Doctor of Philosophy in Mathematics Education

Program Handbook

Mathematics Education Graduate Program
August 2024

August 28, 2024

CONTENTS

I. Program Overview

The Doctor of Philosophy in Mathematics Education is designed for those who show promise of becoming researchers and leaders in state, national, and international mathematics education communities. The program prepares researchers and leaders to address critical issues in mathematics education by engaging in reflective teaching, deepening mathematical knowledge, and developing analytical perspectives for research. The program is meant for those who wish to pursue *academic careers as researchers* in mathematics education in university departments of mathematics, education, and psychology, as well as for those who intend to assume a range of *leading roles in other mathematics education settings*, such as curriculum development organizations, K-12 educational systems, government agencies, and development and policy organizations.

Accordingly, the primary educational objective of the Ph.D. in Mathematics Education is to develop researchers in mathematics education. Beginning at entry into the program, students focus on research in mathematics education. They will get acquainted with existing research and will be given the opportunity to develop research skills while engaging in original research. As expected of a research-intensive university, both the Colleges of Education and Natural Science have a strong commitment to advancing knowledge in the field of mathematics education. And because of the applied nature of mathematics education as a field of scholarship, the program is consistent with MSU's commitment to transforming lives.

In keeping with the educational missions of the Colleges of Education and Natural Science and the land-grant mission of Michigan State University, in addition to the research objective, the program also has an educational objective focused upon teaching. The structured teaching experiences in the program allow students to develop as teachers of mathematics and mathematics education.

Finally, one of the major strengths of this program is that all students will advance their mathematical knowledge while matriculating in the program. This objective is consonant with the strong focus on mathematics in the College of Natural Science. In fact, a career at any level in mathematics education requires substantive knowledge of the core discipline of mathematics. Therefore, the degree is designed so that a PhD student can pursue the equivalent of a master's degree or more in mathematics or statistics suitable to their area of focus. Each student will plan with the guidance committee a set of courses in mathematics that, together with the student's prior coursework and teaching experiences, are appropriate for the student's career plans.

Students will have opportunities to acquire an understanding and experience in various aspects of the mathematics education field including investigation of mathematical learning and teaching, the development of instructional materials, participation in policy formation, development and use of assessment, and the integration of technology into mathematics learning and teaching. Students will address issues of research ethics in the Mathematics Education Proseminar.

Students who may be interested in the program include the following:

- Graduates of undergraduate mathematics or mathematics education programs with interests in research and academic careers.
- K-12 teachers intending to return to the classroom who desire strong, research-oriented knowledge and experience in mathematics education.
- Graduates of undergraduate mathematics or mathematics education programs with interests in careers in curriculum development, policy, assessment, etc., not necessarily with a focus on research.
- Graduates of master's or doctoral programs in mathematics who wish to be mathematics education faculty in a college or university mathematics or education department.

Graduates of the program:

- will gain deeper knowledge of mathematics relevant to their work in mathematics education;
- will typically have already begun establishing themselves as researchers;
- will be well versed in related subject matter domains relevant to their research interests such as psychology, anthropology, mathematics, educational foundations, philosophy, sociology;
- will gain experience and competency in teaching in a range of undergraduate and graduate areas;
- will have begun to establish themselves as members of the mathematics education profession by participation in experiences at MSU and in the wider community;
- will have a history of participation in scholarly outreach in mathematics education through collaboration with faculty in their on-going projects.

Current events in the Program in Mathematics Education can be found on our website at https://prime.natsci.msu.edu/.

II. ADMISSION TO THE PROGRAM

Because faculty members and doctoral students from across the two colleges are involved in the recruitment of new students, this Handbook includes a description of the admissions process.

In addition to meeting the requirements of the University, students must meet the requirements specified below.

The program admits students with a variety of backgrounds. Some students will have equally strong backgrounds in education and mathematics. Others may have more extensive prior preparation in one of the two areas. Candidates should normally have the equivalent of an undergraduate major in mathematics OR satisfactory completion of coursework in mathematics appropriate to the applicant's program of study and approved by the Admissions Committee, with the expectation of completing additional mathematics study if necessary. In such cases, the guidance committee will help the candidate design a program that includes appropriate coursework in mathematics so that by completion of the comprehensive exam the candidate has the equivalent of an undergraduate major in mathematics. In addition, K-12 teaching experience is strongly encouraged, but not required.

Admissions decisions will be made by an Admissions Committee composed of members of the Mathematics Education Faculty Group.

How to Apply

To be considered for teaching and research assistantships and for a variety of possible university or college fellowships, it is very important for applicants to submit application materials on time. All application materials should be submitted **by December 1st** for the following academic year for full consideration of funding.

The entire application package (described below) can now be completed online. If needed, part of the application package could be mailed to:

Destini Evans, Program in Mathematics Education
619 Red Cedar Rd, Room C110 Wells Hall
Michigan State University
East Lansing, MI 48824

If there are issues with the uploading of content online, it can be sent electronically via email to Destini Evans at evansde3@msu.edu. Destini is the current Academic Program Coordinator/Graduate Secretary for the mathematics education doctoral program. MSU prefers the title Academic Program Coordinator over Graduate Secretary.

Applicants from other MSU graduate programs

Those who have already been admitted to a graduate degree program at Michigan State University and now wish to apply to this program will need to submit a full application.

If you were enrolled in an MSU degree program at some point but if you have not been enrolled in the past year (3 consecutive semesters, including the summer semester), you also need to fill out an **Application for Readmission form**, which is available from the Registrar's Office: https://reg.msu.edu/StuForms/ReAdmission/ReAdmission.aspx

All others:

1. **University Application**

Go to the website: https://grad.msu.edu/apply for the Graduate Applicant and general information from The Graduate School at MSU. To create an account to start a new application or log in to continue an application, visit: https://explore.msu.edu/apply/.

Follow the Graduate Application link (for both domestic and international applicants) to begin your application. When an application form has been started, it will be visible to the **Mathematics Education Doctoral Program**. When completing the online application, you can submit your credit card or electronic check information for payment of the online application fee. Note that international students also need to complete a Financial Proof Form if you are not planning on having an assistantship, and Proof of English Proficiency: see details at the link below https://grad.msu.edu/internationalapplicants.

Once you have applied, you can use your Applicant ID and password to log in to your personalized online student portal at: https://explore.msu.edu/apply/

You can upload the rest of your application materials, as well as register your recommenders, using this online gradportal.

If you wish to change your desired semester of enrollment and/or major preference, you can do that yourself via the gradportal before you submit your application. If you wish to change either after submitting your application, please contact the Admissions office by phone (517) 355-8332, by fax (517) 353-1647, or via email: admis@msu.edu.

Applications are valid for one year beyond the semester of submission. It is not necessary to submit a new application form or application fee during this period.

2. **Letters of Recommendation**

Request three letters of recommendation from professors or others who can assess your promise of success in our mathematics education graduate program and enter their contact information into your online portal at the link above. They will be prompted to upload their letter of recommendation online. At least one letter should be from one of your teachers in the highest degree you have earned to date. If your recommenders have any issues with the website, please have them send their letter of reference to the Academic Program Coordinator.

3. **Writing Sample**

Applicants should submit one or more examples of academic or professional writing, e.g., something you have published, a master's thesis, or a paper you might have submitted to fulfill an undergraduate or graduate course requirement. The sample must be authored exclusively by the applicant. The purpose is to demonstrate your ability to write analytical English prose in order to give the review committee a clear idea of how well you will be able to carry out the kind of analytical writing that is such a central component of advanced graduate study. It would be most useful if this paper is at least 10 pages long (double-spaced). An applicant may submit several such papers to the online gradportal site: https://explore.msu.edu/apply/. Again, if you have any issues with the site, please send it via email to the Academic Program Coordinator. Please identify the course for which this paper was written, or the original purpose for this paper.

4. **Statement of Professional Goals**

From an autobiographical perspective, applicants should discuss their reasons for pursuing a doctoral degree. In this academic statement, please include responses to the following questions:

What question or area of interest related to mathematics education are you interested in exploring?

How have your experiences and intellectual growth shaped questions that an advanced graduate program might help you to explore?

What sorts of academic and professional leadership roles would the program and degree help you to assume?

Why are you interested in the mathematics education Ph.D. program at Michigan State

University?

This statement is a very important part of the file for the review committee. Candidates should present a thoughtful and extended verbal portrait (2-3 pages long, single-spaced) of their *reasons for pursuing advanced graduate study*, and the *match between their goals and professional interest that they wish to explore during their graduate career*. The statement should be submitted to the online gradportal site: https://explore.msu.edu/apply/. Again, if you have any issues with the site, please send it via email to the Academic Program Coordinator. If you complete the personal and academic statements on the MSU application, you do not need to submit a separate statement of professional goals. The statements written on the MSU application will be sufficient.

5. **Personal Statement**

The personal statement is a place where you can document your background and describe any obstacles you have overcome along your personal and/or educational journey. You can type your personal statement in the designated place on the MSU Application or upload it as a separate document to the online gradportal site: https://explore.msu.edu/apply/. The directions in the MSU Application state: The personal statement should include information about your background and life experiences. Items you might address include but are not limited to leadership experiences, how you might contribute to a diverse educational community, and any obstacles you may have overcome.

6. **Current Curriculum Vitae or Resumé**

Applicants are required to submit a current curriculum vita or resumé, listing educational background, GPA, and teaching experience. Upload to the online gradportal site:

https://explore.msu.edu/apply/

7. **Transcripts**

You may send copies of transcripts/unofficial transcripts from all universities attended (except Michigan State University, as we have access to those) to the Academic Program Coordinator at the address above. Do not send copies/unofficial transcripts to the Admissions Office. Or, you may upload unofficial transcript copies for now to the gradportal site: https://explore.msu.edu/apply/. **However, the university will need official transcripts**

before a prospective student can be admitted. Official e-transcripts can be sent to the Academic Program Coordinator or to the Admissions Office.

8. **English Language Proficiency Test** (International Students Only)

Applicants for whom English is not their primary language are required to submit an English Language Proficiency test score, such as TOEFL (Test of English as a Foreign Language), and the test must be taken within two years of the application.

With the internet-based test version of the TOEFL (iBT), the minimum MSU requirement is an average score of 80, with no subscore below 19 for reading, listening, and speaking, and no writing subscore below 22. Please visit The Graduate School site for more information regarding English Language Competency and other accepted English Language Tests: https://grad.msu.edu/english-language-competency.

Note: Applicants who have completed a degree program in an English-speaking country can request a waiver of the English Language Proficiency Test requirement. Once the program admissions committee is convinced of the applicant's English language skills based on past program completion and other evidence, they will ask the University to waive the requirement. This waiver is usually granted, but the university typically requires the admitted student to take the English proficiency test (MSU Speaking Test) upon arrival at MSU before allowing the student to become a Teaching Assistant. See more English Language Proficiency information at https://grad.msu.edu/english-language-competency.

Review Process

Each application is reviewed by a committee of mathematics education faculty members from the Colleges of Education and Natural Science with representation from all program emphasis areas. The review committee considers the following factors in assessing applicants:

- Strength of academic and professional education record.
- Potential for educational, professional, or civic leadership in mathematics education.
- Fluency in oral and written expression.
- Compatibility of applicant's stated professional goals with the objectives of the program.
- Conformity with university and college admission requirements.

The deadline for application for full consideration for financial support is December 1 for the following fall. Only a limited number of the highest-ranking applicants can be admitted in a given year. The committee may recommend acceptance or denial of admission to the program, or it may recommend holding an application and requesting more information. If the decision is to admit the applicant, the mathematics education faculty assigns a first-year faculty advisor. Applicants are notified of the department's decision by mail and e-mail as soon as possible after the review.

Applicants missing the December 1 deadline may apply as late as February 1. They will not, however, be able to compete for university and college level competitive fellowship awards. Assistantship and fellowship support may not be available for these applicants. Applications received later than February 1 may be accepted if space is available in the program.

Required Application Materials

Note: A list of all materials needed for application to the program can be found on the program web page https://prime.natsci.msu.edu/prospective-students/application-and-admission/application-process.aspx.

Provisional Acceptance to a Program

The Program Faculty reserves the right to make a provisional acceptance to the program in the case of any student whom they perceive has deficiencies that preclude an outright acceptance decision, but which are not so great that rejection would be the appropriate admissions decision. In general, the Program Faculty will not admit students who cannot eliminate deficiencies within one year of admission to the program. At the time of provisional acceptance, how the student can meet the provisions will be spelled out in detail in the letter of provisional acceptance, including specification of a deadline date, when failure to eliminate deficiencies will mean that the student cannot continue in the program.

Summary of Application Process

Send the following to the **MSU Office of Admission**, 250 Administration Building, Michigan State University, East Lansing, MI 48824:

University application and fee (submitted online)

Official English Language Proficiency Test scores, such as TOEFL scores (international students only)

Send the following to the **Mathematics Education Academic Program Coordinator**, 619 Red Cedar Rd, Room C110 Wells Hall, Michigan State University, East Lansing, MI 48824:

Official (sealed) versions of college transcripts

Upload the following to the **online Gradportal site**: https://explore.msu.edu/apply/

Copy of English Language Proficiency Test report (international students only)

Vita

Reference letters (Recommenders will submit to online Gradportal site)

Statement of Professional Goals/Academic Statement and Personal Statement

Writing sample

Student copy of transcripts

Passport (international students only)

Special Information for International Applicants

Application Process for International Students

When completing the online application, you can submit your credit card or electronic check information for payment of the online application fee. Do not send cash or international coupons.

If you are not a native speaker of English and have not obtained a university degree from an English language program, you must submit test scores from an English Language Proficiency Test, or request a waiver with a valid reason. Send waiver requests via email to Lisa Keller, Assistant Director, kellerl@msu.edu. For more information on English Language Proficiency tests, visit: https://grad.msu.edu/english-language-competency.

MSU Speaking Test

MSU candidates for TA appointments **who were required to demonstrate English proficiency as a condition for regular admission to Michigan State University** must also demonstrate that they meet a minimum standard of proficiency in spoken English before they can be assigned teaching work that involves oral communication with undergraduate students. Those international teaching assistants (ITAs) may meet this requirement in one of the following ways:

- Presenting a TOEFL iBT speaking section score of 27 or higher.

- Receiving a score of 50 or higher on the MSU Speaking Test: https://elc.msu.edu/tests/msu-speaking-test/
- Taking AAE 451 or AAE 452 (three-credit ITA language support courses) and receiving a score of 50 or higher on the ITA Oral Interview (ITAOI).

Those ITAs who received a waiver of the TOEFL or of other accepted tests of English proficiency for admission, must also meet the requirement of proficiency in spoken English before they are assigned to teaching work that involves oral communication with undergraduate students. To meet this requirement, those ITAs may use any of the three options listed above. Individual exceptions from these requirements (on a case-by-case basis in rare circumstances) will be considered by the Graduate School in consultation with the ELC upon the request of the department and with the endorsement of the Associate Dean of the College.

Often, just as important as English language proficiency for all TAs, however, is familiarity with American K-12 education. For some entering international students as well as other students who have not taught in K-12 settings, this will mean that they should include in their first year of studies some opportunities in K-12 schools in order to become more familiar with the American institution of schooling from the perspective of a professional serving such settings.

