

Doctor of Philosophy in Mathematics Education

Program Handbook

**Mathematics Education Graduate Program
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I. Program Overview

The Doctor of Philosophy in Mathematics Education is designed for persons 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 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 each PhD student can pursue the equivalent of a master's degree or more in mathematics suitable to his or her area of focus. Each student will plan with his or her 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. For example, for candidates prepared as elementary teachers with at least a minor in mathematics (i.e., at least 20 credits in college-level mathematics, including calculus), provisional admission is possible. 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. The Graduate Record Examination (GRE) General Test is required of all applicants.

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 entry to the Ph.D. program will be admitted to the M.S. in Mathematics Education program and provided with specific conditions to be met before admission to the Ph.D. program. Upon successful completion of these requirements, and the qualifying examination, the student may re-apply to the Ph.D. program.

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. Applications are typically accepted into February for consideration for assistantships for the following fall.

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

Freda Cruél, Mathematics Education Graduate Secretary
354 Farm Lane

Room 211 North Kedzie
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 [Freda Cruél](mailto:bunt@msu.edu) at bunt@msu.edu.

Applicants from other MSU graduate programs

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

If you were enrolled in an MSU degree program at some point but if you have not been enrolled in the past year, 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>.

Follow the appropriate link (domestic applicant or international applicant) to begin your application. When an application form has been started, it will be visible to the **Mathematics Education Doctoral Program** by using the code **7069**. The application fee (payable in U.S. dollars drawn on a U.S. bank) is \$50 for domestic and international students. Note that international students also need to complete a Financial Proof Form 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 using the box at the top right side of the Graduate Education admissions gradportal site: <https://admissions.msu.edu/gradportal/>. Then, you can upload the rest of your application materials, as well as register your recommenders, using this online gradportal.

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 Graduate Secretary, Freda Cruél at bunt@msu.edu.

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 graduate course requirements. 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://admissions.msu.edu/gradportal/>. Again, if you have any issues with the site, please send it via email to the Graduate Secretary. 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 your 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://admissions.msu.edu/gradportal/>. Again, if you have any issues with the site, please send it via email to the Graduate Secretary. If you completed 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. 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://admissions.msu.edu/gradportal/>.

6. Transcripts

Send official transcripts from all universities attended, except Michigan State University, to the Graduate Secretary at the address above. Do not send copies to the graduate school or to Admissions. You may upload unofficial copies to the gradportal site: <https://admissions.msu.edu/gradportal/>. Official e-transcripts will be sent directly to Admissions.

7. GRE Scores

The three standard sections of the GRE: verbal, quantitative, and analytical writing are required for admission. If you have not taken the GRE yet, please **select Michigan State University** as a recipient of your scores, **code 1465**. The scores go directly to MSU, so you really don't need a department code anymore. It would also help if, once you receive your scores, you were to upload an unofficial copy of the results to the online gradportal, along with your application materials, since official results often take several weeks to be processed. GRE scores are valid for 5 years. Applicants who have taken the test within the past 5 years should have official test results sent to MSU and upload a copy of their score report to the online gradportal. GRE Official Website: www.gre.org

8. TOEFL Scores (International Students Only)

Applicants for whom English is not their primary language are required to submit TOEFL (Test of English as a Foreign Language) scores, and the test must be taken within two years of the application. For the paper-based test (PBT), MSU requires a minimum average score of 550, with no subscore below 52.

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.

Note: If the student has completed a degree program in an English speaking country, he or she can request a waiver of the TOEFL requirement. Once the program admissions committee is convinced of the student's English language skills based on past program completion and other evidence, it will ask the University to waive the requirement. This waiver is usually granted, but the university may require the student to take the English proficiency test (MSU Speaking Test) upon arrival at MSU. See more English Language Proficiency information at https://prime.natsci.msu.edu/_prime/assets/File/EnglishLanguageRequirements.pdf

9. Information on Chinese Graduate Applications

During the application process, applicants submit certified copies (sealed and stamped by institutions) of all post-secondary transcripts, graduation certificates and degrees directly to the MSU Department to which they are applying. MSU requires these documents in the original language (Chinese) as well as an official English translation.

Effective Spring 2015, Michigan State University will require all incoming ADMITTED students pursuing degrees or who have earned degrees from universities in China to submit a verification report (English version) through the China Academic Degrees and Graduate Education Development Center (CDGDC) for their final bachelor degree transcripts and bachelor degree. All verification reports need to be sent to the MSU Office of Admissions directly by CDGDC. For those Master degree granted students, we only need the undergraduate level verification report from CDGDC. The Mathematics Education Graduate Program will reimburse you for the cost of the verification once you **register** at MSU.

