of the comprehensive examination, the recommendation of the committee, and the approval of the graduate dean.

A minimum of nine credits must be taken after successful completion of the comprehensive exam. A student may not register for dissertation credits (700) prior to successful completion of the qualifying exam. The dissertation preparation shall total at least 18 credits of courses numbered 700. The doctoral committee can impose additional requirements for courses numbered 700.

A student is admitted to the doctoral program after successful completion of the qualifying examination. After successful completion of the comprehensive examination, a student must continue to register for at least three credits of dissertation or graduate course work each regular semester until the dissertation is approved by the Graduate School and the copies have been accepted by the binding section in Branson Library. A student who fails to abide by this regulation will be considered withdrawn from the university, and, in order to resume studies, must formally apply for readmission and satisfy the requirements in effect at time of reapplication.

If the final examination is to be held during the summer or the dissertation is to be completed during the summer, the student must register for one credit hour during the summer session in which the final examination will be held or the dissertation will be completed.
In order to graduate in the summer the student must have filed the "Application for Degree (Diploma)" by the posted deadline for the semester in which degree requirements will be completed.

**Finalizing the Doctoral Dissertation**

After successful completion of the final examination a copy of the dissertation must be submitted to the Graduate School for format review on or before the deadline. The deadlines are posted to the Graduate School website at

http://prospective.nmsu.edu/graduate/current/deadlines.html

The form and style of the dissertation must comply with the regulations given in the Guidelines for Preparing a Thesis or Dissertation

http://gradschool.nmsu.edu/Guidelines/. These guidelines also contain detailed information on the dissertation approval process and binding. Candidates are encouraged to consult with the Graduate School on format, deadlines, and procedures before final typing.

The dissertation is not complete until copies have been accepted for binding by the binding section staff and until the microfilm agreement form has been completed and received in Branson Library.

**Residency**

The requirements for the doctoral degree ordinarily cannot be met in less than three years following the bachelor's degree.

The minimum campus residency requirement for the doctoral degree shall include enrollment in at least two semesters of classes taught by New Mexico State University faculty.
**Minor**

Any doctoral applicant for candidacy may declare up to two approved minors in addition to the major area of study. The list of approved minors can be found in the [Graduate Catalog](#) in the section called Graduate Degree Programs, Specializations/Concentrations, and Approved Minors. Demonstration of competency in the minor area will be required at both the oral comprehensive and final examinations.

**Foreign language examination**

The department requires that each Ph.D. student pass a basic mathematical reading knowledge exam in a language other than English relevant to the student's research interests. This exam is coordinated by the student's advisor and consists of the open-dictionary written translation into English of a mathematical text of interest to the student. The language requirement must be fulfilled after the successful completion of the written part of the comp and prior to the oral part. Upon successful completion of the written comprehensive exam, the student confers with his or her advisor who will identify an appropriate mathematical document written in a foreign language and determines the time of the exam. The student is asked to translate a part of the document in writing with the aid of a translation dictionary and submits the translation to the advisor, who determines whether or not the translation is acceptable. Upon approval of the advisor, the foreign language exam is determined to have been passed.

**Comprehensive Examinations**

**Written comprehensive examinations**

Candidates for the PhD 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 506, 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 of being in the PhD program. Those who have not made substantial progress towards completion of their written exams at the start of the fifth semester of PhD work 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. Email notices will be sent to all graduate students in March and October asking students who wish to take the exams in August and January, respectively, to identify themselves. A student who signs up for an exam in response to the notice is expected to take it as scheduled. Last minute cancellations are not acceptable due to the effort needed on the part of examining faculty to prepare the exam. Failure to cancel an exam sufficiently far in advance may result in the canceled exam counting as one of the attempts by the student in that area. A student has three consecutive examination periods to complete the written comprehensive exam requirements (Example: if the first exam is taken in August, the student has that August and the following January and August examination periods to complete all three exams). This does not extend the time limit mentioned above. Students will normally not be given more than two attempts at any one exam.
Oral Comprehensive Exam

The student must take this exam within the first month of the semester after completing the written comprehensive exams. The student should present a proposed direction for thesis work at the oral exam if possible.