In order to be considered for funding beyond the first year of graduate school, an international student must pass the MSU Speaking test or its equivalent by the end of the first year of graduate study. There are some ways to improve spoken English beyond taking an English course (https://elc.msu.edu/programs/ita/ and https://grad.msu.edu/english-language-competency). Students and their adult family members may attend the Volunteer English Tutoring Program (http://vetp.isp.msu.edu/). Or, students may become involved in the International Friendship Program, http://cvip.isp.msu.edu/programs/international-friendship-program/, which seeks to acquaint MSU international students with Lansing area residents in an atmosphere of mutual respect. This program is sponsored by Community Volunteers for International Programs (CVIP), an MSU volunteer organization associated with the Office for International Students and Scholars (OISS) at MSU. Another option is the MSU Buddy Program, a cross-cultural program designed to provide cultural support for International TAs (ITAs). The program pairs individual ITAs who have received teaching assignments with an MSU undergraduate student. In the 8-week program, the ITA-Buddy pairs meet once a week to explore student life at MSU and to compare it with student life at the TA's home university. We also encourage all students to attend mathematics education colloquia and events and to meet with other mathematics education students and faculty outside of class.

Sources of Information for International Students

If you have questions about how to fill out the application, please contact us or the MSU **Office of Admissions**, https://admissions.msu.edu/. This and the other links mentioned below are accessible from the program web page: https://prime.natsci.msu.edu/.

If you have questions about any of the following, go to the web page for the **Office of International Students and Scholars** (OISS) (https://oiss.isp.msu.edu/):

- visa types and requirements,
- travel to the U.S.,
- finances for international students, and
- support services.

If you have questions about housing, visit the web page for **Campus Living Services**, **Residential and Hospitality Services** (https://liveon.msu.edu/):

Assistantship and Fellowship Support for International Applicants

For most students in the doctoral program, international and domestic, the primary source of on-campus support is graduate assistantships. These pay students for doing work as teachers in our teacher education program or for doing research in one of our research projects. Included in an assistantship is a salary and tuition credit (covering a maximum of 9 credits of course work per semester that the student is employed). There are no guarantees about receiving this level of support beyond the guarantee in the offer letter. After being admitted to the program, a student should examine the assistantship opportunities that exist in the College of Education and the Program for the following year (which are available on the college's website at https://education.msu.edu/resources/financial/assistantships/, and the Program's website at https://prime.natsci.msu.edu/research-projects/, and also through the program web page) and state their preferences for a particular assistantship to PRIME. After their first year in the program, students apply directly to the specified employer stating their qualifications and desire to fill the particular opening. Hiring decisions are worked out between each employer and the student.

The assistantship options are frequently more limited for international students. Teaching assistantships are often difficult for international students to obtain, especially at the start of their program, because these positions generally require someone who is an experienced schoolteacher fluent in English and knowledgeable about U.S. education. Research assistantships are generally more flexible.

III. PROGRAM COMPONENTS

Successful completion of doctoral study entails more than simply completing a series of required courses and assignments. This section provides a brief overview of the components and expectations of the mathematics education doctoral program. Details follow in subsequent sections of the Handbook. **All students are expected to have a notebook computer or laptop.**

Overview of Program Components and Expectations

Coursework

Courses play an important role in supporting students' learning about a range of perspectives and issues relevant to mathematics education, the development of their own research focus, and their participation in intellectual communities. Course requirements are intended to provide students with a common grounding in important knowledge and issues while providing maximum flexibility to build a program suited to the student's individual professional goals. The requirements ensure a rich grounding in understanding and carrying out research. Students are expected to work closely with their guidance committees, formed no later than the end of the first year, to select courses that provide sufficient exposure to other perspectives important for studying chosen educational issues. The product of this discussion with the guidance committee is the students' program plan (to be entered by the student into GradPlan in Campus Solutions, at: https://student.msu.edu/. The program plan lists the student's coursework and committee members. (See Section III, Program Components, *Program of Coursework*).

Research

Development of researchers is a principal goal of the doctoral program in mathematics education. Students will typically engage in several types of research experiences, including *research done as a part of coursework*, participation in various *mathematics education research projects* at MSU, a *research practicum,* and a *dissertation*.

Research as a part of coursework. Research preparation and experiences are integrated with coursework throughout the program in several required and elective courses. Course projects can take many forms but they are, at their core, a structured opportunity for students to plan, conduct, and report on a research study connected to the topics of the course. Students will engage in the

processes of proposing and designing their study, collecting and/or analyzing data, and reporting on findings in a paper for the course.

Mathematics education research projects. MSU is home to a rich and ever-changing set of research and development projects related to mathematics education. Participating in these projects, either as a graduate research assistant or as a volunteer, provides important opportunities for students to gain research experiences and competencies. See a current list of research projects at https://prime.natsci.msu.edu/research-projects/.

Research Practicum. Every doctoral student must complete a research practicum, which is designed as an early research experience that entails identifying a question or issue of interest, designing and conducting a study, and analyzing and reporting the findings. The research practicum is undertaken in the second year, after completing MTHE 926, MTHE 927, and at least one research methods course. MTHE 954 serves as a site for students to learn about the design of research in mathematics education and develop proposals for their research. Completing the research practicum is important preparation for more advanced work in the doctoral program and must be completed before taking the comprehensive examination. (See Section III, Program Components, *Research Practicum*).

Dissertation. Every doctoral candidate must write a dissertation acceptable to the faculty. The dissertation is to be original scholarship that is a significant contribution to the mathematics education knowledge base. The dissertation constitutes evidence that the candidate is a well-trained and capable researcher in mathematics education. The research for the dissertation is completed under the guidance of the dissertation director and guidance committee. (See Section III, Program Components, *Dissertation and Final Oral Examination*).

Teaching

Students are expected to gain experience in teaching while enrolled in the program. Specific assignments will vary, but the following options are typical:

- TA for Teacher Education courses (TE 202, 401/2, TE 407/8/9, TE 802/4, TE 801/406)
- Field instructor in the Teacher Education program (TE 501/2)
- TA in courses for teachers in the Mathematics Department (MTH 101, 102, 103, 103A/B, 124, 132, 201, 299) or other mathematics content courses

Other teaching assignments may be arranged by the student and advisor.

Annual Reviews

Students admitted to the mathematics education doctoral program are expected to progress toward completion of degree requirements in a timely fashion. Beginning with the first year in the program, each student is required to submit materials for review every spring. These materials are reviewed by the mathematics education program faculty, who will provide feedback on the student's progress. (See Section III, Program Components, *Annual Reviews*).

Comprehensive Examination

The university requires all doctoral degree candidates to pass a comprehensive examination. Mathematics education students take the comprehensive examination when the prescribed course work is substantially complete as defined by the Guidance Committee, and the Research Practicum is completed, typically in the fall or spring of the third year or fall of the fourth year in the program. The examination assesses depth and breadth of knowledge in mathematics education, as well as the ability to construct effective scholarly arguments. It has written and oral components. (See Section III, Program Components, *Comprehensive Examination*).

Attendance at Colloquia, Research Seminars, "Brown Bags," Dissertation Proposal and Defense Presentations, and Professional Meetings

The Mathematics Education Graduate Program and the College of Education offer many colloquia, brown bag lunches, and enrichment opportunities. Although attendance is not required of graduate students, all members of the mathematics education community are encouraged to attend such events and participate vigorously as time permits and as is consistent with interests. Many students will also participate in professional association meetings, especially at the national level but occasionally at the state or international level, during their matriculation in the graduate program, often, presenting research that they have co-designed, carried out, analyzed, and written up. Such participation is expected by the larger profession, and, thus, all graduate students are expected to enter the program with a goal of making such presentations during their graduate careers. Often, during the first years in the program, students will attend national conferences as audience members (e.g., the annual meeting of the American Educational Research Association, AERA, the National Council of Teachers of Mathematics, NCTM, or the Psychology of Mathematics Education of North America, PME-NA), which prepares them to understand the quality standards for submitting work for professional presentation as well as the expectations for presenting such work when their own proposals are accepted. As students proceed through the doctoral program, they are increasingly expected to be aware of the state of the art and science of mathematics education and their specialty fields, as reflected in major

research and theory journals in teacher and mathematics education broadly defined as well as in presentations at major professional conferences, such as NCTM. Students in this program enter into many of the conversations in mathematics education and its various specialty areas, with the expectation that by the end of the program, students are ready to engage in such conversations at a high professional level, a level reflecting informed understanding of the history of the field as well as the most recent advances, including the relationship of historical and contemporary research-based understandings to educational policies at the district, state, and national levels.

Demonstrable Mastery of Subject Matter at Different Stages of the Program

During the early years in the program, course work is an important means for acquiring the general knowledge of mathematics education as well as for specialization in one of its subdomains. Exam performances, presentations, and papers in courses should reflect increasing knowledge of the field of mathematics education and its specializations. Students in the program should begin reading the major journals in teacher and mathematics education as well as journals serving their areas of specialization. As students increasingly participate in research and other opportunities afforded by the Departments (e.g., serving as a project assistant on a teacher or mathematics education reform project, a field supervisor, a research assistant on a research project, or attending colloquia or research conferences), learning becomes more individualized and specialized. The expectations are that there will be a steady increase in learning about mathematics education throughout the years in the program, with the preliminary and comprehensive examinations tapping some of the most basic content knowledge. Students are expected to acquire high levels of expertise in areas related to their dissertation research, with this reflected in portions of the comprehensive examination that admit specialized knowledge to be referenced but especially with respect to all aspects of the dissertation. Although publication of research-based articles or theoretical papers (perhaps in collaboration with a faculty member) is not required in the program, such accomplishment is clear evidence of the type of expertise the program aspires for its graduates. Every dissertation is expected to become a basis for publications, and in the case the author is pursuing a research career, it should also give raise to a research program spanning several years.

Program of Coursework

Courses play an important role in supporting students' learning about a range of perspectives and issues relevant to mathematics education, the development of their own research focus, and their participation in intellectual communities. Course Requirements are as follows:

Course Requirements

1. **Core sequence** All of the following courses (12 credits):

MTHE	926	Proseminar in Mathematics Education I	3
MTHE	927	Proseminar in Mathematics Education II	3
TE	950	Mathematical Ways of Knowing	3
MTHE	954	Design and Methods in Mathematics Education Research	3

2. **Research Methods** (9 credits)

   a. One course in quantitative research methods 3

   b. One course in qualitative research methods 3

   c. One additional research methods course 3

   Research methods courses must be approved by the student's guidance committee.

3. **Research Practicum** (1 to 3 credits)

MTHE	995	Research Practicum	1-3

4. **Mathematics and Mathematical Knowledge for Teaching** (12 credits)

   Twelve credits of course work, approved by the student's guidance committee, focusing on mathematics content, both traditional mathematical sciences content and specialized knowledge needed by those engaging in research on teaching and learning mathematics.

5. **Area of Concentration** (12 credits)

   Twelve additional credits of course work in the student's area of concentration. Both the area and the courses must be approved by the student's guidance committee.

Developing a Program Plan

Working within this framework, students work closely with their guidance committee to select courses that provide sufficient exposure to other perspectives important for studying chosen educational issues. The product of this discussion with the guidance committee is the student's

program plan, which lists the specific courses constituting the student's plan. The approved program plan should be completed no later than Fall Semester of the second year in the program. (See Section V, Advisors and Guidance Committee, *Timeline/Lifespan of the Guidance Committee*). For program forms, visit: https://prime.natsci.msu.edu/current-students/forms.aspx.

Note that in addition to courses, students must take a minimum of 24 credits of 999 (Doctoral Dissertation Research). University policy has lowered the maximum number of credits allowed in 999. Students in the Program in Mathematics Education will have a maximum of 36 credits of MTHE 999.

Dual Major

PRIME offers the Dual Major jointly with other doctoral programs at MSU. University rules require that all dual major doctoral degrees must be approved by the Dean of the Graduate School. A request for the dual major degree, at https://grad.msu.edu/forms, must be submitted within one semester following its development and within the first two years of the student's enrollment at MSU. A copy of the guidance committee report must be attached. The following conditions must prevail.

1. The intent to receive the degree in two areas must be outlined in the guidance committee report.
2. The content of the guidance committee report must reflect the required standards for both departments.
3. The integrated coursework must be satisfactory to both departments.
4. The comprehensive examination must be passed to the satisfaction of both departments.
5. A guidance committee including members from both departments must be satisfied that the dissertation represents a contribution meeting the usual standards in both areas.
6. There must be a single dissertation that represents an integration of the disciplinary areas.
7. Responsible Conduct of Research requirements will be as defined and approved by the guidance committee.

Students who wish to pursue a Dual Major with mathematics education as the secondary field must submit an application to the Mathematics Education Graduate Director. The application should consist of
1. A letter of support from the student's advisor or the director of graduate studies of the student's primary department, and
2. A copy of the student's admissions application file forwarded directly from the graduate office of the student's primary department.

The application will be evaluated by the Mathematics Education Graduate Director and select mathematics education faculty. The primary evaluation criterion will be whether, on the basis of

the student's academic record, the student is prepared to pursue doctoral study in Mathematics Education.

The guidance committee and dissertation committee should consist of four or more tenure stream faculty members at least half of whom have a 50% or more appointment in mathematics education. The guidance committee must report to the graduate director the student's intent to do a dual degree and outline the topic or topics that could fulfill the university requirement that there be a single dissertation that represents an integration of the disciplinary areas. The report must, in addition, describe the program of study the student will follow to fulfill the requirements of both departments. This report is due before the end of the second year of the student's enrollment at Michigan State University. The report must be approved by the Mathematics Education Graduate Director before it is sent to the Dean of the Graduate School.

The comprehensive exam should be fulfilled as specified for PhD candidates in mathematics education, but can include topics and questions from the dual program. The comprehensive exam proposal must be approved by the PRIME Graduate Director.

The primary responsibility for financial support of dual degree PhD students whose home unit is not mathematics education (secondary candidates) lies with the home department.

GradPlan

GradPlan in Campus Solutions is the official site for all doctoral student program planning, guidance committee members and changes, Research Overview, Service Requests (Plan Change, Leave of Absence, etc), and Responsible Conduct of Research, Scholarship, and Creative Activities (RCR). It provides electronic routing for checking/approvals and generates automatic emails when needed. Campus Solutions can be found at https://student.msu.edu. GradPlan can be found by logging in to Campus Solutions, and click on the GradPlan Tile. Follow the Job Aid for GradPlan – Student View for instructions, located on the PRIME Hub (https://michiganstate.sharepoint.com/sites/NatSci-PRIMEAdmin/PRIMEhub).

GradPlan was developed for Ph.D. students to lay out their Ph.D. program of study, record faculty approval, and make notes on all the requirements as they are completed. The Graduate School will certify the acceptance of each dissertation final format using Campus Solutions. The PRIME Program or other department or college level designee will sign off on the degree, and then the Office of the Registrar will complete degree certification once a student completes an application for graduation and all degree requirements are met. Training and help guides may be found at: https://sis.msu.edu/training/index.html. Detailed instructions for the doctoral students and Guidebooks are also available on the PRIME Hub

(https://michiganstate.sharepoint.com/sites/NatSci-PRIMEAdmin/PRIMEhub) and on D2L in the Mathematics Education Graduate Student site.