Please refer to the CDGDC website for more information:

<http://www.chinadegrees.cn/en/>

The process is straightforward. Students in China send copies of their documents to the CDGDC along with payment. CDGDC verifies grades and degrees (depending on what is requested) by accessing national and provincial databases and contacting universities directly. CDGDC then sends via courier service directly to the U.S. university stamped copies of the verified documents along with a statement noting in English what the degree is and whether the university and program is recognized by the Chinese Ministry of Education. The student pays approximately \$40 dollars for this service.

CDGDC operates underneath the Ministry of Education for the purpose of verifying the authenticity of transcripts and degrees granted at the post-secondary level. They do this not only for overseas universities, but for employers and organizations within China as well. WES, ECE, AACRAO, and Educational Perspectives require students using their credential services to order a CDGDC verification. NAFSA and the American Embassy in Beijing have also endorsed CDGDC. MSU has required this credential for transfer applicants since fall 2012 and has had no difficulty with students obtaining this verification.

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 will be accepted if space is available in the program.

Required Application Materials

Note: All forms needed for application to the program are linked to from the program web page <https://prime.natsci.msu.edu/prospective-students/application-and-admission/application-process/>.

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
- TOEFL scores (international students only)
- GRE score reports

Send the following to the **Mathematics Education Ph.D. Program Secretary**, N211 North Kedzie, 354 Farm Lane, Michigan State University, East Lansing, MI 48824:

- Official (sealed) versions of college transcripts
- Photocopy of TOEFL scores (international students only)

- Vita (these are preferred to be submitted online)
- Reference letters (these are preferred to be submitted online)
- Goal statement (these are preferred to be submitted online)
- Writing sample (these are preferred to be submitted online)

Special Information for International Applicants

Application Process for International Students

The application process for international students is somewhat different:

Your **application fee** (\$50) should be paid by check or money order payable to Michigan State University and attached to the application form. Checks drawn outside the U.S. must be **payable**

in U.S. funds through a U.S. bank. Checks drawn on foreign banks that do not have a correspondent U.S. bank may be returned. 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 a **TOEFL** score and this score must be **550 or higher** on the paper-based test (80 on the internet-based test). (See above for more information.)

MSU Speaking Test

The English-language campus minimum proficiency score is 50 on the MSU Speaking test, for international students to serve as teaching assistants. Those individuals who need to take this test should contact the English Language Center at 353-0800, via their website:

<http://elc.msu.edu/tests/msu-speaking-test/>, or go in person to B230 Wells Hall for information.

The schedule for the MSU Speaking test is at: <http://elc.msu.edu/tests/msu-speaking-test/msu-speaking-test-schedule/>.

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 English 097 (<https://grad.msu.edu/tap> and <http://vetp.isp.msu.edu/>). For example, 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, <https://grad.msu.edu/tap/buddy>, 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 buddy. 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 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 international application, please get in touch with the MSU **Office of Admissions**, 250 Administration Building or go to their web page (<http://admissions.msu.edu/>). This and the other links mentioned below are accessible from the program web page: <http://prime.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)** (<http://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, go to the web page for the **Campus Living Services, Residential and Hospitality Services** (<http://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 needs to 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 <http://education.msu.edu/resources/financial/assistantships.asp>, and the Program's website at <https://prime.natsci.msu.edu/research-projects/>, and also through the program web page) and apply directly to the specified employer stating your qualifications and your desire to fill the particular opening. Hiring decisions are worked out between each employer and the students who apply.

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 about these things.

For these reasons, some international students pay for their doctoral study in other ways. The most common situation is that they receive financial support from their home government or home educational institution. A number of them also draw on their own savings or receive support from their families. Still others find alternative sources of income through assistantships elsewhere on campus (for example, teaching a lower-level class for the Mathematics Department).

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. The Mathematics Education doctoral program requires at least 13 courses, plus 4 mathematics courses. 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. Each student is expected to work closely with his or her guidance committee, 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, which is currently available at: <https://login.msu.edu/?App=J3205>). 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 after completing MTHE 926 and/or MTHE 927, and at least one research methods course, typically in the second year. 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. 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 done 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 401/2, TE 407/8, TE 802/4, TE 801/3)
- Field instructor in the Teacher Education program (TE 501/2)
- TA in courses for teachers in the Mathematics Department (MTH 201/2) or other mathematics content courses

Other teaching assignments may be arranged by the student and advisor. To provide support and professional development (and to fulfill the University's contractual obligations to the Graduate Employees Union), all students will enroll in MTHE 879 or TE 994, typically before or concurrent with their first teaching assignments.