Minimum 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/STAT 540, MATH/STAT 598, MATH 599, MATH 600, MATH 700. Most courses can be taken for credit only once. A few advanced courses can be repeated for credit, see the Graduate Catalog for details.

Students may petition the Graduate Studies Committee to replace as core courses either Math 525 or 581 with Math 582, and to replace one or both of Math 527, 528 with Math 593, 594. It is imperative that students discuss this with their advisor before submitting such a petition.

Syllabi for Written Comprehensive Examinations

As mentioned in the overview of the comprehensive examination, the department uses the written examinations to ensure that Ph.D. recipients are acquainted with the
terminology and methods of a broad section of mathematics. Exam questions reflect fundamental aspects of each subject, as listed in the syllabi below.

**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.


**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.


Differential 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-Kovalevski 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 472, Math 531, Math 532.


Logic and Foundations


Logic: classical, intuitionistic, and modal propositional logics. Predicate calculus; the completeness and compactness theorems, Lowenheim-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.


Probability and Statistics

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

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.


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 (Holder 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: Introduction to Real Analysis by J. DuPree and C. Swartz, Principles of Mathematical Analysis by W. Rudin, 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.


Most of the references are available either in the Branson Library or in the mathematics reading room, SH 226. Previous exams from 2000 to current, can be found on the Interdepartmental website at http://sierra.nmsu.edu/dept/ under “Comp Exams”. Hard copies are also filed in the main office; you may borrow the notebook of old exams and photocopy the ones in which you are interested. You will see that large parts of the exams are based on applications of theorems proved and discussed in the basic courses, and are therefore similar to homework problems. So the first requirement for success on the exams is to master the material of the basic courses. Because of the time limit, there is an implicit second requirement that you develop a clear and concise style of explanation, the style being somewhat dependent on the subject area. For the sake of the second requirement we recommend the formation of study groups in which you can compare approaches to sample problems and have your peers give you editorial feedback. Also members of the faculty will be willing to provide "courtesy critique."

Oral Comprehensive Examination

Students will be admitted to this examination after passing the three written comprehensive examination and the foreign language requirement. This oral exam must be scheduled to occur during the semester following completion of the written examinations. The mathematics covered is at the same level as the written examinations, but it is not restricted to the three areas in which the student has passed the written examinations. The exam committee will have at least four members. Three of them must be from the mathematics department and one member from another department to serve as the Dean's representative. If a minor is declared, at least one
but not more than two members of the committee must be from the minor area. All members of the committee must attend the comprehensive oral and the final defense for the dissertation. No change in membership of the doctoral committee may be made without prior approval of the Dean of the Graduate School. The examination committee is approved by the Graduate Studies Committee, by the head of the department and by the Dean of the Graduate School. The student must notify the Graduate School of the choice of committee and of the exam date and time at least two weeks prior to the examination. The Graduate School sends the paperwork pertinent to administering the exam to the Dean's representative prior to the exam.

**Dissertation**

The dissertation must be an original work in a significant branch of mathematics, as judged by contemporary standards and the NMSU faculty.

The form and style of the dissertation must comply with the regulations given in the [Guidelines for Preparing a Thesis or Dissertation](#) which may be obtained from the Graduate School website. For optimal stress management, this publication ought to be consulted soon after the material of the dissertation becomes clear, or at least well before writing of a final version starts. The other technicalities of finishing up are described in the [Graduate Catalog](#) One of the best sources of information about preparation of the dissertation are graduate students who have just completed their dissertations.