Changes to Program Plan

As the student progresses through the program, there may be reasons to make changes in the approved program plan, for example changes in course offerings or shifts in the student's research focus. The program plan is always subject to future additions, deletions, or substitutions, as long as the revisions satisfy program requirements. The earliest course on the plan can be no more than eight years older than the oldest course on the plan; all courses and all degree requirements must be completed within an eight-year period of time. Students circulate proposed changes among all committee members for their consideration electronically using GradPlan. All members must sign off electronically on the change(s) in the Forms Tracking Utility (FTU) system before it is forwarded to the director of the doctoral program.

Research Practicum

Every Mathematics Education doctoral student must complete a research practicum, which is designed as an early research experience that entails identifying a question or issue of interest, designing and conducting a study, and analyzing and reporting the findings. The research practicum is begun during Fall Semester of the second year with a proposal, is conducted during the Spring Semester, and is completed by the end of the second year, or by the end of the Fall Semester of the third year with an approved extension. If additional time is needed, another extension will be required (contact the Graduate Secretary). Completing the research practicum is important preparation for more advanced work in the doctoral program and must be completed before taking the comprehensive examination.

Goal of the Research Practicum

The research practicum is an integral part of the doctoral student experience, serving as an important early experience in conducting research. It is partly responsible for linking course work and research experiences (in particular, the dissertation) by introducing students to the process of conducting research. Further, the research practicum may help the student identify areas of research which are of particular interest to the student, and which the student can pursue through and after graduate school.

Scope

Research conducted for the practicum should be empirical, and involves: (a) posing a research question, often a refinement or replication of a small part of an existing study, (b) analyzing data, collected by the students themselves or as available from others, and (c) presenting findings, focusing on the student's work although possibly conducted within the context of some larger research project or group. Research practica are to be narrow in scope, and students should place an emphasis on moving through the stages of the research process in a timely fashion choosing practicality and placing limitations over expanding the scope.

Timing

The research practicum is carried out in the second year of doctoral study. After completing MTHE 926, 927, and at least one research methods course in the first year, second-year students enroll in the fall in MTHE 954, Design and Methods in Mathematics Education Research. MTHE 954 serves as a site for students to learn about the design of research in mathematics education as they begin work on the research practicum. By the end of MTHE 954, students must have a practicum proposal that has been submitted to their advisor and practicum committee.

In the Spring Semester, students enroll in MTHE 995 while carrying out the practicum study. This course (3 credits) is graded on a P/NP basis with a pass being reported when the practicum has been successfully completed. Students who have not completed the practicum by the end of the Spring Semester may receive an extension till the end of the following Fall Semester. An unsuccessful or incomplete practicum will receive a NP for MTHE 995.

Steps to Completing the Research Practicum

1. **Research Practicum Committee**
   When beginning the research practicum process, the student forms a research practicum committee. This committee consists of the student's advisor, one additional faculty member, and a doctoral student subject to the approval of the advisor who has completed the research practicum. Only the faculty members will evaluate the student's work on the research practicum and approve its completion. The student member will be involved in discussions in the planning and conduct of the research.

   A graduate student serving as the student member on a practicum committee attends scheduled meetings of that committee. The graduate student also lends advice after reading the practicum or draft versions, provides written or oral feedback, and is a general support person to the student writing the paper. The graduate student practicum

committee member is invited to attend the practicum oral presentation but does not sit in on the discussion between the two faculty practicum committee members after the presentation, and is not a voting member regarding the passing or failing of the practicum.

2. Proposal

Each student will develop a written proposal for the practicum research, to be approved by the faculty members of the practicum committee. The proposal should grow out of the student's work in first- and second-year courses, in particular MTHE 926, 927 (Proseminars in Mathematics Education), research methods courses, and MTHE 954 (Design and Methods in Mathematics Education Research). Students taking MTHE 954 in the fall of the second year will write proposals for their practicum research as part of the course work.

In the proposal, the student must argue for the importance and relevance of the proposed research, drawing on research literature in mathematics education and related fields. Building on or extending existing research in the literature is encouraged, for example, by replicating aspects of existing research. As part of the proposal, the student will also specify a research journal in mathematics education that would be an appropriate outlet for the work. This journal will be used as a model for the length and structure of the practicum final report.

Students will meet with their practicum committee before or during the last week of the Fall Semester to present the proposal. Satisfactory completion of the research practicum proposal is documented by two faculty signatures on the Research Practicum *Proposal Approval* Form, located on our PRIME Hub (https://michiganstate.sharepoint.com/sites/NatSci-PRIMEAdmin/PRIMEhub) and program website: https://prime.natsci.msu.edu/current-students/forms.aspx.

3. IRB approval

Any research conducted by MSU faculty or students must be approved by the Institutional Review Board (IRB) for the protection of human subjects. IRB approval must be obtained before collecting or analyzing data for the practicum research. (See Section VII, Integrity and Safety in Research and Creative Activities, *Research Involving Human Subjects: Institutional Review Board (IRB)*).

4. Carry out the research

The practicum research must be primarily the student's own work. The research may,

however, be done within the context of some larger research project or group. The student should meet with the research practicum committee periodically to discuss the research as it progresses.

5. Written Research Report

The written report of the practicum research is the main product that is evaluated. The document should follow a structure consistent with the format and page length for submissions to the journal specified in the practicum proposal, or a different journal approved by the practicum committee. The advisor approves the document before it is sent on to the other faculty member on the committee and before the oral presentation. The other faculty member on the practicum committee must receive the research report at least two weeks before the oral presentation. **Samples of previous research practicum papers are available on the Math Ed Graduate Student D2L site.**

6. Oral Presentation

The student must make a formal oral presentation of the completed practicum research. It is expected that the two faculty members of the practicum committee will be present at the oral presentation. This presentation might happen at a practicum committee meeting or at one of the following events:

- colloquium or seminar at MSU
- student context, such as the Mathematics Learning Research Group (MLRG)
- guidance committee meeting
- final exam structure of MTHE 995

This practice is intended to help students develop their presentation skills as well as to provide others an opportunity to learn about the student's research.

7. Review and Evaluation

The student's work on the research practicum, including the written report and oral presentation, is evaluated by the two faculty members of the research practicum committee. Satisfactory completion of the research practicum is documented by two faculty signatures on the Research Practicum Completion Form, located on our PRIME Hub (https://michiganstate.sharepoint.com/sites/NatSci-PRIMEAdmin/PRIMEhub) and program website: https://prime.natsci.msu.edu/current-students/forms.aspx.

Comprehensive Examination

Comprehensive exams in PriME can be taken in fall or spring semesters of the academic year. Starting fall 2023, PriME students who are ready to take Comps will submit a scholarly essay focused on a question or questions of importance to the field of mathematics education to their Advisor, 1 guidance committee member, and 1 additional faculty member at MSU (for an 'outside reviewer' perspective) for evaluation. The additional faculty member at MSU will be selected based on a list of potential reviewers suggested by the student. The scholarly essay should follow APA guidelines and be no more than 40 pages, including references. The genre for the essay is intentionally open-ended to allow students to design a program milestone that is productive in supporting them in their scholarly development. What is not negotiable is that the paper needs to be distinct from the practicum (the topic can of course be related to the practicum).

In terms of evaluation and addressing concerns raised by doctoral students about consistency across assessments, all essays will be evaluated using the same rubric. This rubric has been adapted based on the previous one used in PriME and the one used in CITE, which were both developed over time to focus attention on critical aspects of scholarly writing found across theoretical perspectives and methodologies.

Below are detailed steps in the process, followed by a suggested list of possible genres.

1. The semester preceding the one in which the student will take comps, they will meet with their advisor and guidance committee members. In this meeting, the student will give a brief presentation that includes: (a) background information on their progress in the program; (b) a description of their developing scholarly interests and a rationale for those interests; (c) an overview of their developing scholarly strengths; (d) an overview of a few specific areas in which they feel they need to continue to develop; and (e) a brief description of what they hope to do after they complete their PhD. Drawing on this information, the student will work with their advisor and guidance committee to craft question(s) to focus on. The question(s) and focus of the essay should be of importance to the field of mathematics education, broadly, and should draw on students' coursework (particularly MTHE 926, 927, TE 950), but can focus on particular issues or facets in the students' fields or areas of interest. Students can draw from previous comps questions and adapt them to their particular areas of interest or write new questions of similar scope and significance. (See the section on genre below for more details.)

2. Within 2-3 weeks of this initial meeting, the student will work with their advisor to write: a) a brief summary of what they took away from the meeting (including the question or area the paper will address and a rationale for its importance in the field), b) a short rationale for how

their essay will contribute to their scholarly development, c) a draft bibliography, and d) a timeline for completing the comps paper (from here on, the document with these four sections will be called the "proposal"). The timeline should include dates for: a) beginning date and deadline for turning in the essay (to be completed in one semester), b) the date the evaluation should be completed by the evaluators (see below for more information), and c.) a scheduled date for the scholarly conversation (see below). These items in the timeline are included to allow everyone to put deadlines on their calendars and to alleviate the doctoral student's concerns about the potential difficulties for scheduling a common time to meet.

3. The advisor and guidance committee will either approve the proposal or offer feedback to improve the proposal. The process of approval needs to be completed before the end of the semester in which they apply for comps (before the end of spring semester for fall comps; before the end of fall semester for spring comps). As a matter of record, the proposal will be signed by the advisor and turned into the PriME Program Director as documentation that the student will be taking comps the subsequent semester.

4. After receiving approval from their guidance committee, the student will submit the approved proposal for comps to the program to indicate they plan to take comps in the subsequent semester. The student will write the essay in their approved timeline (to be completed within the semester), drawing from their proposed bibliography and other sources as needed.

5. To create a fair basis for evaluation, students will work independently and not collaborate with other students. They may ask their advisor(s) clarifying questions during the writing process. Students may repurpose previous scholarly writing or coursework into their essays, but this work should be significantly revised and solo-authored.

6. The Advisor, one Guidance Committee member (selected by the student and noted on the application), and one 'outside reviewer' will evaluate the essay using the rubric. As is typical in our program, the evaluation process should be completed within 2-3 weeks of the deadline for the paper to be turned in. The evaluation will not be masked; that is, the students will know the reviewer's identity. This feedback will be provided to all students regardless of the outcome of the Comps.

7. The result of the evaluation will be one of the following: pass, revise and resubmit, or not pass. If a student receives a pass, the written portion of the Comps process is then complete. If a student receives a revise and resubmit, they have one month to complete the revision, which is then evaluated on a pass/not pass basis. If a student does not pass, the student will submit an application and essay again in the next semester's cycle.

For students who receive a not pass (either as a first decision or as a second decision for those students who receive a revise and resubmit), the student will go over the feedback with their advisors and/or guidance committee and decide whether they would like to submit a new or revised essay on the same question(s) or propose new question(s) for the next cycle. Students will still have three attempts to pass Comps. A decision of "not pass" will count as one of those attempts.

8. Once the written portion of Comps is complete, the student should meet with their advisor and guidance committee members to have a scholarly conversation about the paper and what the student feels they learned in the process. This scholarly conversation will be similar to those that occur at professional conferences: the student will do a brief (10-15 minute) presentation and then advisor and guidance committee can ask questions or offer reflections on the substance of the paper.

9. The role of the guidance committee and advisor: Students need the approval from the advisor and guidance committee for the proposed questions, bibliography, and timeline. Only the advisor, however, can respond to clarifying questions during the writing process. Once the Comps process is complete, students may repurpose this writing for future projects, including co-authored projects and dissertations. Although we recognize that students do not write in a vacuum, the Comps process is intended to evaluate students on an individual basis. The product generated in the Comps process is not intended to be a final product but instead to be a step in the student's scholarly trajectory.

Genres

The genre of the Comps essay is intentionally open-ended. The term "essay" is used to capture the range of responses that Comps may take. Below we identify some possible genres but understand that this list is not exhaustive. Resources are provided, where relevant.

- Literature Review
    - https://writeonline.ca/litreview.php?content=section1
    - Kennedy, M. (2007). Defining a literature. *Educational Researcher 36*(3). https://doi.org/10.3102/0013189X07299197
    - Boote, D.N., & Beile, P. (2005). Scholars before researchers: On the centrality of the dissertation literature review in research preparation. *Educational Researcher, 34*(6). https://doi.org/10.3102/0013189X03400600
    - University of Waterloo (m.d.) Literature review.

https://writeonline.ca/litreview.php?content=section1

- Conceptual/Theoretical Essay
- Arts-based Essay
- Empirical Study (although distinct from Practicum)
- Grant Proposal
- Written Examination

Questions? Please reach out to the PriME Director and/or Lisa Keller.

Comprehensive Examination Evaluation and Rubric

The summative evaluation for an exam essay will be Pass, Revise and Resubmit, or Not Pass. For a Pass, all criteria must be evaluated by the three reviewers (Advisor, internal reviewer from the Guidance Committee and external reviewer) as *Strong* or *Adequate* (i.e., no criteria can be evaluated as *Underdeveloped*). **All reviewers will use this rubric (found on the homepage of the PRIME Hub) to evaluate the essay.**

A student may take the Comprehensive Examination at most three times. A student who fails the Examination on the third attempt will not be allowed to continue enrolling in the program.

If a student wishes to challenge the grading of any part of the Comprehensive Examination, the student should follow the procedures outlined in paragraph 3 of Section VIII, *STUDENT CONDUCT AND CONFLICT RESOLUTION.*

Dissertation and Final Oral Examination

The doctoral dissertation is the culmination of a student's graduate education and training and reflects not only the accomplishments of the graduate student but also the quality of the graduate program. Each doctoral candidate must write a dissertation acceptable to the faculty. The dissertation is to be original scholarship that is a significant contribution to the mathematics education knowledge base. The dissertation constitutes evidence that the candidate is a well-trained and capable researcher in mathematics education. The research on the dissertation is done under the guidance of the dissertation director and guidance committee.

Dissertation Proposal

The student writes a dissertation proposal after passing the Comprehensive Examination. It should include an appropriate review of the literature, a methodologically sound design, and a convincing argument as to why the question of interest is important and significant. Methods of data collection and analysis must be clearly laid out. The guidance committee will meet formally with the student to discuss the proposal, ask questions of the student, and evaluate the proposed project in terms of its quality, originality, scope, and appropriateness. The committee will accept the proposal, ask for revisions, or, in rare cases, turn the proposal back to the student for considerable rethinking and rewriting (and another proposal meeting). Three committee members must be present for the proposal meeting to be valid. When the committee approves of the proposal, all committee members sign a Dissertation Proposal Approval form located at the PRIME Hub (https://michiganstate.sharepoint.com/sites/NatSci-PRIMEAdmin/PRIMEhub) or https://prime.natsci.msu.edu/current-students/forms.aspx and submit it to the Academic Program Coordinator. Most dissertation projects will require human subjects clearance from the university. (See Section VII, Integrity and Safety in Research and Creative Activities, *Research Involving Human Subjects: Institutional Review Board (IRB)*). **The student's guidance committee must sign off on the proposal BEFORE Human Subjects (IRB) approval is sought and BEFORE any data are collected.**

Dissertation

There are several options as to the format of the dissertation. The form of the dissertation is determined by the student and the guidance committee. Students may gather original data or use existing data, perhaps from a common data-gathering effort (e.g., videotaping of classrooms), with different students undertaking analyses with different foci or perspectives. Options include, but are not limited to:

- a traditional dissertation reporting on a single major study;
- a collection of three interconnected studies or papers written in the form of publishable articles. The papers might draw from the same research effort or may represent three closely related studies. Each must include empirical components.