Annual Reviews

Students admitted to the mathematics education doctoral program are expected to progress toward completion of degree requirements in a timely fashion. Each student is required to submit materials for review each spring, beginning at the end of the first year in the program. 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

<i>Category</i>	<i>Requirement (credit total)</i>	<i>Required Courses and Course Options</i>
Introduction to Mathematics Education Research	Both of the following courses (6)	MTHE 926 Proseminar in Mathematics Education I MTHE 927 Proseminar in Mathematics Education II
Pedagogy	Three courses in Pedagogy and Content with at least one from each category (9)	CEP 913 Psychology and Pedagogy of Mathematics MTHE 997 Special Topics in Mathematics Education TE 950 Mathematical Ways of Knowing
Content		MTHE 840 Critical Content of School Mathematics: Number and Operations MTHE 841 Critical Content of School Mathematics: Algebra MTHE 842 Critical Content of School Mathematics: Geometry
Teaching	One of the following courses (2 or 3)	MTHE 879 Teaching College Mathematics (3) TE 994 Laboratory and Field Experience in Curriculum, Teaching & Educational Policy (2)
Research Design	The following course (3)	MTHE 954 Design and Methods in Mathematics Education Research
Research Methods	At least one approved quantitative methods course and one approved qualitative methods course. A partial list of approved courses is on the right. (6)	CEP 931 Qualitative Methods in Educational Research CEP 933 Quantitative Methods in Educational Research II EAD 955B Field Research Methods in Educational Administration STT 422 Statistics II STT 801 Design of Experiments STT 825 Sample Surveys STT 843 Multivariate Analysis
Foundations of Education	One course in general ed foundations, policy, or learning & development (3)	Selected from a list of approved courses available from the student's guidance committee.
Mathematics/ Statistics	At least four courses (12)	To meet this requirement, courses must be at the 400-level or above and must be appropriate to the student's program of study, excluding Mathematics 443.
Cognate	At least three courses (9)	The student should consult with his or her guidance committee to select cognate courses that are appropriate to the student's program of study.

Research Practicum	The student must successfully complete a research practicum and the following course. (3)	MTHE 995 Research Practicum
Dissertation Research	(at least 24 credits, but no more than 30)	Twenty-four credits of MTHE 999 Doctoral Dissertation Research

All students are expected to have a notebook computer or laptop for use at MSU.

Developing a Program Plan

Working within this framework, each student works closely with his or her 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 students' **program plan**, GradPlan, which lists the specific courses. 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/>.

Note that in addition to actual 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 30 credits of MTHE 999.

GradPlan

In 2013-14, "GradPlan" became the official site for all doctoral student program planning, guidance committee reports and changes, comprehensive and final defense reports, submission of the dissertation to the Graduate School, and the final University degree certification. It provides electronic circulation for checking/approvals and generates automatic emails when needed. GradPlan can be found at: <https://login.msu.edu/?App=J3205>

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. **GradPlan is also the only way final degree certification/degree audit will be conducted beginning in Spring 2017.** GradPlan replaces the Report of the Guidance Committee, Record of Comprehensive Exam, the Dissertation Final Defense form and the final certification form. The Graduate School will certify the acceptance of each dissertation final format using GradAudit. The Graduate Secretary or other department or college level designee has the final GradAudit sign off. The Office of the Registrar and the departments/units will access Degree Audit to complete degree certification once a student completes an application for graduation and all degree requirements are met. GradPlan, GradInfo and GradAudit help guides may be found at: <https://gradinfo.msu.edu/help.asp>. Detailed instructions for the doctoral students and Guidebooks are also available 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, therefore, must be taken 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 or 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 his/her 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 or 927 (Proseminar 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.

Each student will meet with his or her practicum committee before or during the last week of the Fall Semester to present the proposal.

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.

Comprehensive Examination

Students typically take the Comprehensive Examination in the Spring Semester of their third year or Fall Semester of their fourth year of doctoral study. To take the Examination, students must have completed their Research Practicum and substantially completed their prescribed course work, as defined by the Guidance Committee. Except in extraordinary circumstances, the examination should be taken by the end of the Fall Semester of the fourth year in the program.