A student must personally deliver a final copy of the dissertation to each member of the examining committee at least seven working days before the final oral examination

4. Graduate Committees

**Master's Degree**
The master's degree committee will consist of a minimum of three faculty members, each holding at least a Master's degree. The committee chair and one other member must be in the student's home department unless one of these two committee members is from another department and that member belongs to the relevant graduate program of the student's home department (see Graduate Faculty Guidelines section "Appointments Outside of Home Department"). At least one member of the committee must serve as the dean's representative and cannot be a faculty member of the student's home department. The student and advisor are responsible for identifying the Dean's representative. A list of graduate faculty that can be used to identify a Dean's representative is available from the Graduate School's website. If the student has an approved minor area of study then either the dean's representative or a fourth committee member must come from the minor department.

Departments can nominate individuals with a Master's degree and/or Doctoral degree and related experience for a temporary appointment to graduate faculty (please see Appointment to Graduate Faculty of Non-NMSU Employees in the Guidelines on Graduate Faculty Appointments in the Graduate Catalog). Nomination letters must identify specific roles of the individual and the year(s) of service (up to three years per request per individual). The nomination letter must receive the endorsement of the academic dean. If granted a temporary appointment to graduate faculty, the individual will be limited to the specific role(s) identified by the department. Departments can request that the individual be allowed to serve as a dean's representative.

**Doctoral Degree**

The doctoral committee will be composed of at least four members of the graduate faculty, each holding a Doctoral degree. The following rules apply to the composition of the committee:

- In addition to the committee chair, at least one other member must be from a discipline within the student's major area, which may encompass more than one degree-granting department.
• One member of the committee may be from a related area of study other than the student's declared minor.
• If an approved minor is declared, at least one but not more than two members of the committee must be from the minor area.
• At least three committee members must be members of the graduate faculty in doctorate-granting departments. Of these three members:
  • The committee chair must be a member of the graduate faculty in the student's department (See the section "Appointments Outside of Home Department" in the "Guidelines on Graduate Faculty Appointments").
  • The home department of no more than one of the other two committee members from doctorate-granting departments may be outside the student's department.

As indicated in the "Guidelines for Graduate Faculty Appointments," any qualified member of the graduate faculty may join any graduate program within a department. Applicants will be approved by the graduate program to which they are applying, through a process to be determined by that program, before their application is forwarded to the dean of the Graduate School.

One member of the committee must serve as the dean's representative. The dean's representative can be either the member from the related area or minor area or an independent member from some other department, but must not be from the student's department. In programs where more than one department is a participant, the dean's representative may not be from any of those departments.

Departments may structure committees that include more than the minimum number of members as long as the stated conditions of membership are satisfied. Additional voting and nonvoting members may be any person approved or appointed by the dean of the Graduate School. All members of the committee must attend the comprehensive oral and the final defense for the dissertation. No change in membership of the doctoral committee may be made without prior approval from the dean of the Graduate School.
5. Final Examinations

Each candidate will be given a final examination conducted by the graduate committee in accordance to the schedule provided by Graduate Student Services. It is the student's responsibility to be sure that the form to schedule this examination is submitted to the Graduate School at least ten working days prior to the proposed date for the examination.

At the time of the final examination, a graduate student must have an NMSU cumulative graduate grade-point average of at least 3.0 and must be enrolled in the final semester; or, if the student is writing a thesis, he or she must have completed all course work for the degree.

Students with the nonthesis option may be required to pay a special exam fee in lieu of registering for one credit hour of graduate course work. (See "Tuition, Fees, and Other Expenses" in the Graduate Catalog.)

The final examination format shall be determined by the department with the approval of the graduate dean. If a department does not specify an examination format, the final examination shall consist of an oral defense of the student's thesis (if one was written) as well as a general examination of the candidate's field of study.

Any candidate who fails in the final examination may (1) upon recommendation of the advisor and approval of the graduate dean, be granted a second examination after a lapse of at least one semester, or (2) be excluded from further candidacy for the degree. Failure in the second examination disqualifies a candidate from obtaining the degree. Certification that the thesis has been accepted and that the final examination has been passed must be filed with Graduate Student Services not later than one week before the degree is conferred.