Dissertation Defense and Final Oral Examination

The dissertation defense is a multi-stage process. The Mathematics Education Faculty Group intends the Final Oral Examination to be a serious scholarly event, not a pro forma celebration in advance of a serious look and defense of the dissertation.

Part 1: Dissertation Director approves dissertation for examination. The candidate schedules regular meetings with the dissertation director to discuss and critique the dissertation, determining whether it is acceptable for the final oral examination.

When the dissertation director deems that the dissertation is acceptable for examination, a final oral examination and public colloquium may be scheduled. **The candidate must present copies of the dissertation to all members of the guidance committee at least two weeks before this final oral examination.**

Part 2: Final oral examination. The final oral examination in defense of the dissertation is a public event conducted by the guidance committee and arranged by the candidate in consultation with the guidance committee and the Graduate Director. Other faculty and graduate students are encouraged to attend the examination although they have no vote in deciding the outcome of the examination. The dissertation and the student's performance on the final oral examination must be approved by a positive vote by at least three-fourths of the voting examiners and with not more than one dissenting vote from among the Michigan State University regular faculty members of the guidance committee.

It is the responsibility of the candidate to determine that all members of the committee are available on the expected date of the defense. Requests for changes or substitutions in the dissertation committee must be submitted to and approved by the Graduate Director at least four weeks prior to the anticipated date of the public defense. Last minute requests for changes may not be honored. An invitation to the public defense will be extended to the entire mathematics education faculty and graduate student population at Michigan State University.

For dissertations, the final oral defense/examination must consist of two parts. The first part is a presentation open to faculty members and members of the public without a vote. The second part is a defense of the dissertation/examination with questions from the guidance committee. Through conversation with your advisor, one of two options may be possible: either have only dissertation committee members attend the second part, or faculty members and members of the public without a vote may stay for the examination portion. Committee members then deliberate and share the outcome with the student. For more information visit: https://reg.msu.edu/AcademicPrograms/Text.aspx?Section=111#s401.

Submission and Publication of the Dissertation

After the final revisions are complete, the student should follow university guidelines regarding the production of the dissertation. MSU only accepts electronic theses and dissertations submitted via ProQuest. The Graduate School provides forms and guidelines pertinent to

producing the dissertation, copywriting the thesis, submitting the product to University Microfilm, and other technical matters https://grad.msu.edu/etd.

Students should also consider publishing their dissertations through the "Open Access Publishing Option" offered by ProQuest. The Open Access option gives ProQuest the authorization to make the electronic version of the document accessible to all via the Internet, including the selling of the document by commercial retailers and the accessibility to the work via search engines. For more information visit: https://about.proquest.com/en/dissertations/.

Ideally, all dissertations will lead to published articles, monographs, or books. Although the dissertation research unambiguously is the intellectual property of the student, any publication's authorship should reflect who contributed to the paper (consistent with professional expectations and ethics in the field of educational research), so that it would not be unusual for a publication based on a dissertation to have the student as first author and the dissertation director (or other faculty or students) as subsequent authors. There is no requirement, however, that the dissertation result in publication.

In addition to the main body of a thesis or dissertation, **the Graduate School now permits the submission of supplementary materials to ProQuest**. These supplemental materials will not be reviewed by the Graduate School for formatting requirements, but they must be acceptable by ProQuest and comply with ProQuest's criteria and storage limits. All supplementary materials need the written approval of the thesis/dissertation committee chair.

The MSU library may accept supplementary materials approved by the thesis/dissertation committee chair per their collection criteria. The Graduate School does not review these materials for formatting requirements. Questions about submission of these materials to the MSU library should be directed to the Associate Director, Digital Information and Systems, currently Shawn Nicholson (nicho147@mail.lib.msu.edu).

At the time of submission to ProQuest, authors now have the opportunity to create an **Open Researcher and Contributor ID** (ORCID: https://vimeo.com/237730655) that provides researchers with a unique identifier for linking their research outputs and activities. An ORCID:

- Improves recognition of research contributions
- Reduces form-filling (enter data once, re-use it often)
- Works with many institutions, funders, and publishers
- Is a requirement of many journal manuscript submission systems and grant application forms.

University Policy About Dissemination of Graduate Students' Research

In keeping with MSU's public mission, the University requires that theses, dissertations and abstracts will become public after the conferral of the degree; embargoes can only be pursued for a limited period (see [1] below). Results that are subject to restrictions for dissemination by funding agencies (see [2] below) cannot be part of any document submitted as a thesis or dissertation to the Graduate School.

[1] Hold/embargo on publication of documents submitted to ProQuest: Students submitting a thesis/dissertation to ProQuest now can request a hold/embargo of publication by ProQuest by contacting the Graduate School at msuetds.approval@grd.msu.edu. In response to the request, the Graduate School will send directly to the student a form that needs to be completed and turned to the Graduate School prior to submission of the document to ProQuest. The form needs to be signed by the student's major professor and by the Associate Dean of the student's college. The request for the hold/embargo may be for six months, one year or two years. Requests for a period longer than six months must include a written justification for the length of the hold/embargo.

[2] Graduate students participating in University Research Organization (URO; https://uro.egr.msu.edu/): Graduate students involved in a URO project will receive both written documentation and a verbal explanation of any limitations or implications to their current or future academic progress prior to participating on the project. Students engaging in work for a URO project undergo a 2-step approval process before hiring: a consultation with a representative of the URO's office to explain the restrictions on the project, and an interview with the Graduate School Dean or Dean's designee to discuss the relationship, if any, between their work as graduate students and their participation in the project. Students must be informed that results that are subject to restrictions for dissemination cannot be part of any document submitted as a thesis or dissertation. As part of their degree program, all graduate students must have research options to ensure the generation of appropriate results to fulfill the degree requirements, and to have data for professional development activities that are integral to their graduate education (e.g., presentations at conferences and research seminars).

Commencement

The Graduate Advanced Degree Ceremonies will typically be on Friday of Finals week: 3:30 PM in the Breslin Center. Graduates and faculty should arrive one hour early to put on gowns/regalia and be properly ordered for the procession.

IV. DEGREE REQUIREMENTS & TIMELINES

This section summarizes requirements for the degree and provides sample program timelines and checklists.

Degree Requirements

The Doctor of Philosophy degree in Mathematics Education is designed for persons who show promise of becoming leaders in local, state, national, and international mathematics education communities. The program prepares researchers and leaders to address critical issues in mathematics education by developing analytical perspectives for research, engaging in reflective teaching, and deepening mathematical knowledge.

In addition to meeting the requirements of the University and of the College of Natural Science, students must meet the requirements specified below.

Admission

The program admits students with a variety of backgrounds. Some students will have equally strong backgrounds in education and mathematics. Others may have more extensive prior preparation in one of these two disciplines.

Admissions decisions will be made by an Admissions Committee composed of members of the Mathematics Education Faculty Group. A student who shows promise for success at doctoral study but who needs additional background to be eligible for admission to the Ph.D. program will be provided with specific conditions to be met before admission. Upon successful completion of these requirements, the student may reapply.

Requirements for the Doctor of Philosophy Degree in Mathematics Education

The student must complete the requirements listed below. The student's program of study must be approved by the student's guidance committee and must include:

1. **Core sequence**. All of the following courses (12 credits):

MTHE	926	Proseminar in Mathematics Education I	3
MTHE	927	Proseminar in Mathematics Education II	3
TE	950	Mathematical Ways of Knowing	3

MTHE 954 Design and Methods in Mathematics Education Research 3

2. **Research Methods** (9 credits)

   a. One course in quantitative research methods 3

   b. One course in qualitative research methods 3

   c. One additional research methods course 3

   Research methods courses must be approved by the student's guidance committee.

3. **Research Practicum** (1 to 3 credits)

   MTHE 995 Research Practicum 1 to 3

4. **Mathematics and Mathematical Knowledge for Teaching** (12 credits)

   Complete 12 credits of course work, approved by the student's guidance committee, focusing on mathematics content, both traditional mathematical sciences content and specialized knowledge needed by those engaging in research on teaching and learning mathematics.

5. **Area of Concentration** (12 credits)

   Complete 12 credits of course work in an area of concentration as approved by the student's guidance committee.

6. Successful completion of comprehensive examinations administered by program faculty.

7. **Doctoral Dissertation**

   Complete at least 24 credits and no more than 36 credits of MTHE 999 Doctoral Dissertation Research and successfully defend the oral dissertation.

Mathematics Education Sample Programs of Study

The following are two student sample programs of study. One is from a student with a focus on Research in Undergraduate Mathematics Education, and the other is from a student with a focus on Research in K-12 Teaching/Education. Courses (in addition to MTHE 999 Doctoral Dissertation Research credits) will be selected with the advisor and guidance committee to ensure that the student will have a comprehensive knowledge of mathematics education, research, and their area of concentration.

Sample Coursework of Student with Research in Undergraduate Mathematics Education (RUME) focus:

This student entered program with some master's level coursework in mathematics.

16 courses:

- MTHE 879 Teaching College Mathematics
- MTHE 926 Proseminar in Mathematics Education I
- MTHE 927 Proseminar in Mathematics Education II
- MTHE 954 Design and Methods in Mathematics Education Research
- MTHE 995 Research Practicum
- MTHE 997 Special Topics in Mathematics Education: Teaching and Learning Reasoning and Proof
- MTHE 997 Special Topics in Mathematics Education: Advanced Mathematical Thinking
- CEP 911 Intellectual History of Educational Psychology
- CEP 913 Psychology and Pedagogy of Mathematics
- CEP 991A The Nature of Understanding in Mathematics and Science
- MTH 880 Combinatorics
- MTH 918 Number Theory I
- STT 801 Design of Experiments
- TE 931 Introduction to Qualitative Methods in Educational Research
- TE 939C Discourse Analysis
- TE 950 Mathematical Ways of Knowing

Sample Coursework of Student with Research in (K-12) Teaching focus:

This student entered program with bachelor's degree in mathematics and secondary math teaching.

18 courses:

- MTHE 840 Critical Content of School Mathematics: Numbers and Operations
- MTHE 926 Proseminar in Mathematics Education I
- MTHE 927 Proseminar in Mathematics Education II
- MTHE 954 Design and Methods in Mathematics Education Research
- MTHE 995 Research Practicum
- CEP 902 The Psychology of Learning School Subjects
- CEP 907 Psychological Study of Teaching
- CEP 910 Motivation and Learning
- CEP 911 Intellectual History of Educational Psychology
- CEP 913 Psychology and Pedagogy of Mathematics
- CEP 933 Quantitative Methods in Educational Research II
- MTH 432 Axiomatic Geometry
- MTH 481 Discrete Mathematics I
- TE 931 Introduction to Qualitative Methods in Educational Research
- TE 950 Mathematical Ways of Knowing
- TE 994 Laboratory and Field Experience in Curriculum, Instruction, and Teacher Education
- STT 421 Statistics I
- STT 441 Probability and Statistics I: Probability

Checklist and Timetable for Doctor of Philosophy Degree

Year 1

_____ Meet with your first-year advisor to determine which courses you should take the first semester and beyond. (See Section V, Advisors and Guidance Committee, *First-Year Advisor*).

_____ International students pass MSU SPEAKING test, or its equivalent. **Note: if SPEAKING test is not passed on first attempt at Orientation, enroll in an English course recommended by the English Language Center, in your first semester.**

_____ Take courses advised by your first-year advisor, typically including MTHE 926, MTHE 927, and one or more research methods courses.

_____ Designate Advisor/Chair of Guidance Committee Major Professor by end of Year 1. (See Section V, Advisors and Guidance Committee, *Advisor*).

_____ Form Guidance Committee. Guidance Committee should have first meeting no later than the end of Year 1. (See Section V, Advisors and Guidance Committee, *Guidance Committee*).

_____ Spring Semester: Prepare and submit annual review documents. Complete RECR requirements by end of semester. (See Section VI, Academic Performance and Review, *Annual Reviews*).

Year 2

_____ Form Research Practicum Committee during Fall Semester.

_____ File program of study in GradPlan no later than end of Fall Semester. (See Section III, Program Components, *Program of Coursework*).

_____ Take courses as laid out in your program plan and advised by your Advisor, typically including MTHE 954 in the fall and MTHE 995 in the spring (for work on the research practicum).

_____ Conduct Research Practicum. Research practicum and presentations to be completed by end of second year or early in third year. (See Section III, Program Components, *Research Practicum*, page 17).

_____ Spring Semester: Prepare and submit annual review documents. Complete RECR requirements by end of semester. (See Section VI, Academic Performance and Review, *Annual Reviews*).

Year 3

_____ Complete courses as laid out in your program plan and advised by your Advisor. Make changes to program plan if needed. (See Section III, Program Components, *Changes to Program Plan*).

_____ Pass Comprehensive Examination after completing the research practicum and substantially completing the prescribed course work, as defined by the Guidance Committee, typically in spring of the third year or fall of the fourth. (See Section III, Program Components, *Comprehensive Examination*).

_____ Make changes to Guidance Committee appropriate to its change in focus on the dissertation. (See Section V, Advisors and Guidance Committee, *Timeline/Lifespan of the Guidance Committee*).

_____ Spring Semester: Prepare and submit annual review documents. Complete RECR requirements by end of semester. (See Section VI, Academic Performance and Review, *Annual Reviews*).

Year 4 and beyond

_____ Write dissertation proposal and meet with Guidance Committee (Dissertation Committee) for approval. Proposal must be approved BEFORE data are collected. (See Section III, Program Components, *Dissertation Proposal*).

_____ Fulfill teaching experience if you haven't already.

_____ Earn at least 24 credits (and no more than 36) of MTHE 999, Doctoral Dissertation Research.

_____ Spring Semester: Prepare and submit annual review documents. Complete RECR requirements by end of semester. (See Section VI, Academic Performance and Review, *Annual Reviews*).

_____ Submit *Application for Graduation* to the University near the beginning of the semester in which you intend to graduate.

_____ Follow Thesis/Dissertation Guidelines from the Grad School.

_____ Complete Dissertation. Get approval from Major Professor to distribute Dissertation to Guidance Committee. The thesis must be distributed to the Guidance Committee at least two weeks prior to the Oral Defense and Final Examination.

_____ Once Guidance Committee approval is granted on dissertation, schedule a publicly announced Dissertation defense.

_____ Pass Dissertation Defense and Final Oral Examination.

_____ Make required revisions to the dissertation.

_____ Turn in final Dissertation and Abstract with all necessary corrections and required forms, with the signature of the Major Professor. MSU only accepts electronic dissertations submitted via ProQuest. The instructions for electronic submissions are available from https://grad.msu.edu/etd.

_____ Complete all university, college and program surveys and other requirements for graduation.

V. ADVISORS AND GUIDANCE COMMITTEE

Advisors and guidance committees play important roles in helping students find their way through the graduate program and into the scholarly community of mathematics educators. They help the student plan a unique graduate learning experience and uphold the standards of excellence in scholarship and personal accomplishment.