The overall purpose of the Comprehensive Examination is to assess students' readiness to enter the last phase of their program, in which they propose and complete their dissertation research. Pursuant to that goal, the Examination assesses students' competency in three areas:

- Depth of knowledge in mathematics education. Depth of knowledge is demonstrated by the ability to complete a careful analysis of an issue or question in mathematics education.
- Breadth of knowledge in mathematics education. Breadth of knowledge is demonstrated by the ability to synthesize different studies, and thus requires familiarity with a body of literature.
- The ability to construct effective scholarly arguments.

The Comprehensive Examination has written and oral components. The Oral Examination is conducted after the written components (Breadth and Depth) have been submitted and both received a score of Pass.

Written Examination Components

Students are evaluated on two categories of scholarly writing: One demonstrating *breadth* of knowledge and one demonstrating *depth* of knowledge.

Breadth Test:

The student responds to two questions written by the Comprehensive Examination Committee that address issues relevant to the doctoral program as a whole and on which all students, regardless of area of specialization, should be conversant. To indicate the areas of work that may be covered on the Examination, the Comprehensive Examination Committee has prepared a list of core readings, drawn from nominations of program faculty, which will be available to students at least one year in advance of the semester in which they take the Examination. In addition, students have access to some Breadth questions posed in prior administrations.

Depth Paper:

The student submits one written article or chapter that is suitable in quality and format for submission for publication in a journal or book. (Note: submissible quality means good enough to avoid editorial rejection and merit peer review.) With this standard in mind, students are encouraged to rework and improve an existing paper they have written for a course or professional conference. In preparing their Depth papers, students must seek and receive feedback on prior drafts from Guidance Committee members, other program faculty, and/or advanced students in the PRIME

program. When applying to take the Comprehensive Examination, the student submits a Depth Paper Proposal (details below) that describes the focus and history of the paper. It must be approved by the student's Advisor and then the Comprehensive Examination Committee.

Applying for the Comprehensive Examination

Students must apply for the Fall Comprehensive Examination in the middle of the preceding April and for the Spring Comprehensive Examination in the middle of the preceding November. Students and program faculty receive via e-mail the Comprehensive Examination application and other related materials either from the PRIME Graduate Secretary or the Program Coordinator. These materials include instructions for the Examination process, a list of core readings, the Examination timeline for the semester, the application form, the Depth Paper proposal form, and the scoring rubric. These materials are also available on the Mathematics Education Graduate Student D2L site. A collection of prior Breadth Test questions is also posted on the Mathematics Education Graduate Student D2L site. Students who wish to take the Examination should return the completed application and Depth Paper proposal form, signed by the advisor, to the Graduate Secretary.

Written Examination Procedures (Breadth and Depth)

Depth Paper Proposal Evaluation

The Depth Paper proposal, completed by the student in collaboration with the Advisor and Guidance Committee, describes the paper that will be submitted for the Depth component of the Examination. The Depth Paper proposal form is available from the PRIME Graduate Secretary and the program web-site, and at the Mathematics Education Graduate Student D2L site. The proposal must be approved by the student's Advisor and the Comprehensive Examination Committee. It must be submitted with the Comprehensive Examination application. The Comprehensive Examination Committee reviews the proposal and approves it or provides feedback concerning revisions of the proposal to the student within four weeks after the application deadline.

Breadth Test

The Breadth Test takes place during one week early in the semester. Students respond to two questions, one on Monday-Tuesday and one on Thursday-Friday of the test week. For each of those two writing periods, the student responds to one of two given questions. Students are given flexibility in choosing when during those two days they write their responses; any consecutive eight-hour period is permitted. This allows students to write when they are most productive and to avoid missing class sessions in courses they are taking that semester.

Students will be provided work space on campus, or may write their responses off campus. Students may request additional time in extenuating circumstances. In particular, if English is their second language, students may request up to two days instead of the usual one day for writing Breadth Test answers.

Depth Paper Completion

From the time the Depth Paper proposal has been accepted and acceptance communicated to the student, the student has two months or more to complete work on the Paper and submit it. During that time, the student may consult with the Advisor (or other faculty) and seek advice on issues of content and structure, but the paper submitted must be solely the student's work. (Timelines for the Depth Paper are different for Fall and Spring Semester; the dates for each Examination are provided to all students for each semester well in advance of the application deadlines.)

All written responses (Breadth Test and Depth Paper) must be double-spaced and follow [APA style](#). Depth Papers should not exceed a 40-page maximum, including references.