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. 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. In mathematics, the student is evaluated both on the student's knowledge of the material in the core courses for the Master's degree, as well as ability to construct and write mathematical definitions and arguments. 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.

It is prudent to start organizing an examination committee early in the semester, as it takes time to round up faculty and find a time (allow about two hours for the exam) when everybody can meet and more time for the Dean's office to handle the paperwork. Students should note that the Master's oral may serve as the Ph.D. qualifying examination for Master's students continuing with the Ph.D. program in our department. See the Graduate Catalog for more information.

**The Doctoral Final Examination**

Every student working toward the doctoral degree will submit a dissertation embodying the results of original research. The dissertation is expected to demonstrate the student's ability in independent investigation and to be an original contribution to human knowledge. The dissertation shall display a mastery of the literature of the subject field and present an organized, coherent development of ideas with a clear exposition of results, and provide a critical discussion of the limits and validity of the student's conclusions.

When a complete draft of the dissertation has been prepared, the student's doctoral committee will conduct the final examination. The final examination is concerned primarily with the research work of the student as embodied in the dissertation, but it may be much broader and extend over the candidate's entire field of study. The intention of the final examination is to verify that the candidate has a satisfactory grasp
of the major subject as a whole and has a general acquaintance with the fields of knowledge represented by the course of study. The final examination is entirely oral and is open to the public.

The final examination must be completed in accordance with the schedule provided in the academic calendar. The form requesting this examination is to be submitted by the department to Graduate Student Services at least ten working days before the examination is taken. This form may be found on the Web at http://gradschool.nmsu.edu/Guidelines/ and is also available from the Graduate School and departmental offices.

The student must ensure that each member of the examining committee receives a copy of the dissertation no later than seven working days before the date of the final examination.

Any candidate who fails the final oral examination may (a) upon recommendation of the committee and approval of the graduate dean be granted a second examination after a lapse of at least one semester; or (b) be terminated from the doctoral program. Failure in the second examination disqualifies the candidate from obtaining the degree.

If the final examination is to be held during the summer or the dissertation is to be completed during the summer, the student must register for one credit hour during the summer session in which the final examination will be held or the dissertation will be completed.

6. Employment as a Teaching Assistant

New TAs are typically asked to assist in the Mathematics Success Center or teach calculus laboratory sections, and more advanced students may teach a section of a multi-section course under the supervision of a faculty member. The typical workload for a full TA is 16 hours per week.
General guidelines for what is expected of graduate teaching assistants are described in the document [Expectations for Teaching Assistants at NMSU](#). This is an extremely important document that every graduate teaching assistant is required to familiarize themselves with.

TA’s are required to enroll and maintain enrollment in at least 9 credits (usually 3 courses) of graduate work per semester. Students with TAs from the Math department require approval of the Graduate Studies Committee to take more than 4 credits of coursework outside our department in a given semester. Other rules pertaining to maintaining a TA include keeping a 3.0 average in graduate work. **This is a very important point:** If you are a TA, and your cumulative GPA falls below 3.0 in any semester, you are placed on academic probation and you may not hold a TA the following semester. See the section on Academic Performance in this handbook, and the [Graduate Catalog](#) for more details on this policy.

For 2013-2014 the stipends for full-time 9 month TAs are as follows:

- Level I: $17,100
- Level II: $17,500
- Level III: $17,700

Partial summer support may also be available, but cannot be guaranteed.

Another very important policy of Graduate School places limits on the number of years a student may receive state support. See [http://gradschool.nmsu.edu/ga/employmentguidelines.pdf](http://gradschool.nmsu.edu/ga/employmentguidelines.pdf). For students who either enroll in the Master’s program or have a Master's degree, the guidelines are

- MASTERS: 2 years, may petition for a 5th semester.
- PHD: 4 years, may petition for a 5th year.
Students entering the PhD program directly from the Bachelor's and without a Master's degree are limited to 5 years of support, with a possible petition for a 6th. The math department does not normally admit students without a Master's degree directly into the PhD program, so this case is rare.