First-Year Advisor

Incoming doctoral students are assigned a first-year advisor upon admission to the program, based on (a) the existing research interests and expertise in the Program faculty and (b) the research interests of the student as expressed in the application materials. This person plays an important role in helping the new student become familiar with the program and doctoral study at MSU. To facilitate the transition into doctoral study, incoming students should contact this person as soon as possible after accepting admission. The first-year advisor answers questions about opportunities for assistantships, program requirements, expected timelines, the procedures and timing for selecting an advisor and guidance committee, and other details about the doctoral experience. During the first year, this person is the most important resource for students in choosing courses and assistantships, making connections with other faculty, and shaping their program and research interests.

Advisor

During the first year, the student selects an advisor, who will serve as the chairperson of the guidance committee. Students may choose to ask the first-year advisor to continue serving as advisor, but students are encouraged to feel free to ask another faculty member to serve as their advisor if they feel there is a closer match with their interests. The advisor and guidance committee (described below) are responsible for working with the student to develop a program of study, up through the completion of coursework and the passing of comprehensive examinations. In order to help maximize the student's academic and professional growth, the chairperson is at minimum responsible for the following:

- Assisting the student in selecting appropriate faculty members for the guidance committee.

- Helping the student to understand and fulfill all of the requirements and policies of the Program, Department, College, and University, including the completion of forms required by those requirements and policies.
- Helping the student identify, pursue, and secure all of the academic, professional, research, and teaching opportunities that would appropriately contribute to their career aspirations.
- Assisting the student in scheduling and preparing for three required official meetings of the guidance committee: (1) to approve the program, (2) to evaluate the Dissertation proposal, and (3) to evaluate the Dissertation. At least three committee members must be present to constitute an official meeting. The guidance committee may and typically does meet additionally as needed.
- Coordinating the activities of the student and the guidance committee to plan the student's program, select and find appropriate research and teaching assistantships, find and read key pieces of research, and prepare for the comprehensive examination.
- Aiding the student in planning for and conducting the research practicum, including the selection of an appropriate committee (see below for details).
- Supporting the student's preparation of a dissertation proposal and changes to guidance committee members as needed in the shift of that committee's role to supporting the completion of the dissertation (see below for details).
- Resolving any conflicts or problems that may arise between guidance committee members and the student.

Every student has the right to work with an advisor who is intellectually suitable to direct their development as a researcher and scholar. It is the responsibility of the Mathematics Education Program faculty to work with all students until each finds and undertakes work with an appropriate advisor. It is the student's responsibility to articulate their research interests, first in the goal statement when applying to the Mathematics Education Program and at all points during the program as their research interests change and develop.

Who May Serve as Advisor?

All tenure system Mathematics Education Program faculty are eligible to serve as advisors for Mathematics Education doctoral students. The advisor of a Mathematics Education student must be a member of the Mathematics Education Program faculty. Typically, the advisor also serves as director of the student's dissertation. In some cases, however, another faculty member from Mathematics Education or elsewhere at MSU is the best choice to serve as dissertation director. The advisor/chair of guidance committee must be a Mathematics Education faculty member; if a

guidance committee has co-chairs, at least one must be a Mathematics Education faculty member.

Timeline for Selecting an Advisor

Students should use the first year of the program to get to know all Program faculty. Each student should select an advisor no later than the end of the first year in the program. The timing of this choice will allow the student to work with that advisor to (a) select the other members of the guidance committee and (b) develop the student's program plan in a timely manner.

Changing Advisors

No student should assume that the first-year advisor is necessarily the best candidate for becoming their advisor for the remainder of the program. The first-year advisor should be seen as temporary, both by faculty and incoming students. As students gain experiences in the program, their interests and/or professional objectives may (and frequently do) shift. The first-year advisor may remain the best candidate for advisor for a particular student, but that is a matter for the student and the first-year advisor to address together during the first year of the student's program. Students should feel free to discuss alternative choices with their first-year advisors and to ask other faculty about their interest and willingness to serve as advisor. Ultimately, a student's transition from working with a first-year advisor to working with an advisor is achieved only when the student finds that relationship is satisfactorily supporting their growth and development as a scholar.

Because students' interests and objectives change, changes in advisors may be considered at any point in the program. Students considering changing advisors should, however, hold in mind that building a good working relationship with any new advisor may take time. If the student, the current advisor, and the proposed new advisor agree that an advisor change is warranted, the student should change the advisor electronically in GradPlan, where the new advisor and guidance committee members will confirm their approval, and the form will be routed to the Mathematics Education Doctoral Program Director for approval.

Program Monitoring of the Advisor-Advisee Relationships

It is the responsibility of the Doctoral Program Director, in consultation with the Program faculty, to ensure that all newly admitted students have been assigned a first-year advisor and that those first-year advisors communicate with their new advisees. The Doctoral Program director is also responsible for ensuring that each student in the Program makes appropriate progress towards timely selection of an advisor and remains productive in that relationship. If

students experience any difficulty meeting or communicating with their advisors, they should consult with the Program Director about the nature of the difficulty. It is the responsibility of the Program Coordinator(s) to help the student resolve those problems.

Responsibilities of the student, the department/school and of the major professor when the major professor leaves MSU before the student completes degree program

Should the Advisor/Chair of the guidance committee or the dissertation director leave MSU before the student completes the dissertation through the final oral defense, there are important decisions to be made. First, if the departure occurs early in the dissertation process, it might make the most sense for the student to select another advisor or dissertation director. If the dissertation process is farther along, or the student and departing faculty member agree that it makes most sense for the original advisement to continue, then, the student and departing advisor should meet with the guidance committee and the Doctoral Program Director to negotiate a plan for the successful completion of the dissertation. The details of this plan, when finalized, should be submitted to the Doctoral Program Director in the form of a letter for approval. The Doctoral Program Director, in turn, will write a letter accepting or rejecting the plan as submitted, perhaps suggesting revisions. Students should recognize that departing faculty are under no obligation to continue advising an MSU student once they depart. If the departing faculty member is not willing to continue advising the student, the student should report that with a letter to the Doctoral Program Director, simultaneously scheduling an appointment with the Director to reflect on potential advisor alternatives. Then, the Program expects the student to seek out a potential alternative advisor or, continue to do so until a replacement advisor is in place.

Responsibilities of the unit administrator when a student and faculty advisor can no longer work together

If a student and/or an advisor discover that they can no longer work together, or either desires to end the advisee/advisor relationship, the Doctoral Program Director should be informed by a letter, which also requests an appointment to discuss the situation so that the Director is fully informed about the circumstances surrounding the decision to end the advisory relationship. After this meeting, the Director will inform the other party (i.e., the advisor if the student is seeking to end the relationship, the student if the advisor is seeking to cease advising) by letter of the wishes of the student or advisor to end the relationship. In all cases, the student will be asked in writing to meet with the Director of the Doctoral program to consider advisory alternatives. Then, the Program expects the student to seek out a potential alternative advisor, with the

assistance as needed by the Doctoral Program Director, continuing to do so until a replacement advisor is in place. GradPlan is used to change Advisor/Chair of guidance committee.

Guidance Committee

The guidance committee serves the student, the program, the college, and the university in setting standards and promoting the highest level of excellence in scholarship and professional accomplishments for each student. Each member of the committee will participate actively and fully throughout a student's program, from course planning through the defense of the dissertation. This committee should be formed by the end of the student's first year of study.

Composition of the Guidance Committee

Each student's guidance committee will consist of at least four Michigan State University regular (tenure system) faculty, at least two of whom are members of the Mathematics Education Program faculty. The four members may be augmented by additional faculty from other groups, including adjuncts, emeriti, and faculty from other universities. Representatives from such groups, however, may not substitute for the four regular faculty members. All other general University regulations for guidance committee membership must be observed. The guidance committee members should possess interests compatible with those of the student, and should have strengths to contribute to the student's academic, professional, and scholarly growth. GradPlan is used to constitute a guidance committee. Students have both the responsibility to constitute their guidance committee and the right to concur with any changes in its membership.

Changes to Guidance Committees

Changes to the membership of the guidance committee can be made at any time, whenever the student and the advisor agree that such changes are appropriate. Changes for appropriate reasons include but are not restricted to: (1) departure of a committee member from the University and (2) changes in the students' research interests or scholarly goals that would justify new faculty expertise and/or experience on the committee. GradPlan is used to make changes in committee membership.

Timeline/Lifespan of the Guidance Committee

Formation. The student and their advisor should meet, discuss, and compose the guidance committee no later than the student's second semester in the program. Forming the committee

any later than the 2nd semester may seriously undermine the committee's capacity to work with the student to plan a Program of Study and for the student to complete the program plan.

Role During the Coursework Phase of Students' Programs. Prior to the comprehensive examination, one major focus for discussion and deliberation in the guidance committee should be the selection of appropriate coursework that meets the student's goals and satisfies the coursework requirements for completing the degree. The committee should also consider and discuss (a) research and teaching assistantship opportunities and needs, appropriate to the student's goals, and (b) possibilities for the student's research practicum.

Students should meet with their Guidance Committee at least every 18 months and complete a Guidance Committee Report after each meeting, to be submitted to the program office. The College of Natural Science, CNS, requires a current Guidance Committee Report or current annual progress report to be submitted with every CNS Dissertation Completion or Continuation fellowship application.

Role During the Dissertation Phase of Students' Programs. Once the student has completed the comprehensive examination, the role of the guidance committee shifts to assisting the student in conceptualizing and carrying out a dissertation. Often the makeup of the student's committee changes at this point. Dissertations ordinarily benefit from specific faculty strengths (in certain methodological or substantive areas, for example), and changes in the committee are logical after the program of study and comprehensive examinations are completed. In fact, many faculty and students refer to the committee at this point as the *dissertation committee*, even though it remains officially the guidance committee. If changes to the guidance committee are made at this stage, the changes should be made before the proposal is approved.

Guidelines for Graduate Mentoring and Advising

The MSU website https://grad.msu.edu/msu-guidelines-graduate-student-mentoring-advising, provides guidelines and tools intended to be useful to all within the MSU community who have advising and mentoring roles related to graduate education. Please read the guidelines on the website and in the accompanying document there regarding the recommendations of the MSU Task Force for Graduate Mentoring and Advising. In particular, these are the essential responsibilities of departments and units:

- Creating explicit expectations and transparent policies that are consistent with MSU policies (e.g., maintaining an updated, online Graduate Handbook that follows the Graduate School Handbook Template and academic unit requirements for degree completion)

- Enabling graduate students to make timely progress in their degree programs by ensuring that required courses and examinations are scheduled in a timely manner
- Creating opportunities for networking and expanding career and professional development (e.g., organizing speaker series, colloquia, and other formal and informal events)
- Creating opportunities for graduate students to become familiar with the various forms of scholarship in the field whether it be with their disciplinary research, teaching or outreach
- Sharing responsibility with guidance committees and faculty advisors for fostering the professional and career development of graduate students (e.g., providing venues for honing professional writing and presentation skills, grants writing, publishing)
- Ensuring that regular progress checks are provided for students (including annual written evaluations)
- Providing education in research ethics and integrity
- Recognizing and rewarding excellence in mentoring, and identifying opportunities for professional development so that faculty can improve their mentoring skills and abilities
- Connecting faculty to a broader community of support by sharing information about MSU and Graduate School resources that can support them in mentoring graduate students

The Graduate School's website, "Optimizing Mentoring," https://grad.msu.edu/optimizing-mentoring, contains ideas and resources for implementing the Guidelines plus mentoring trainings and workshops.

VI. ACADEMIC PERFORMANCE AND REVIEW

This section describes policies on academic performance and procedures for review of students' progress in the program.

Policy on Academic Progress

The university policy on academic standards and evaluation states:

> A 3.00 cumulative grade-point average in the degree program is the minimum University standard, but colleges, departments, or schools may establish a higher minimum standard. However, attainment of the minimum grade-point average is in itself an insufficient indicator of potential for success in other aspects of the program and in the field. The guidance committee and academic unit are jointly responsible for evaluating the student's competency (as indicated by, e.g., grades in core and other courses, research performance, and development of professional skills) and rate of progress (as indicated by, e.g., the number of courses for which grades have been assigned or deferred). Written evaluations shall be communicated to the graduate student at least once a year, and a copy of such evaluations shall be placed in the graduate student's file. A student whose performance does not meet the standards of quality will not be permitted to continue to enroll in the degree program, and appropriate action will be taken by the college, department, or school.

The College of Natural Science policy on academic standards states:

> The minimum standard is a 3.00 grade-point average. Standards may be set higher than the minimum by the academic unit responsible for the degree program. The accumulation of grades below 3.0 in more than three courses of 3 or more credits each, or deferred in more than three courses of 3 or more credits each at any given time, or a combination of the above in excess of four courses may remove the student from candidacy for the degree. A student who fails to meet the academic standards for any program, may, on recommendation of the director, be required by the dean to withdraw at the end of the semester.

The following sections define what constitutes acceptable academic progress in coursework and research for students in the Ph.D. in Mathematics Education program. Students are held

accountable for meeting the standard each semester and may be subject to action at the end of any semester in which the standard is not met.

Academic Progress in Coursework

All students are expected to maintain a cumulative grade point average of 3.0 and to complete all deferred and incomplete grades in a timely manner. Students failing to meet this standard will be designated as the focus of one of three levels of concern and may be subject to remedial actions noted:

> ***Level 1 Concern:*** Any student receiving less than a 3.0 in any course or accumulating a total of two or more incomplete/deferred grades at any point will be required to discuss the situation with their advisor. It is expected that the faculty member in whose class the student received the unacceptable grade will have some involvement in this part of the evaluation process. In order to remove the designation of Level 1 Concern, the student must satisfactorily address the conditions that occasioned the designation. In some cases, the student may be required to develop a formal plan to address the problems.
>
> ***Level 2 Concern:*** Any student accumulating a total of two or more grades below 3.0 or three or more incomplete/deferred grades will be required to discuss the situation with their advisor and to have their case reviewed by the program director. In all cases, the student will be required to develop a formal plan to address the problems. In addition, in the semester following the next semester of study, the student will not be permitted to have a combined assistantship and course load exceeding 100 percent (e.g., 6 credits and 1/2 time assistantship, 9 credits and 1/4 time assistantship) until all incomplete grades have been cleared. For example, if a student receives the designation of Level 2 Concern at the end of the Fall Semester, this restriction will apply beginning in the subsequent Summer Semester.
>
> ***Level 3 Concern—Academic Probation:*** If a student accumulates a total of three or more grades below 3.0, or if the student fails to clear incomplete grades in a timely manner, the student may be subject to probation and eventual dismissal. Such circumstances will require a formal review by a committee appointed by the program director in consultation with the student and advisor to determine the likelihood of a reversal of circumstance. During this review, the student will have the opportunity to meet with the committee, both with and without their advisor present.
>
> According to university regulations, if a student's cumulative grade point average falls below 3.0, the student will be designated as being on *academic probation*. Any student so

designated will be required to discuss the circumstances with their advisor and to develop a plan to address their academic problems. The university will remove the student from probation when the student's cumulative average rises to 3.0 or above. If the student's cumulative average does not rise to 3.0 or above within one year, the student may be subject to dismissal.

Note that for DF-deferred grades, the required work must be completed and a grade reported within 6 months, with the option of a single six-month extension. If the required work is not completed within the time limit, the DF will become U-Unfinished and will be changed to DF/U under the numerical and Pass-No Grade (P-N) grading systems, and to DF/NC under the Credit-No Credit (CR-NC) system. This rule does not apply to graduate thesis or dissertation work.