Oral Examination

A 90-minute Oral Examination will be conducted after (and presuming) the student passes both written components of the Examination. The purpose of the Oral Examination is to assess the student's ability to justify and elaborate their arguments and respond to questions about the work presented in the written parts of the Examination. Though the Oral may address issues raised in the two Breadth responses, significant time is allotted to the Depth Paper, recognizing its potential for publication. The examining committee will be the three faculty members who evaluated the written responses for that student.

Grading of the Comprehensive Examination

For each student taking the Examination, the Comprehensive Exam Committee chair will assign three faculty members to score all responses for that student. The three faculty members will be two members of the Comprehensive Examination Committee and the student's Advisor. One of the two members of the Comprehensive Examination Committee will serve as Chair.

All three responses (two Breadth responses and the Depth paper) are scored independently by the three faculty scorers, on each of four dimensions: (1) Responsiveness to (or rationale for) the proposed question, (2) evidence of breadth (or depth) of knowledge, (3) effectiveness of argument, and (4) clarity of writing. From those domain scores, each faculty scorer provides an overall score for each response of Pass, Revise, or Fail. The Comprehensive Examination Committee uses those scores, consulting with student's Advisors as needed, to produce a Pass or Fail outcome for the Breadth Test and a Pass, Revise, or Fail outcome for the Depth Paper.

If a student's Depth Paper is scored a Revise, the student may seek and receive guidance to inform the revision, just as in the initial development of the paper. But as before, the revised Depth Paper must be solely the student's work. The revised paper must be submitted within two weeks of the date the student receives the decision letter. The decision letter will contain the exact date of resubmission. The Advisor and the Chair of the student's Examination Committee read the revised paper and determine whether or not the revision is a Pass. If the revision is judged a Pass, the student advances to the Oral Examination. If the revision is scored a Fail, the student fails the Depth portion of the Examination.

The Oral Examination has two possible results: Pass or Fail. The result is communicated directly to the student at the end of the Oral.

To pass their Comprehensive Examination, students must pass all three parts (written breadth, written depth, and the Oral) of the Examination. If a student passes one part of the Examination but fails another part, the Examination is a Fail. Students are eligible to retake the failed part of the examination in the next administration of the Comprehensive Examination. Students who retake the Breadth Test will respond to new questions. Students who retake the Depth Paper will submit a new proposal. The proposed paper must satisfy the student's Advisor and the Comprehensive Examination Committee as being sufficiently different from the prior Depth Paper to merit the characterization of a "new paper." Students who retake their Oral Examination will respond to questions from members of their examining committee on the substance of the students' three written responses.

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 and submit it to the Graduate Program Secretary. 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 is a presentation open to faculty members and members of the public without a vote. Only dissertation committee members may attend the second part, which is the examination portion of the defense. For more information visit:

<http://www.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: <http://www.proquest.com/products-services/dissertations/Submitting-Graduate-Works.html>.

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 Assistant Director for Digital Information, currently Shawn Nicholson (nicho147@mail.lib.msu.edu).

Commencement

Effective Fall 2012 the Graduate Advanced Degree Ceremonies will 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 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

<i>Category</i>	<i>Requirement (credit total)</i>	<i>Required Courses and Course Options</i>
Introduction to Mathematics Education Research	Both of the following courses (6)	MTHE 926 Proseminar in Mathematics Education I MTHE 927 Proseminar in Mathematics Education II
Pedagogy	Three courses in Pedagogy and Content with at least one from each category (9)	CEP 913 Psychology and Pedagogy of Mathematics MTHE 997 Special Topics in Mathematics Education TE 950 Mathematical Ways of Knowing
Content		MTHE 840 Critical Content of School Mathematics: Number and Operations MTHE 841 Critical Content of School Mathematics: Algebra MTHE 842 Critical Content of School Mathematics: Geometry
Teaching	One of the following courses (2 or 3)	MTHE 879 Teaching College Mathematics (3) TE 994 Laboratory and Field Experience in Curriculum, Teaching & Educational Policy (2)
Research Design	The following course (3)	MTHE 954 Design and Methods in Mathematics Education Research
Research Methods	At least one approved quantitative methods course and one approved qualitative methods course. A partial list of approved courses is on the right. (6)	CEP 931 Qualitative Methods in Educational Research CEP 933 Quantitative Methods in Educational Research II EAD 955B Field Research Methods in Educational Administration STT 422 Statistics II STT 801 Design of Experiments STT 825 Sample Surveys STT 843 Multivariate Analysis
Foundations of Education	One course in general ed foundations, policy, or learning & development (3)	Selected from a list of approved courses available from the student's guidance committee.
Mathematics/ Statistics	At least four courses (12)	To meet this requirement, courses must be at the 400-level or above and must be appropriate to the student's program of study, excluding Mathematics 443.
Cognate	At least three courses (9)	The student should consult with his or her guidance committee to select cognate courses that are appropriate to the student's program of study.
Research Practicum	The student must successfully complete a research practicum and the following course. (3)	MTHE 995 Research Practicum
Comprehensive Exams		Successful completion of comprehensive examinations.
Dissertation Research	(at least 24 credits, but no more than 30)	Twenty-four credits of MTHE 999 Doctoral Dissertation Research
Dissertation		Successful oral defense of the dissertation