These funding limits make it imperative that you make a proper plan for the completion of your degree. You should keep track of your years of support, and if you feel it will be necessary to petition for an extra year, you should discuss the matter with your advisor well in advance.

Information about other scholarships and fellowships can be found at http://gradschool.nmsu.edu/fellowships/index.htm.

**English Requirements for Graduate Assistants**

International graduate assistants need to take the ITA screening upon coming to NMSU. Depending on the screening, they may be required to take COMM 485 and/or SPCD 470 or (rarely) SPCD 110. If so, they must take COMM 485 before starting their second year and SPCD 470 before finishing their second year in order to keep their assistantships. In the event that a student is placed into SPCD 110, it is important to be aware that, unlike SPCD 470 and COMM 485, SPCD 110 does not count toward the 9 credits that a GA must enroll in every semester to maintain the GA appointment. A student placed in SPCD 110 must enroll in 9 additional graduate-level credits to maintain the GA appointment. See the section on “Numbering of Courses” in the Graduate Catalog for information on which numbered courses can count toward a graduate degree.

**What to do if you must miss work**
It is very important for you to be sure you make arrangements to cover your work assignments in the event you are sick or otherwise cannot be where you are assigned to be (whether that is in the tutor center or a classroom). If you are sick, you should try to find a qualified replacement and then call the Math office if you are teaching a class, or the MSC if you are a tutor, to inform us of the situation. If you cannot find a replacement, call the appropriate office to explain that, and we will try to help you find a replacement. If you have to miss class because you are traveling, you should arrange a replacement well in advance, and inform the department of your plans well before you leave town.

7. Important Departmental and University Policies

**Academic Performance**

A graduate student at NMSU must maintain a cumulative Grade Point Average of at least 3.0 to be in good academic standing. **If at the end of any semester your cumulative GPA falls below 3.0 you will be placed on academic probation and may not hold a TA during the following semester.** Note that this is a University policy so no exceptions are possible; if your cumulative GPA falls below 3.0, you will not be funded the following semester, so it is very important that you keep abreast of your status in each class you take. If this happens to you, you then have one semester to raise your GPA to 3.0 or show “substantial improvement in the quality of work” as determined by the graduate dean in consultation with the math department. If you fail to get off of academic probation in the next enrollment period after your cumulative GPA falls below 3.0, you will be suspended from the Graduate School for a semester. If this happens, you cannot take graduate classes and you must re-apply to the Graduate School in order to continue your studies. Subsequent suspensions are for a period of one year. See the [Graduate Catalog](#) for full details on this policy.

**Professional Travel**
There are some funds available from the department and the university to support professional travel for conferences or collaboration. You must speak to your advisor and the department head to request departmental funds. Also see the Graduate School website and the ASNMSU website for information about other sources of travel funds. You should plan well ahead and try to line up support several months before you plan to travel.

**Student Conduct**

The regulations regarding conduct of students, both academic and nonacademic, is found in the [NMSU Student handbook](http://deanofstudents.nmsu.edu/student-handbook/1-student-code-of-conduct/3-academic-misconduct.html) which applies to both undergraduate and graduate students. The purpose of the regulations on academic conduct should be fairly clear. The need for enforcement of regulations regarding nonacademic conduct is to ensure the freedom of all individuals to study and learn in an atmosphere free of suppression and harassment. Every student at NMSU should read the Student Code of Conduct carefully since adherence to the standards set out there is mandatory, and ignorance of the rules is not a defense against the repercussions of violating them. Every student is responsible for knowing all expectations regarding student conduct and adhering them carefully.