Academic Progress in Research

All doctoral students are expected to participate in research throughout their program of study. The student's annual review materials submitted each year should demonstrate participation in research and development of research competency. This progress in research may be demonstrated through a variety of types of activity, such as graduate assistantships, research practicum, dissertation, and individual research efforts.

Students in the post-comprehensive phase of their programs especially should demonstrate annual progress in research. If the student has not had a dissertation proposal approved within three years of passing the comprehensive examination, a formal warning will be issued by the program director. Further action may be warranted if the student does not subsequently complete an acceptable dissertation proposal within an appropriate period of time.

Annual Reviews

When a student is admitted into the Ph.D. program, timely progress toward completing degree requirements is expected. The student's guidance committee and the mathematics education program faculty share responsibility for evaluating and providing feedback on students' progress through an annual review process.

Annual Review Process

Each student will submit review materials during Spring Semester each year. Materials for students are due around March 1st. The review process is introduced in cohort meetings in the first year with the Graduate Director and/or Assistant Director in which students will be given guidance in preparing materials for their first review. Students will submit their review materials

to an online site in the D2L course management system. Advisors will access and review online materials for their student advisees and solicit input from guidance committee members and other faculty, as needed. The faculty advisor and graduate student will meet to discuss the student's goals and progress in the program as well as plans for the coming year and complete and sign the Academic Performance portion (page 3) of the Annual Progress Report form.

The signed Annual Progress Report should be submitted to the Academic Program Coordinator in the PRIME Office by the designated time, typically March 31st.

If a student is not making timely and reasonable progress towards their degree, the Annual Progress Report will specify the deficiencies and describe the expected steps, with a timetable, to get back in good standing. The student may wish to respond in writing regarding disagreement with the deficiencies listed or with the steps and timetable for remediation. Any responses will become part of the student's file.

It is a disservice to permit a student to continue towards the advanced degree without necessary qualifications, a high level of motivation, commitment, and aptitude. Judgment regarding retention is made by the student's guidance committee. The committee may consult the Director of Graduate Studies and the department chairperson. If a majority of the guidance committee decides that a student lacks such standards, the student may be asked to withdraw from the program according to the procedures as defined in the Graduate Student Rights and Responsibilities document: https://spartanexperiences.msu.edu/about/handbook/graduate-student-rights-responsibilities/index.html.

Materials to Submit

The submitted materials constitute a cumulative portfolio, with the following components:

- Annual Progress Report form
- current curriculum vita
- current goal statement/plan
- at least one paper from a course or research activity
  (in Year 2 typically includes Research Practicum Proposal or Report)
- current program plan, with completed courses noted
  (beginning in Year 2)
- Program Progress Chart

- Report of Scholarly Activity
- Responsible and Ethical Conduct of Research and Scholarship (RECR) Training Report

Comprehensive Examination

The comprehensive examination, taken after completion of the research practicum and when the prescribed course work is substantially complete as defined by the Guidance Committee, is an important milestone for the student to demonstrate progress in the doctoral program. Policies and procedures are described fully in the *Comprehensive Examination* Section III, Program Components.

Dissertation Defense and Oral Examination

The dissertation defense and oral examination marks the final formal opportunity for faculty evaluation of the doctoral student's accomplishments in the program. Policies and procedures are described in the *Dissertation Defense and Final Oral Examination* Section III, Program Components.

VII. INTEGRITY AND SAFETY IN RESEARCH AND CREATIVE ACTIVITIES

Integrity in research and creative activities is based on sound disciplinary practices as well as on a commitment to basic values such as fairness, equity, honesty and respect. The Program in Mathematics Education expects all research and creative activities to be conducted with integrity. Further information is available at The Research Integrity Office: https://rio.msu.edu/ and The Graduate School research and scholarly integrity webpage: https://grad.msu.edu/researchintegrity/.

Responsible and Ethical Conduct of Research (RECR) Education Plan

In 2009 the Office of the Provost and the Office of the Vice President for Research and Graduate Studies required that all departments and programs involved in graduate education develop a Responsible Conduct of Research (RCR) Training Plan. Those plans were intended in part to respond to federal requirements for training set out in the "America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Act." Although the immediate concern was with federally funded projects, all academic units at MSU were expected to implement similar training, as teaching responsible practices in research, scholarship, and creative activities is fundamental to the integrity of every graduate program. In 2023, the training name was changed to Responsible and Ethical Conduct of Research (RECR).

> *Students who are supported by NSF grants may be required to complete additional specific training; they must meet the timeline and content requirements of training for that grant.
>
> *Students engaged in research involving human subjects must complete MSU Human Research Protection/IRB Certification submitting IRB approvals.
>
> Details are also on the PRIME Hub: https://michiganstate.sharepoint.com/sites/NatSci-PRIMEAdmin/PRIMEhub.

Basic RECR Education

All PRIME graduate students must complete the following basic RECR requirements by the end

of the second year in the program.

BASIC EDUCATION: Year 1

Within the first year of enrollment, students must complete the following online training components:

- Human Research Protection/ IRB Certification, https://orrs.msu.edu/train/

- The following 4 CITI online modules, https://orrs.msu.edu/train/programs/citi.html
  - Introduction to the Responsible Conduct of Research
  - Authorship
  - Plagiarism
  - Research Misconduct

All graduate students must also complete the following 3 hours of discussion-based training within their first year:

- One workshop in the Graduate School RECR Workshops series (1.5 hours; https://grad.msu.edu/recr)
- 1.5 hours in MTHE 926, MTHE 927, or other doctoral courses

BASIC EDUCATION: Year 2

Within the first 2 years of enrollment, students must complete 3 additional CITI online modules (https://orrs.msu.edu/train/programs/citi.html) from the following list (CITI course numbers are listed on the PRIME Hub):

- Collaborative Research
- Conflicts of Interest
- Data Management
- Financial Responsibility
- Mentoring
- Peer Review

All graduate students must also complete the following 3 hours of discussion-based training

within their second year:

- One workshop in the Graduate School RECR Workshops series (1.5 hours; https://grad.msu.edu/recr) and
- 1.5 hours in MTHE 954 or other doctoral courses

Annual Refresher Training

Starting in Year 3, all doctoral students must complete 3 hours of refresher training each year. This training may include:

- online CITI "refresher" course(s)beyond those required for initial training in Years 1 and 2. *Each CITI module completed counts as .75 hours (45 minutes).*
- Additional workshops in the Graduate School RECR Workshops series (1.5 hours each)
- Discussion-based training in courses and research groups
- Advisor RECR topic and discussion time, to be entered by the student in Campus Solutions/SIS. See list of acceptable topics in your RECR menu in SIS, where you enter your discussion time.

Documenting RECR Education

Online training completed at https://orrs.msu.edu/train/ will be recorded in the Ability information management system, which documents students' training. Completion of Grad School RECR Workshops is also recorded in Ability as Instructor-Led Training (RECR-ILT). Students need to log in to the RECR section of Campus Solutions to record any advisor discussion hours for advisor approval (for Year 3 and beyond Refresher Training). Students will also record their online modules and discussion-based training experiences on PRIME's RECR Record and Report form: https://prime.natsci.msu.edu/current-students/forms.aspx. The student will submit this form in the spring of each academic year as part of PRIME's annual review process. The student and their advisor will sign the report to confirm the RECR experiences. The report submitted each year will include RECR records from previous years so that it serves as a cumulative record of the student's RECR training. When the report—signed by student and advisor—is received by the PRIME program office, PRIME will verify completion of the year's requirements in Campus Solutions.

The following records are *automatically* entered into MSU systems. You should not need to do anything.

- CITI Programs - There is a delay of **up to 2 weeks** for your completions to pass from CITI to Ability system and over to RECR page in SIS Campus Solutions.
- Graduate School Workshops
- Unit-Specific Events and Classes - Your discussion-based RECR training time completed through brownbags, seminars, or academic class are entered by your academic unit personnel into the Ability system. If you do not see your completion records in Ability, contact your academic unit (advisor, graduate secretary, or academic program coordinator). If your records are complete in Ability, but not showing up in SIS Campus Solutions, contact the Graduate School for assistance.

***For Year 3 and beyond: Students record any One-on-One Advisor discussions and Research Project RECR discussions* as Advisor discussions in SIS Campus Solutions.**

Record conversations, mentoring, and coaching with your advisor in the RECR area of the Academic Progress tile in SIS Campus Solutions. Your entry will be approved by your advisor or unit personnel.

See the student Job Aid on the PRIME Hub for details.

DEI Training

As of Fall 2020, all students, faculty, and staff must complete MSU's online DEI training. It may or may not need to be completed on a yearly basis. Visit the Training page from MSU's Office of Regulatory Affairs for FAQs and the link to take the training in the Ability system, and watch for updates as this requirement evolves.

In addition to this training, we strongly encourage you to take advantage of any talks and workshops on campus related to being informed about issues of diversity, equity, and inclusion.

Guidelines for Integrity in Research and Creative Activities

A copy of *Guidelines for Integrity in Research and Creative Activities* is in the Appendix of this handbook. All graduate students and faculty are advised to read this document and commit to being in compliance with the guidelines. All students are urged to read the materials on the Institutional Review Board (IRB) web site https://hrpp.msu.edu/ (Human Research Protection Program) and to be in compliance with IRB regulations, returning to the web site often to stay abreast of new developments regarding research ethics.

Research Involving Human Subjects: Institutional Review Board (IRB)

All faculty members advising students in research are expected to communicate with their students the importance of being in complete compliance with the IRB and to read in detail the most recent instructions from IRB. All faculty teaching graduate students in courses also are to emphasize complete compliance with IRB principles and policies. Faculty teaching courses are also urged to determine when and how IRB principles can be covered in graduate courses.

Any research that is conducted by a graduate student in Mathematics Education that is not in compliance with IRB regulations cannot be used to fulfill course or degree requirements. Should a student conduct research that is not in compliance with IRB, at a minimum, the work will have to be repeated with no adjustment for time lost in carrying out the research that was not in compliance. The faculty consider IRB compliance to be very important. A very serious violation of IRB standards by a student, or repeated violations, would result in a referral to the appropriate Associate Dean of Education, who will refer the case to a College-level hearing board, as specified in University policy. Serious and/or repeated violations of IRB policies could result in sanctions up to and including dismissal from the graduate program.

Students are advised early in the program that they are to go to the MSU IRB web site—and read about human research protection training. They should take the Human subjects training: https://hrpp.msu.edu/training/index.html, which requires about a half hour, in the first semester at MSU and before involvement in any research.

It is emphasized that absolutely no research data can be collected until a project is in complete compliance with IRB and the collection of data before such compliance is a serious ethical breach. Once a student files with IRB, if the student receives any feedback that they do not understand, they should immediately consult with a member of the Mathematics Education faculty or the IRB staff for guidance as to how to proceed. Again, for emphasis, **absolutely no**

data can be collected without IRB approval. If any such data is collected it cannot be used for any degree purpose.

You may visit the IRB webpage at: http://hrpp.msu.edu/ for detailed information about all aspects of the IRB process.

Conduct of research without approval of IRB may result in dismissal from the program. Any incidence of plagiarism may result in dismissal from the program.

Although research with animals and chemical or biological materials is rare in our program, students should be aware that strict guidelines exist for any such research.

Academic Integrity

The related enterprises of scholarship and research are built upon honesty and integrity. Without these, we could not progress or even survive as a field of inquiry. When you become a graduate student in the Mathematics Education Graduate Program, you make an implicit promise to your classmates, your faculty, and your profession to conduct yourself in a scrupulously honest and upright way. If you fail to keep this promise, the consequences to yourself and everyone you work with are very serious. Academic integrity stands for many things. Obviously, it means you don't cheat on tests and exams, you don't plagiarize your papers, and you don't falsify your data or misrepresent your research findings. However, academic integrity refers to much more.

Academic integrity is more than just a set of rules—it is a way of life, a state of mind. It means that we must always think about the consequences of our choices, for ourselves, our program, and our University. Academic dishonesty is not simply a personal failure. It is a failure of the mentoring system and a failure of the evaluation system. It is a failure that tarnishes us all. Graduate students at MSU are governed by a code of ethics: https://spartanexperiences.msu.edu/about/handbook/regulations/student-group-regs-rulings-policies-ordinances/integrity-of-scholarship-and-grades.html. Please familiarize yourself with this code. It is also appropriate for you to have ongoing discussions with your advisor about integrity issues as they become relevant. Many situations are ambiguous. Actions can often be interpreted in several ways. Many behaviors can generate disagreements among well-meaning people. Often the only way to resolve these ambiguities is conversation and discussion with colleagues. If you have questions about ethical concerns, start by initiating a conversation with your advisor. If this is not possible, there are other resources in the program and in the University to help you resolve these issues.

Ethical Violations

The Office of the University Ombudsperson provides assistance to students, faculty, and staff in resolving University-related concerns. Such concerns include: student-faculty conflicts; communication problems; concerns about the university climate; and questions about what options are available for handling a problem according to Michigan State University policy. The University Ombudsperson also provides information about available resources and student/faculty rights and responsibilities, and has a copy of the Academic Grievance Hearing Procedures for the Mathematics Education Graduate Program. The office operates as a confidential, independent, and neutral resource. It does not provide notice to the University - that is, it does not speak or hear for the University.

Contact the Ombudsperson at any point during an issue when a confidential conversation or source of information may be needed. The Ombudsperson will listen to your concerns, give you information about university policies, help you evaluate the situation, and assist you in making plans to resolve the conflict. Contact information: Office of the University Ombudsperson,

129 N. Kedzie Hall (517) 353-8830, https://ombud.msu.edu/.

We expect you to adhere to the high ethical principles of our profession and University as you conduct your research, scholarship, and professional activities. If you violate these principles, you will face sanctions proportional to the gravity of your infraction. Disciplinary action for ethical violations can include dismissal from your graduate program. Because of the bedrock importance of ethical comportment, violators may not get a second chance. It is critically important for you to be aware of the ethical landscape as you travel through your graduate program. We encourage you to read the documents referenced above and to engage your faculty and fellow students in discussions of ethics in Mathematics Education, before problems arise. It is often in these discussions that you will learn to avoid ethical problems.

If you are accused of inappropriate behavior, the University has established a judicial structure and process for hearing and adjudicating alleged violations. The first step in this process is informal and should begin with the two parties trying to resolve the problem in an appropriate way. If this fails, you should go to the director of the Program to enlist help in resolving the problem. PRIME's Academic Grievance Hearing Procedures are posted on the Math Ed Graduate Student site in D2L and the PRIME Hub. If all program resources to resolve the problem have been exhausted, you can request a formal hearing from the College of Natural Science Review Board.

To read more about the University's judicial structure see Academic Rights and Responsibilities for Graduate Students: https://spartanexperiences.msu.edu/about/handbook/graduate-student-

rights-responsibilities/article-two-academic-rights-and-responsibilities-for-graduate-students.html. Additional descriptions can also be found in Article 5 of the Graduate Student's Rights and Responsibilities. These same procedures can be used to resolve conflicts between faculty and graduate students that do not involve issues of academic integrity including grievances. The Office of the Ombudsperson is also available to you to help you resolve conflicts with faculty or University administrators.