Mathematics Education Sample Programs of Study

Sample of a 5-year program, assuming a 50% assistantship

Year	Fall	Spring	Summer
1	MTHE 926 or 927 Prosem (3) CEP 933 Quantitative Methods (3) MTHE 879 or TE 994 (3)	TE 931 Qualitative methods (3) MTHE 840 or 842 (3) Math content 1 (3)	Math content 2 (3)
2	MTHE 927 or 926 Prosem (3) MTHE 954 Research Design & Methods (3) Educ. foundations (3)	MTHE 997 (3) To do research practicum, MTHE 995 (3) TE 950 (3)	Math content 3 (3)
3	Cognate 1 (3) Cognate 2 (3)	Comprehensive exam Math content 4 (3) Cognate 3 (3)	
4	MTHE 999 (6)	MTHE 999 (6)	
5	MTHE 999 (6)	MTHE 999 (6)	

Sample of a 4-year program, assuming a 50% assistantship

Year	Fall	Spring	Summer
1	MTHE 926 or 927 Prosem (3) Math content 1 (3) MTHE 879 or TE 994 (3)	CEP 933 (3) TE 950 (3) Math content 2 (3)	TE 931 (3)
2	MTHE 927 or 926 Prosem (3) MTHE 954 Research Design & Methods (3) MTHE 841 (3)	MTHE 997 (3) Cognate 1 (3) To do research practicum, MTHE 995 (3)	Math content 3 (3)
3	Comprehensive exam Cognate 2 (3) Educ. foundations (3) MTHE 999 (3)	MTHE 999 (3) Cognate 3 (3) Math content 4 (3)	
4	MTHE 999 (9)	MTHE 999 (9)	

A cognate is a set of related disciplinary or interdisciplinary courses. Students need to name their cognate and be able to articulate what their cognate is. For example, a cognate may be in curriculum, teaching and learning, educational psychology, technology, statistics, a particular area of mathematics, etc...

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 English 097 in your first semester.**
- _____ Take courses advised by your first-year advisor, typically including MTHE 926 and/or 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*).
- _____ Prepare and submit annual review documents at end of Spring Semester. (See Section VI, Academic Performance and Review, *Annual Reviews*).

Year 2

- _____ Form 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 926 or 927 and 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).
- _____ Prepare and submit annual review documents by March 1. (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 the spring of their third year or fall of their fourth year of doctoral study. (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*).
- _____ Prepare and submit annual review documents by March 1. (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 30) of MTHE 999, Doctoral Dissertation Research.
- _____ Prepare and submit annual review documents by March 1. (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.
- _____ Obtain [*Thesis/Dissertation Submission Packet*](#) 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>.

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 time lines, 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 the student in choosing courses and assistantships, making connections with other faculty, and shaping his or her 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 his or her 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 his or her 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 his or her research interests, first in the goal statement when applying to the Mathematics Education Program and at all points during the program as his or her 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. In all cases, the advisor/chair of guidance committee 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 his or her 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 his or her 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 his or her 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.

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 his or her 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.

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.

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 his or her 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 his or her advisor and to have his or her 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 his or her 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 his or her advisor and to develop a plan to address his or her 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, he/she 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. First-year students' materials are due the last day of final exams; materials for students beyond the first year are due March 1. The review process is introduced in the proseminar course, taken in the first year. In that course, 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. Faculty will access and review online materials for their assigned students before a scheduled meeting of the Mathematics Education Program Faculty, during which faculty will discuss the progress of each student. The student's advisor (chair of the guidance committee) will draw on this faculty discussion to write an assessment of the student's progress on the second part of the Annual Progress Report form. The advisor discusses the report with the student. Signatures by the student and the advisor acknowledge discussion of the contents of the report. The student can then add a written response to the advisor's comments. A copy of the annual progress report will be kept in the student's departmental file and can be accessed by the student or any member of the mathematics education program faculty.