**Academic Misconduct**

**Plagiarism**

Plagiarism is a form of academic misconduct. The university's policy on plagiarism is available at the website

http://deanofstudents.nmsu.edu/student-handbook/1-student-code-of-conduct/3-academic-misconduct.html

and reads in part: "Any ideas, words, pictures, or other intellectual content taken from another source must be acknowledged in a citation that gives credit to the
source. This is true no matter where the material comes from, including the internet, other student’s work, unpublished materials, or oral sources. Intentional and unintentional instances of plagiarism are considered instances of academic misconduct. It is the responsibility of the student submitting the work in question to know, understand, and comply with this policy." These policies apply to all written work, including homework, research articles, and thesis work.

Citation

Citation in mathematical research is aided by the resources available the MathSciNet (www.ams.org/mathscinet). Every article indexed my Math Reviews is available on that site, along with automatically generated bibtex code providing a standardized bibliographic format that can be included in any LaTeX document. The bibtex code can be found under the “Select alternative format” menu that appears in the upper left corner of each review. For students in applied math or an interdisciplinary program, MathSciNet may not reference all relevant materials. Other similar sites exist on the internet. Students for whom this is an issue should consult with their advisor or other faculty who are familiar with their area of study.

Nonacademic Misconduct

Nonacademic misconduct is a very broad categorization of many different kinds of problematic behavior. Violence against individuals, including oneself, is one obvious example, as is threatening, harassing or unreasonably annoying others. Possession of weapons or explosives or illegal drugs on campus is prohibited, as is possession or use of alcohol in contradiction to state law and/or university policy. See http://deanofstudents.nmsu.edu/student-handbook/1-student-code-of-conduct/4-non-academic-misconduct.html for a more comprehensive list of prohibited behaviors and descriptions of disciplinary procedures, actions and sanctions, and a list of official parties responsible for disposition of disciplinary matters.
Sexual Misconduct

Sexual misconduct is a particularly sensitive and important class of misconduct. In an environment such as a university campus that contains a large number of individuals from many very different cultures, it is very important to stay well clear of any activity that could be construed as sexually harassing. In particular, it should be stressed that sexual misconduct can be entirely verbal in nature. It is especially important not to engage in any speech that could in any way be interpreted as sexual harassment when serving as a teaching assistant. There have been instances of teaching assistants in the math department who were subject to complaints of sexual harassment who were shocked to learn that their behavior was considered sexual harassment, so as a teaching assistant you should absolutely err on the side of caution and avoid carefully any possible appearance of sexual impropriety whatsoever. It should be obvious that this includes the rule that under no circumstances should there ever be any kind of sexual relationship or sexual advances between an instructor of any type and students in the instructor's class. See http://deanofstudents.nmsu.edu/student-handbook/2-discipline-related-policies-and-procedures/sexual-misconduct-policy.htm for more details on the NMSU sexual misconduct policy.

Conflict Resolution

Academic Appeals

A graduate student who believes he or she has been unjustly treated within the academic process may take steps to resolve their grievance as described in the section “Disciplinary Issues for Graduate Students” in the Graduate Catalog, where a three-level process is outlined starting with the instructor, moving to the department head and ending with the graduate dean. A graduate student starts at the lowest relevant level and if he or she is not satisfied with the results at that level may take the issue to the
next until the issue is resolved to the student's satisfaction, or the graduate dean gives the final ruling.

**Nonacademic Grievance Policy**

If a student feels he or she has been treated unfairly in a nonacademic area that does not involve a violation of the Code of Conduct, a grievance may be filed and a multi-level process similar to that discussed in the section on Academic Appeals can be followed. See [http://deanofstudents.nmsu.edu/student-handbook/2-discipline-related-policies-and-procedures/student-non-academic-grievance-policy.html](http://deanofstudents.nmsu.edu/student-handbook/2-discipline-related-policies-and-procedures/student-non-academic-grievance-policy.html) for a full description of this process.

**Safety in Research and Creative Activities**

For those involved in educational or interdisciplinary research, it may be necessary to obtain prior approval from the NMSU Institutional Review Board (IRB) before beginning research projects. This applies only to research involving human or animal subjects. Note that student subjects in educational research are considered human subjects, and IRB approval is required for any research involving students. This includes any studies that will be disseminated to the academic community, whether through research articles or conference presentations.