VIII. STUDENT CONDUCT AND CONFLICT RESOLUTION

Graduate students are an integral and highly valued part of the mathematics education research and teaching programs. Professional behavior is expected from all students and it is expected that students in our program carry out their duties at a high level of performance. Discussions of professional expectations including academic honesty, plagiarism, and MSU policies can be found at the Office of the Ombudsman: https://ombud.msu.edu/.

Occasionally problems involving students, teaching assistants, research assistants and faculty do arise. The Mathematics Education Graduate Program desires to resolve conflicts in a manner agreeable to all parties whenever possible. The Graduate School provides information and regularly conducts workshops on conflict resolution to aid such efforts: https://grad.msu.edu/phdcareers/career-support/skills#conflict.

- Should a conflict arise, the student should first attempt to resolve the conflict with the party or parties directly involved. Students should consider seeking the advice and support of their advisor in seeking to resolve conflicts. Should informal attempts fail to resolve the situation, a formal grievance must be submitted in writing to the Graduate Director. Should the efforts of the Graduate Director fail to resolve the situation, a meeting should be set up with the conflicting parties and the PRIME Grievance Hearing Board. The PRIME Grievance Hearing Board will attempt to resolve the conflict in keeping with the policies of the Program and University including the Guidelines for Graduate Student Advising and Mentoring Relationships and the Graduate Student Academic Grievance Procedures for PRIME. If satisfactory *resolution of a conflict is not achieved, the student may seek resolution through the College of Natural Science Graduate Hearing Board as defined in the Graduate Student Rights and Responsibilities* document: https://spartanexperiences.msu.edu/about/handbook/graduate-student-rights-responsibilities/index.html, or the student may seek the assistance of the University Ombudsperson. The University has established a judicial structure and process for hearing and adjudicating alleged violations of recognized graduate student rights and responsibilities. The University Ombudsperson has a copy of the Academic Grievance Hearing Procedures for the Mathematics Education Graduate Program. assistance of the University Ombudsperson. The University has established a judicial structure and process for hearing and adjudicating alleged violations of recognized graduate student rights and responsibilities. The University Ombudsperson has a copy of the Academic Grievance Hearing Procedures for the Mathematics Education Graduate Program.

In case of a conflict involving the faculty advisor, the student may request that the department provide a change of advisor (see Section V of this Handbook).

If the Program Director and/or Graduate Director is also serving as the student's advisor and conflict resolution is needed after informal attempts have failed, the student should submit a formal grievance in writing to the PRIME Grievance Hearing Board, through the Graduate Secretary. PRIME's Academic Grievance Hearing Procedures are posted on the Math Ed Graduate Student site in D2L.

IX. WORK RELATED POLICIES

Graduate assistantships are an important part of students' programs, not only for the financial support they provide but also for the opportunities for professional development that they offer. The Mathematics Education Graduate Program tries to provide all students with graduate assistantships in their program (involving both research and teaching) and administers assistantships in a manner consistent with University policies.

This section applies to graduate students employed within the Program in Mathematics Education. For students employed in other University Departments or Units, the policies of that Department or Unit apply.

Types of Assistantships

Graduate assistantships are of two basic types: Teaching Assistantships and Research Assistantships. Teaching Assistantships involve teaching students, usually undergraduates but sometimes Master's students, under the supervision of a faculty member or in a direct co-teaching role with a faculty member. Research Assistantships involve the conduct of research, typically under the direction of a faculty member or members. Graduate assistants are granted a nine credit per semester tuition waiver for Fall and Spring Semesters, and are automatically enrolled in a health insurance plan, the premium of which is paid by the University. For credits beyond the first nine, graduate assistants pay tuition at the in-state rate. Students are responsible for paying student voted taxes (e.g. COGS Tax, FM Radio Tax, State News Tax).

Finding and Applying for Assistantships

Incoming students are often supported first by a TA position, and then by a RA position and are most often supported throughout their Ph.D. program.

Students should be active in pursuing assistantship opportunities. First, they should make their interests and availability known to the graduate director and to their advisor. Second, they should inquire to faculty who might have or know of assistantships for which they might be appropriate. For Teaching Assistantships, inquiries should be made to the Graduate Director. Third, students can increase their likelihood of being chosen for assistantships by performing well in courses, attending seminar talks and brown bag presentations such as the mathematics education colloquium talks, and other sessions at which research and teaching projects may be discussed,

by developing relationships with professors, and by volunteering their time for projects where funded work is not yet available.

International students who are not native speakers of English must take the MSU SPEAKING test and pass the examination at the required level in order to be appointed as a TA. Students must have a score of at least 50 or waiver approval following an interview to satisfy the SPEAKING test requirement.

Decisions on TA appointments are made by the Graduate Director. Students will be informed, usually by the end of March, whether they will have a TA position for the following academic year, subject to continued progress in their Ph.D. program, continued adequate performance of their TA duties, and also subject to budgetary considerations. Since teaching is a required component of the Ph.D. program, students are expected to have TA duties during their studies in mathematics education. See our Assistantships, Fellowships, and Funding webpage for details: https://prime.natsci.msu.edu/current-students/assistantships-fellowships-and-funding.aspx.

Decisions on RA appointments are made by individual faculty or by faculty groups involved in group research projects. Students will be informed, usually by the end of March, whether their RA will be continued for the following academic year, or into the summer semester, if desired, subject to satisfactory performance of their RA duties and also subject to the budgetary considerations. Students should seek a faculty member with a RA opening before the end of their second year in the program.

Students who need to take a summer course for their program plan should consult with their RA supervisor (or the Graduate Director if they are not on an RA) early in the spring semester to see if they can be supported on a summer assistantship to pay for the tuition. Also, some research projects are able to fund hourly summer support for a graduate student who is not enrolled in a summer course.

Limits on Assistantships

Graduate students are permitted to work a maximum of 1/2-time (20 hours per week) to ensure that they make sufficient progress in their program. Half-time positions may involve a single 1/2-time assistantship or a combination of two 1/4-time assistantships.

In order to maximize the equitable distribution of available graduate assistantships and to accelerate academic progress, it will be an exceptional case for a student to hold positions

totaling more than 1/2-time or to hold positions beyond the fifth year. Students who seek assistantships that total more than 1/2-time or extend beyond the fifth year in their doctoral programs will require written assurances of adequate academic progress.

Assistantship Levels

Levels in all units are determined as follows:

Level 1: Employees with less than one year of experience as a graduate assistant or full support fellow.

Level 2: Employees with a master's degree or equivalent and/or two semesters' experience as a graduate assistant or full support fellow in the employing unit with a master's degree.

Level 3: Employees shall be appointed at Level 3 when they have completed a minimum number of semesters as a graduate assistant, provided that they have also attained a master's degree or equivalent. The graduate assistant experience must be in the employing unit or in a department at Michigan State University considered relevant by the chairperson or employing unit. The minimum number of semesters shall be four (4), five (5), or six (6), but in any case no greater than the practice stipulated in 2004. This practice is stipulated on the Human Resources website. PRIME's requirement for Level 3 status, effective August 1, 2011, is six semesters as a Graduate Assistant at MSU.

Outside Work for Pay

The students who are appointed as a TA or a RA are expected to devote their time to their academic studies and to their TA/RA responsibilities. No outside work for pay can be undertaken without discussing with the Graduate Director (in the case of TA's) or with their research advisors (in the case of RA's).

Rules for Conduct in Teaching Assistantships

Teaching assistantships are subject to a contract between Michigan State University and the Graduate Employees Union (GEU). That contract, which is renegotiated periodically, can be accessed at https://hr.msu.edu/contracts/documents/geu-2019-2023.pdf

This document also contains information about the monthly stipend and tuition payment associated with teaching assistantships, as well as information on job security and the procedure that may be invoked for unsatisfactory performance.

Fellowships

Students may request PRIME funds to support their research practicum or dissertation. These fellowship funds may come from their PRIME travel fund allotment for that year. See the PRIME website for college and university fellowship support.

All students are encouraged to apply for any available fellowships or other financial aid, internal or external to MSU. See https://grad.msu.edu/funding for funding opportunities at MSU. Also, check with the Assistant Director or Director of PRIME for fellowship funding opportunities. Many of these are posted on our website: https://prime.natsci.msu.edu/current-students/assistantships-fellowships-and-funding.aspx.

Note that receipt of externally funded fellowships by students who have written their own grant applications and worth at least $20,000 (direct costs) now makes the students eligible for the in-state tuition rate. The in-state tuition rate applies only to the semesters during which the student is supported by the fellowship. This policy applies only to grants funded through a competitive process by a US institution/agency/foundation. Funds obtained through non-competitive processes (e.g., need-based fellowships) or from international sources do not qualify the students for in-state tuition rates. For more information contact Melissa Del Rio (mdelrio@msu.edu) in 220 Chittenden Hall.

Health Insurance

“Student only” coverage will be automatically provided, at no cost to graduate assistants. Michigan State University will provide a full twelve months of coverage if your appointment is at least nine months. No enrollment is necessary, unless you wish to enroll your legal spouse and/or dependent children. Students on full university fellowship will need to self-enroll. Questions regarding enrollment, premium payment and coverage should be directed to Blue Care Network (BCN) Customer Service at 1-800-662-6667. Questions or issues that cannot be resolved with BCN may be directed to the MSU Benefits office at 1407 South Harrison Road, Room 140 Nisbet Building at 517-353-4434, ext 170. Information is available on the MSU Human Resources website at https://hr.msu.edu/benefits/graduate-assistants/index.html.

Illness/Injury/Pregnancy leave

A graduate assistant unable to fulfill their TA or RA duties because of illness, injury, or pregnancy must inform their TA or RA advisor immediately, as well as the Graduate Director.

The full policies for leave for illness, injury, pregnancy, adoption, and bereavement are spelled out in the current GEU contract: https://geuatmsu.org/about/geu-contract/

Graduate Assistants not covered by the Graduate Employees Union contract follow the policy outlined in the Academic Programs Catalog:
https://reg.msu.edu/AcademicPrograms/Text.aspx?Section=111#s351

Students who fail to carry out their duties and who fail to give adequate reason for their absence will be sent a warning letter immediately. If the student fails to respond appropriately, the student's stipend will be stopped 10 days after the warning letter is sent.

Grief Absence Policy

See the following link for information about Michigan State University's Grief Absence Policy:

https://reg.msu.edu/roinfo/notices/griefabsence.aspx

Course Load for Graduate Assistants

The University requires that every quarter-time and half-time graduate assistant carry at least three credits per semester during the academic year in order to be paid. Full time status for doctoral students is defined as a minimum of 1 credit for those students who either have successfully completed all comprehensive examinations and are actively engaged in dissertation research, or are doing department-approved-off-campus fieldwork related to preparation of their dissertation. None of these credits can be taken as a visitor. For those with any type of student loan, the Registrar's Office does not consider a master's student carrying less than nine credits, or a doctoral student carrying less than six credits, to be a full-time student. This could affect the repayment of your student loan since a financial institution will require that the Registrar's Office sign an affidavit stating that you are a full-time student. If this affidavit is not signed, you could be asked to begin repaying your loan immediately. International students should always follow the rules of SEVIS regarding proper course load.

Deviation from the minimum enrollment requirement of six credits for a master's degree student is permitted only during summer session, when a three-credit minimum is allowed for all types of assistantships, and in the semester in which the degree is granted. Assistants must enroll for at least the number of credits required to complete the degree requirements or meet the University's minimum registration requirement of one credit. This exception to the regular policy is to be used only one time per student per graduate degree earned. Please notify the Graduate Secretary prior to the beginning of the semester you plan to apply for your degree if you will be taking less than the required number of credits.

Doctoral students who have successfully completed all comprehensive examinations may enroll for only one credit beginning the semester after completion of the exam only if the Comprehensive Examinations form has been sent electronically to the Dean's office through GradPlan no later than thirty days (sixty days is preferable) prior to the beginning of the semester in which the one-credit full-time status will be effective.

For students who were enrolled in the spring and are taking **their comprehensive exams** during the immediate Summer Semester, the department can request a waiver of the requirement that the student be enrolled for at least one credit the semester of the comprehensive exam. These requests are to be directed to the Graduate School and must be endorsed by the student's department and college. **All students defending their thesis or dissertation in the summer need to be registered for at least one credit during that summer, regardless of their being enrolled in the preceding Spring Semester.**

Course Load for Non-Assistants

If you consider yourself a full-time student, we recommend a minimum of nine credits per semester course load. For those with any type of student loan, the Registrar's Office does not consider a master's student carrying less than nine credits, or a doctoral student carrying less than six credits, to be a full-time student. This could affect the repayment of your student loan since a financial institution will require that the Registrar's Office sign an affidavit stating that you are a full-time student. If this affidavit is not signed, you could be asked to begin repaying your loan immediately.

Disability Accommodations for Graduate Assistants

Graduate assistants (RAs, TAs, and TEs) are both students and employees. They are thus eligible for disability accommodations in both of these roles, and these accommodations are provided through distinct documents coordinated by RCPD: Students receive VISAs (Verified Individualized Services and Accommodations) or VISTAs (Verified Individualized Services and Temporary Accommodations) and employees receive SEADs (Statements of Employee Accommodation Determination). Graduate assistants can register for both using RCPD's MyProfile portal.

Travel

Financial support for travel of graduate students will be considered in categories of internal and external support. External support is from grants and contracts and will be at the discretion of the principal investigator. Internal support will be from the Program funds, and requires approval of the Graduate Director. Graduate students are also encouraged to present papers at state and local meetings, without financial subsidy.

Students who are scheduled to present research papers or to talk at regional or national meetings will be considered for funding. A flat rate will be provided by the Program for graduate students, subject to availability of funds. A Program travel request form is available online at the PRIME Hub and at https://prime.natsci.msu.edu/current-students/forms.aspx . Requests should be submitted at the beginning of the academic year for travel during that year. The University requires – and prudence dictates – that an economical means of travel and per diem accommodations be utilized. University "per diem" rates are available from the Graduate Secretary's office. **Any student traveling on University business must have a travel authorization form completed prior to leaving**.

If you are traveling abroad:

a. Check with the MSU Travel Clinic. They will let you know of any health risks or immunizations. https://travelclinic.msu.edu/

b. Check the International Studies and Programs website for issues related to safety around the world. https://www.isp.msu.edu/information-resources/international-travel/

c. Apply for assistance with travel funding via the Graduate School: https://grad.msu.edu/travel. If the Graduate School provides funding, they will also provide a MEDEX emergency card.

Work Hours and Vacation Time

All students should be actively engaged in research, literature reviews, or some other phase of the doctoral program even during semester breaks. Keep in mind that the Mathematics Education Program is a "full-time" program. Specific times on research and vacation schedules are to be

arranged between the graduate student and their advisor and/or project director. Graduate assistants should clarify with their supervisor expectations for work outside of the academic year or before classes begin, or after classes end, but within the contract dates.

Resources Related to Teaching Assistantships

Students should use every opportunity to improve their teaching. The University has many resources available including workshops, videotapes, and so on. The list below contains some examples of the kinds of resources students may draw upon.

- Certification in College Teaching
  https://grad.msu.edu/CCTP
- Certification in Teaching College Science and Mathematics
  https://natsci.msu.edu/graduate/future-students/certification-in-teaching.aspx
- Teaching Assistant Program and Resources
  https://grad.msu.edu/teaching

Policies on use of Departmental Resources

Departmental resources provided to the students for studying, teaching and research (e.g. computers, office supplies, copying, etc) cannot be used for personal purposes. The department of employment will provide a desk, office and/or building key/access, and a mailbox.