If a student is not making timely and reasonable progress towards his or her 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 if he or she disagrees 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, he/she may be asked to withdraw from the program according to the procedures as defined in the [Graduate Students Rights and Responsibilities](#).

Materials to Submit

Students should submit review materials each spring, beginning at the end of the first year in the program. 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
- Responsible Conduct of Research and Scholarship (RCR) 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:

<http://www.rio.msu.edu> and The Graduate School research and scholarly integrity webpage: <http://grad.msu.edu/researchintegrity/>.

The Graduate School sponsors a series of workshops offered throughout the academic year on the Responsible Conduct of Research and Scholarship. This series is intended to provide specific information about the responsibilities of students, faculty and research staff in conducting research, interacting with others both within and outside defined research groups, and complying with policies and regulations of sponsors and the University. More information can be found at <https://grad.msu.edu/rcr>.

The Program's education/training plan for Responsible Conduct of Research and Scholarship can be found at <https://prime.natsci.msu.edu/current-students/forms/>.

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 IRB web site—throughout the MSU web site—and read about IRB. They should take the [IRB training](#), 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 <https://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: [Integrity of Scholarship and Grades](#). 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
ombud@msu.edu
<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. 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 (<http://splife.studentlife.msu.edu/graduate-student-rights-and-responsibilities/article-2-academic-rights-and-responsibilities-for-graduate-students>). Additional descriptions can also be found in

[Article 5](http://splife.studentlife.msu.edu/graduate-student-rights-and-responsibilities) of the Graduate Student's Rights and Responsibilities (<http://splife.studentlife.msu.edu/graduate-student-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](https://grad.msu.edu/sites/default/files/content/researchintegrity/guidelines.pdf): <https://grad.msu.edu/sites/default/files/content/researchintegrity/guidelines.pdf> 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 (<http://splife.studentlife.msu.edu/graduate-student-rights-and-responsibilities>), 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.

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.

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 governs employment for graduate students administered within the Mathematics Education Graduate Program. If students are 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 Masters 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. Graduate assistants pay tuition at the in-state rate for credits beyond the first nine. In addition, registration fees are waived and assistants are automatically enrolled in a health insurance plan, the premium of which is paid by the University.

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 twice-monthly 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.

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, subject to satisfactory performance of their RA duties and also subject to the budgetary considerations. Students should seek an advisor with a RA opening before the end of their second year in the program.

Limits on Assistantships

Graduate students are permitted to work a maximum of 1/2-time (20 hours per week) to insure 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.

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/GEU2015-2019.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

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.

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. 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. After such notification and during the illness, injury, or pregnancy the Program will adjust (reduce, waive, or reschedule) the graduate assistant's duties as those duties and the assistant's circumstances reasonably dictate. If total absence from duties becomes necessary, the stipend will be maintained, provided the graduate assistant is still enrolled, for a period of two months,

or to the end of the appointment period, whichever should occur first. The graduate assistant shall have the right to return to the assistantship, within the original semester(s) of the appointment, at such time as the assistant is able to reassume the duties of the position.

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: <http://splife.studentlife.msu.edu/regulations/selected/grief-absence-policy>.

Course Load for Graduate Assistants

The University requires that every quarter-time and half-time graduate assistant carry at least six 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 in N211 North Kedzie 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.

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 fund request form](#) is available online. 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. <http://travelclinic.msu.edu/>
- b. Check the International Studies and Programs website for issues related to safety around the world. <http://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 his or her advisor and/or project director.

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/academics/graduate/certification-in-teaching/>
- Teaching Assistant Program and Resources
<https://grad.msu.edu/tap>

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.

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://mail.msu.edu/imp/login.php>.

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. The Mathematics Education program encourages students to take advantage of the full range of resources available at MSU. Some examples are listed below.