The NMSU IRB website is [http://research.nmsu.edu/compliance/IRB/forms.html](http://research.nmsu.edu/compliance/IRB/forms.html)

At this website you can find a variety of important information about the IRB process. In particular, the Classroom Research Project Waiver Decision Chart may be useful in determining whether certain activities constitute research requiring IRB approval. This website also includes an on-line submission system for proposals, and examples of consent forms.
Before you can submit an IRB proposal, you must complete an on-line training, available through research.nmsu.edu/compliance/IRB/training.html. The training certificate obtained through this process must be submitted along with any proposal sent to the IRB.

For those involved in educational research, it is important to plan ahead. IRB approval and informed consent from participants (e.g. students) must be obtained before any data is collected or any advertising of a study takes place. Note that student subjects under the age of 18 cannot usually give consent themselves, so parental consent may be required. Informed consent forms must be approved by the IRB before they are distributed to participants. Many educational research projects can be approved through an expedited process, but to obtain expedited approval it is important that your proposal is carefully written and adheres to the guidelines found at research.nmsu.edu/compliance/IRB/principles%20and%20procedures.html (see the section on Expedited Review in particular). You should also consult with faculty who have submitted similar proposals in the past.

8. University Resources

The most current information about the Graduate School at New Mexico State University and about the graduate program within mathematical sciences can be found on-line. Here are some useful links.

Information about graduate programs offered at NMSU: http://prospective.nmsu.edu/graduate/degrees/ (575 646-2736)

Graduate Student Services: http://prospective.nmsu.edu/graduate/index.html (575 646-2736)

Information for current graduate students: http://prospective.nmsu.edu/graduate/current/index.html (575 646-2736)
Information for graduate students in mathematics:
http://prospective.nmsu.edu/graduate/degrees/as/math.html
(575-646-3901)

Information for international students and link for visa application:
http://prospective.nmsu.edu/international/index.html

Admission information at:
http://prospective.nmsu.edu/graduate/apply/admission-info.html

Information about graduate student awards:
http://prospective.nmsu.edu/graduate/awards/index.html

Information about financial aid:
http://fa.nmsu.edu/
(575-646-4105 or 877-278-8586)

University Resources, including advising and the Counseling Center:
http://resources.nmsu.edu/

**9. Preparing for employment**

Students should keep teaching evaluations and materials from the courses they teach if they are seeking a job that could involve teaching.

Conference presentations and/or publications are going to be very helpful in making a resume that is attractive to a future employer. A Master’s student probably won’t have a publication, but may have a conference presentation. A PhD student really should have a conference presentation or two based on results in their thesis, and hopefully will have at least one or two papers submitted. This would apply whether the student was looking for an academic job, or a job in industry. Obviously students looking for a job in industry will have a better chance if their research topic matches their intended career.

Students should visit the NMSU Career Services webpage
http://www.nmsu.edu/~pment/ and contact them at Garcia Annex 224, (575) 646-1631, to take advantage of the many services that they offer.
You can check the Mathematical Sciences Career Information at www.ams.org/careers. The booklet "The Academic Job Search in Mathematics" is available at www.ams.org/employment/. All issues of The Notices of the AMS contain academic job advertisements and can be found in the Branson library. The website of the American Mathematical Society (http://www.ams.org) maintains a section on employment opportunities as well. Another good source of job information is at http://chronicle.com/jobs.

Generally, it is advisable to attend the National Joint Meetings of the American Mathematical Society/Mathematical Association of America in January of the year in which you hope to graduate. There you may participate in a large organized job fair called Mathematical Sciences Employment Center. Many departments also arrange informal interviews during the National Joint Meetings. For information on how this Employment Center works, see the September 1999 issue of the Notices of the AMS, p. 1013. See the article "A Student Guide to the National Meetings" in the November 1998 issue of Math Horizons, which is posted at www.maa.org.

10. Graduate Studies Committee

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