Additionally, if students are regularly meeting with faculty related to their individual research, students must be enrolled. An exception is a summer semester, unless if the dissertation defense occurs that summer and the student would need to be enrolled. If a student is working with an MSU faculty member on their dissertation or other requirement of the doctoral degree, the student must be enrolled for a minimum of 1 credit of MTHE 999. Note: Often faculty are not paid in the summer, need to focus on their own research, and do not have paid university responsibilities.

Electronic Mail

Each MSU student will be issued an account on the MSU email system. Mail users can exchange email with other students at MSU and elsewhere on the worldwide Internet. Much of the correspondence from the Mathematics Education Program office will be communicated via email. A quick start guide to the email system and sign in screen can be found at https://tech.msu.edu/technology/collaborative-tools/spartan365/spartan-mail/.

Telephone

If a telephone is provided, the assistant is responsible for paying for any long-distance calls made that are not work-related. Long distance calls related to research should be charged as agreed upon with the major professor/project director. There is no charge for on-campus calls.

X. UNIVERSITY RESOURCES

The University offers many resources to support graduate students in their studies. Students are encouraged to take advantage of the range of resources available at MSU. Some examples are:

- Academic Programs Catalog
  https://reg.msu.edu/AcademicPrograms/
- Anti-Discrimination Policy (ADP)
  https://hr.msu.edu/policies-procedures/university-wide/ADP_policy.html
- Career Services Network
  http://careernetwork.msu.edu/
- Center for Service-Learning and Civic Engagement
  https://servicelearning.msu.edu/
- Code of Teaching Responsibilities
  https://spartanexperiences.msu.edu/about/handbook/regulations/student-group-regs-rulings-policies-ordinances/code-of-teaching-responsibility/index.html
- College of Education Resources for Students
  https://education.msu.edu/resources/students/
- Counseling & Psychiatric Services
  https://caps.msu.edu/
- Disability and Reasonable Accommodation Policy
  https://civilrights.msu.edu/policies/disability-and-reasonable-accommodation-policy.html
- English Language Center
  https://elc.msu.edu/
- General Student Regulations
  https://spartanexperiences.msu.edu/about/handbook/regulations/general-student-regulations.html
- GEU Contract 2024-2028
  https://hr.msu.edu/contracts/documents/geu-2024-2028.pdf
- The Graduate School
  https://grad.msu.edu/
- Graduate Students Rights and Responsibilities (GSRR)
  https://spartanexperiences.msu.edu/about/handbook/graduate-student-rights-responsibilities/index.html

- Guidelines for Graduate Student Advising and Mentoring Relationships
  https://grad.msu.edu/msu-guidelines-graduate-student-mentoring-advising
- Guidelines for Integrity in Research and Creative Activities
  https://grad.msu.edu/researchintegrity
- Integrity of Scholarship and Grades
  https://spartanexperiences.msu.edu/about/handbook/regulations/student-group-regs-rulings-policies-ordinances/integrity-of-scholarship-and-grades.html
- MSU Libraries
  https://lib.msu.edu/
- Office of International Students and Scholars
  https://oiss.isp.msu.edu/
- Policy on Relationship Violence and Sexual Misconduct
  https://civilrights.msu.edu/policies/relationship-violence-and-sexual-misconduct-and-title-ix-policy.html
- Teaching Assistant Programs
  https://grad.msu.edu/teaching
- Writing Center
  https://writing.msu.edu/

XI. APPENDICES

Forms

The following pages contain information on various forms associated with program admission and completion.

Form	*Where to find*	*When to file*
Admission Application https://grad.msu.edu/apply	Online	When applying to the program
Annual Progress Report (Program forms)	D2L and PRIME Hub	End of Spring Semester each year
General Grad School forms https://grad.msu.edu/	Online	Varies
General Program forms https://prime.natsci.msu.edu/current-students/forms.aspx	Online	Varies
Application for Readmission https://reg.msu.edu/StuForms/ReAdmission/ReAdmission.aspx	Online	When applying to the program
Program Plan/courses/Guidance Committee members – GradPlan https://student.msu.edu	Online	End of first year or beginning of second year
Changes in Program Plan – GradPlan https://student.msu.edu	Online	When changes are made within the program plan/courses.
Guidance Committee Membership – GradPlan https://student.msu.edu	Online	Before completion of the program plan/First guidance committee Meeting

Changes in Guidance Committee Membership – GradPlan https://student.msu.edu	Online	Promptly when members are deleted or added
Guidance Committee Report https://prime.natsci.msu.edu/current-students/forms.aspx	Online	Yearly meeting with Guidance Committee
Research Practicum Proposal Approval https://prime.natsci.msu.edu/current-students/forms.aspx	Online	After practicum proposal is approved; practicum committee members
Research Practicum Completion https://prime.natsci.msu.edu/current-students/forms.aspx	Online	After the written report and oral exam are successfully completed
Record of Comprehensive Examinations https://prime.natsci.msu.edu/current-students/forms.aspx	Online, by program office	After the written and oral exams are completed
Dissertation Director Approval https://prime.natsci.msu.edu/current-students/forms.aspx	Online	Immediately after first meeting of guidance committee to discuss your dissertation plans
Dissertation Proposal Approval https://prime.natsci.msu.edu/current-students/forms.aspx	Online	Immediately after the dissertation proposal meeting with your guidance committee
Request for Extension of Time to Complete Degree Requirements https://grad.msu.edu/forms	Online	The semester before the completion of eighth year
Notice of Doctoral Dissertation Oral Examination https://prime.natsci.msu.edu/current-students/forms.aspx	Online	Two months prior to Oral Examination
Record of Dissertation and Oral Examination https://prime.natsci.msu.edu/current-students/forms.aspx	Online, by program office	At the time of the Oral Examination
Travel Fund Request (Program form: https://prime.natsci.msu.edu/current-students/forms.aspx)	Online	At the beginning of each academic year in which student's original work will be presented at a conference

(Grad School: https://grad.msu.edu/travel)		
Big 10 Academic Alliance Traveling Scholar Program Application and Introduction Information below: https://grad.msu.edu/btaa https://www-s.cic.net/OnlineApplications/ts/tsapp/ https://www.btaa.org/resources-for/students/traveling-scholar-program/introduction	Online	Semester prior to class at another institution

Guidelines for Integrity in Research and Creative Activities

The conduct of research and creative activities by faculty, staff, and students is central to the mission of Michigan State University[6] and is an institutional priority. Faculty, staff, and students work in a rich and competitive environment for the common purpose of learning, creating new knowledge, and disseminating information and ideas for the benefit of their peers and the general public. The stature and reputation of MSU as a research university are based on the commitment of its faculty, staff, and students to excellence in scholarly and creative activities and to the highest standards of professional integrity. As a partner in scholarly endeavors, MSU is committed to creating an environment that promotes ethical conduct and integrity in research and creative activities.

Innovative ideas and advances in research and creative activities have the potential to generate professional and public recognition and, in some instances, commercial interest and financial gain. In rare cases, such benefits may become motivating factors to violate professional ethics. Pressures to publish, to obtain research grants, or to complete academic requirements may also lead to an erosion of professional integrity.

Breaches in professional ethics range from questionable research practices to misconduct.[7] The primary responsibility for adhering to professional standards lies with the individual scholar. It is, however, also the responsibility of advisors and of the disciplinary community at large. Passive acceptance of improper practices lowers inhibitions to violate professional ethics.

Integrity in research and creative activities is based not only on sound disciplinary practice but also on a commitment to basic personal values such as fairness, equity, honesty, and respect. These guidelines are intended to promote high professional standards by everyone-- faculty, staff, and students alike.

KEY PRINCIPLES

Integrity in research and creative activities embodies a range of practices that includes:

Honesty in proposing, performing, and reporting research

Recognition of prior work

Confidentiality in peer review

Disclosure of potential conflicts of interest

Compliance with institutional and sponsor requirements

Protection of human subjects and humane care of animals in the conduct of research

Collegiality in scholarly interactions and sharing of resources

Adherence to fair and open relationships between senior scholars and their coworkers

Honesty in proposing, performing, and reporting research. The foundation underlying all research is uncompromising honesty in presenting one's own ideas in research proposals, in performing one's research, and in reporting one's data. Detailed and accurate records of primary data must be kept as unalterable documentation of one's research and must be available for scrutiny and critique. It is expected that researchers will always be truthful and explicit in disclosing what was done, how it was done, and what results were obtained. To this end, research aims, methods, and outcomes must be described in sufficient detail such that others can judge the quality of what is reported and can reproduce the data. Results from valid observations and tests that run counter to expectations must be reported along with supportive data.

Recognition of prior work. Research proposals, original research, and creative endeavors often build on one's own work and also on the work of others. Both published and unpublished work must always be properly credited. Reporting the work of others as if it were one's own is plagiarism. Graduate advisors and members of guidance committees have a unique role in guiding the independent research and creative activities of students. Information learned through private discussions or committee meetings should be respected as proprietary and accorded the same protection granted to information obtained in any peer-review process.

Confidentiality in peer review. Critical and impartial review by respected disciplinary peers is the foundation for important decisions in the evaluation of internal and external funding requests, allocation of resources, publication of research results, granting of awards, and in other scholarly decisions. The peer-review process involves the sharing of information for scholarly assessment on behalf of the larger disciplinary community. The integrity of this process depends on confidentiality until the information is released to the public. Therefore, the contents of research proposals, of manuscripts submitted for publication, and of other scholarly documents under

review should be considered privileged information not to be shared with others, including students and staff, without explicit permission by the authority requesting the review. Ideas and results learned through the peer-review process should not be made use of prior to their presentation in a public forum or their release through publication.

Disclosure of potential conflicts of interest. There is real or perceived conflict of interest when a researcher has material or personal interest that could compromise the integrity of the scholarship. It is, therefore, imperative that potential conflicts of interest be considered and acted upon appropriately by the researcher. Some federal sponsors require the University to implement formal conflict of interest policies. It is the responsibility of all researchers to be aware of and comply with such requirements.

Compliance with institutional and sponsor requirements. Investigators are granted broad freedoms in making decisions concerning their research. These decisions are, however, still guided, and in some cases limited, by the laws, regulations, and procedures that have been established by the University and sponsors of research to protect the integrity of the research process and the uses of the information developed for the common good. Although the legal agreement underlying the funding of a sponsored project is a matter between the sponsor and the University, the primary responsibility for management of a sponsored project rests with the principal investigator and their academic unit.

Protection of human subjects and humane care of animals in the conduct of research. Research techniques should not violate established professional ethics or federal and state requirements pertaining to the health, safety, privacy, and protection of human beings, or to the welfare of animal subjects. Whereas it is the responsibility of faculty to assist students and staff in complying with such requirements, it is the responsibility of all researchers to be aware of and to comply with such requirements.

Collegiality in scholarly interactions and sharing of resources. Collegiality in scholarly interactions, including open communications and sharing of resources, facilitates progress in research and creative activities for the good of the community. At the same time, it has to be understood that scholars who first report important findings are both recognized for their discovery and afforded intellectual property rights that permit discretion in the use and sharing of their discoveries and inventions. Balancing openness and protecting the intellectual property rights of individuals and the institution will always be a challenge for the community. Once the

results of research or creative activities have been published or otherwise communicated to the public, scholars are expected to share materials and information on methodologies with their colleagues according to the tradition of their discipline.

Faculty advisors have a particular responsibility to respect and protect the intellectual property rights of their advisees. A clear understanding must be reached during the course of the project on who will be entitled to continue what part of the overall research program after the advisee leaves for an independent position. Faculty advisors should also strive to protect junior scholars from abuses by others who have gained knowledge of the junior scholar's results during the mentoring process, for example, as members of guidance committees.

Adherence to fair and open relationships between senior scholars and their coworkers. The relationship between senior scholars and their coworkers should be based on mutual respect, trust, honesty, fairness in the assignment of effort and credit, open communications, and accountability. The principles that will be used to establish authorship and ordering of authors on presentations of results must be communicated early and clearly to all coworkers. These principles should be determined objectively according to the standards of the discipline, with the understanding that such standards may not be the same as those used to assign credit for contributions to intellectual property. It is the responsibility of the faculty to protect the freedom to publish results of research and creative activities. The University has affirmed the right of its scholars for first publication except for “exigencies of national defense”.[8] It is also the responsibility of the faculty to recognize and balance their dual roles as investigators and advisors in interacting with graduate students of their group, especially when a student's efforts do not contribute directly to the completion of their degree requirements.

Misconduct in Research and Creative Activities

Federal[9] and University[7] policies define misconduct to include fabrication (making up data and recording or reporting them), falsification (manipulating research materials, equipment or processes, or changing or omitting data such that the research is not accurately represented in the record), and plagiarism (appropriation of another person's ideas, processes, results, or words without giving appropriate credit). Serious or continuing non-compliance with government regulations pertaining to research may constitute misconduct as well. University policy also defines retaliation against whistle blowers as misconduct. Misconduct does not include honest errors or honest differences of opinion in the interpretation or judgment of data.

The University views misconduct to be the most egregious violation of standards of integrity and as grounds for disciplinary action, including the termination of employment of faculty and staff, dismissal of students, and revocation of degrees. It is the responsibility of faculty, staff, and students alike to understand the University's policy on misconduct in research and creative activities[7], to report perceived acts of misconduct of which they have direct knowledge to the University Intellectual Integrity Officer, and to protect the rights and privacy of individuals making such reports in good faith.

RESOURCES

"Guidelines on Authorship", Endorsed by the University Research Council, January 15, 1998 (https://vprgs.msu.edu/michigan-state-university-guidelines-authorship)

"Integrity in Scientific Research: Creating an Environment that Promotes Responsible Conduct", National Academies Press, Washington, D.C., 2002, 216 pp (http://www.nap.edu/openbook.php?isbn=0309084792)

"Research Data: Management, Control, and Access Guidelines", Endorsed by the University Research Council, February 7, 2001 (http://rio.msu.edu/research-data)

Footnotes

6 Michigan State University "Mission Statement" approved by the Board of Trustees on June 24-25, 1982, (*acadgov.msu.edu/executive/documents/MSU**MissionStatement**10-07.pdf*)

7 MSU Faculty Handbook, Chapter VI, "Research and Creative Endeavor-Procedures Concerning Allegations of Misconduct in Research and Creative Activities" https://hr.msu.edu/policies-procedures/faculty-academic-staff/faculty-handbook/6Section-Research.html

8 MSU Faculty Handbook, Chapter VI, “Research and Creative Endeavor--Sponsored Research and Creative Endeavor” https://hr.msu.edu/policies-procedures/faculty-academic-staff/faculty-handbook/6Section-Research.html

9 Office of Science and Technology Policy, “Notice of Final Policy”, 65 CFR 76260

Students will be briefed during their orientation to graduate study about their rights and responsibilities under the MSU-GEU contract. The contract is available at

https://hr.msu.edu/contracts/documents/geu-2019-2023.pdf and all students should read it.

Graduate students will also receive information about health care benefits at the orientation meeting. Students are urged to review carefully the information about graduate student health insurance at

https://hr.msu.edu/benefits/graduate-assistants/index.html