- 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/>
- College of Education Resources for Students
<http://education.msu.edu/resources/students/>
- Counseling Center
<http://www.counseling.msu.edu/>
- English Language Center
<http://www.elc.msu.edu/>
- GEU Contract
<https://hr.msu.edu/contracts/documents/GEU2015-2019.pdf>
- The Graduate School
<https://grad.msu.edu/>
- Guidelines for Graduate Student Advising and Mentoring Relationships
<https://grad.msu.edu/sites/default/files/content/researchintegrity/guidelines.pdf>
- Guidelines for Integrity in Research and Creative Activities
<https://grad.msu.edu/sites/default/files/content/researchintegrity/guidelines.pdf>
- Learning Resources Center
<http://nssc.msu.edu/>
- Library
<http://www.lib.msu.edu/>
- Office of International Students and Scholars
<http://oiss.isp.msu.edu/>
- Policy on Relationship Violence and Sexual Misconduct
http://www.hr.msu.edu/documents/uwidepolproc/RVSM_Policy.htm
- PREP Program for Graduate Student Professional Development
<https://grad.msu.edu/prep>
- Teaching Assistant Programs
<https://grad.msu.edu/tap>
- Writing Center
<http://writing.msu.edu/>

XI. APPENDICES

Forms

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

- *University Curriculum and Catalog*
<https://reg.msu.edu/UCC/UCC.aspx>
- *MSU/GEU Contract*
<https://hr.msu.edu/contracts/documents/GEU2015-2019.pdf>

<i>Form</i>	<i>Where to find</i>	<i>When to file</i>
Admission Application https://grad.msu.edu/apply	Online	When applying to the program
Annual Progress Report (Program forms)	D2L	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/	Online	Varies
Application for Readmission https://reg.msu.edu/StuForms/ReAdmission/ReAdmission.aspx	Online	When applying to the program
Report of the Guidance Committee – GradPlan (Program Plan) https://grad.msu.edu/ https://login.msu.edu/?App=J3205	Online	End of first year or beginning of second year
Changes in Program Plan – GradPlan https://login.msu.edu/?App=J3205	Online	When changes are made within the program plan
Guidance Committee Membership – GradPlan https://login.msu.edu/?App=J3205	Online	Before completion of the program plan/First guidance committee Meeting
Changes in Guidance Committee Membership – GradPlan https://login.msu.edu/?App=J3205	Online	Promptly when members are deleted or added
Credit Evaluation: Transfer credits https://prime.natsci.msu.edu/current-students/forms/	Online	After Guidance Committee determines which courses transfer
Research Practicum Committee Membership https://prime.natsci.msu.edu/current-students/forms/	Online	Before beginning the research practicum

Research Practicum Completion https://prime.natsci.msu.edu/current-students/forms/	Online	After the written report and oral exam are successfully completed
Record of Comprehensive Examinations https://prime.natsci.msu.edu/current-students/forms/	Online, by program office	After the written and oral exams are completed
Dissertation Director Approval https://prime.natsci.msu.edu/current-students/forms/	Online	Immediately after first meeting of guidance committee to discuss your dissertation plans
Dissertation Proposal Approval https://prime.natsci.msu.edu/current-students/forms/	Online	Immediately after the dissertation proposal meeting with your guidance committee
Request for Extension of Time to Complete Degree Requirements https://prime.natsci.msu.edu/current-students/forms/	Online	The semester before the completion of eighth year
Notice of Doctoral Dissertation Oral Examination https://prime.natsci.msu.edu/current-students/forms/	Online	Two months prior to Oral Examination
Record of Dissertation and Oral Examination https://prime.natsci.msu.edu/current-students/forms/ https://login.msu.edu/?App=J3205	Online, by program office	At the time of the Oral Examination
Travel Fund Request (Program form: https://prime.natsci.msu.edu/current-students/forms/) (Grad School: https://grad.msu.edu/travel)	Online	At the beginning of each academic year in which student's original work will be presented at a conference
Big 10 Academic Alliance Traveling Scholar Program Application http://www.btaa.org/projects/shared-courses/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 University⁶ 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 his or her 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 his or her degree requirements.

Misconduct in Research and Creative Activities

Federal⁹ and University⁷ 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 activities⁷, 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/announcement/msus-authorship-guidelines-updated>)

“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/MSUMissionStatement10-07.pdf)

7 MSU Faculty Handbook, Chapter VI, “Research and Creative Endeavor-Procedures Concerning Allegations of Misconduct in Research and Creative Activities” (<http://www.hr.msu.edu/documents/facacadhandbooks/facultyhandbook/misconductproc/>)

8 MSU Faculty Handbook, Chapter VI, “Research and Creative Endeavor--Sponsored Research and Creative Endeavor” (<http://www.hr.msu.edu/documents/facacadhandbooks/facultyhandbook/sponsoredresearch.htm>)

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 <http://geuatmsu.org/geu-proposals/> 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 <http://www.hr.msu.edu/benefits/studenthealth/index.htm>