# Table of Contents

- Mission ................................................................. Page 3
- Goals of the Program ................................................. Page 3
- Mathematics Education Faculty ....................................... Page 4
- Doctoral Program Committee ........................................ Page 6
- Program of Study ....................................................... Page 7
- Core Courses .......................................................... Page 8
- Program of Study Summary .......................................... Page 9
- Professional Experiences ............................................. Page 10
- Annual Doctoral Student Review .................................... Page 11
- Second-Year Study ..................................................... Page 12
- Comprehensive Exam ................................................. Page 13
- Dissertation Prospectus .............................................. Page 15
- Dissertation Proposal ................................................. Page 16
- Dissertation ............................................................. Page 17
- D-Form Summary ....................................................... Page 19
Mission

The mathematics education community at the University of Missouri are dedicated to the following overarching mission: **Empowering mathematics teachers and learners in schools.**

We believe in the power of teachers to affect not only their students’ mathematical development but also their personal experiences and growth. In a climate where teachers are often scrutinized and under-appreciated, we honor the work they do and support them in their self-directed goals of improvement.

We believe that students should not only learn mathematical facts and procedures but should be empowered as mathematical thinkers and communicators. This empowerment will allow for positive attitudes toward mathematics to flourish and will position learners to be change-makers in our world, with mathematics an important tool at their disposal. Empowering learners also means taking full account of their prior experiences and lives outside of the mathematics classroom and recognizing their individuality rather than assuming mathematics should be taught and learned in the same way by everyone.

Our mission statement also acknowledges that our focus is “in schools,” indicating our PreK–12 emphasis and the fact that teaching and learning cannot be separated from its context.

Goals of the Program

The purpose of the PhD Program in Mathematics Education is to prepare individuals for research and teacher education careers in higher education and for leadership positions in various educational settings. The program is designed to prepare professionals who are knowledgeable and think critically about mathematics education and to develop expertise in conceptualizing, conducting and reporting research in the field. Programs of study are individually planned with a faculty committee, and are based upon a candidate’s background, experience, and professional goals. The goals of the program are to prepare students to:

- Understand the breadth of the field of mathematics education in terms of research, curriculum, mathematical thinking and learning, equity, teaching and teacher development;
- Develop and carry out research in mathematics education;
- Understand, in-depth, a particular area of research in mathematics education and to build a research agenda in that area;
- Become stewards of the field of mathematics education; and
- Assume leadership roles in mathematics education.

These goals are achieved through a combination of coursework, internships, research, and teacher education experiences. The capstone experience is a research study designed, carried out, analyzed, and reported by the candidate. This handbook highlights the major elements and processes of the PhD program in mathematics education at MU.

Students are urged to complete the program as a full-time student (no other job responsibilities outside of MU) and applicants committed to full-time residency are given preferential consideration in the admissions process. All students must meet a residency requirement (complete at least two nine-hour semesters or three six-hour semesters in an 18-month period at MU).
Mathematics Education Faculty

Kathryn Chval  
Dean of the College of Education

Dean Chval’s research focuses on effective preparation models and support structures for teachers, effective elementary mathematics teaching for English language learners, and curriculum standards and policies. Dean Chval joined the faculty in 2003 and received her Ph.D. from the University of Illinois at Chicago.


Zandra de Araujo  
Assistant Professor

Dr. de Araujo’s research examines the ways in which teachers use curriculum, particularly in the context of instructional change and with English learners. She also studies innovative approaches to teacher education. Dr. de Araujo joined the faculty in 2012 after earning her doctorate from the University of Georgia.


Susan Empson  
Professor and Richard G. Miller Endowed Chair

Dr. Empson studies children’s mathematical thinking and classroom teaching that is responsive to children’s thinking. Her current research focuses on the design of professional development that cultivates in teachers the skills to make sense of and respond to children's thinking during instruction. She joined the faculty in 2016 after spending 20 years on the faculty at The University of Texas at Austin. She earned her doctorate in mathematics education from the University of Wisconsin – Madison.


John Lannin  
Associate Dean of Academic Affairs

Dr. Lannin earned his Ph.D. from Illinois State University in 2001 and joined the MU faculty that same year. He is currently the Associate Dean for Academic Affairs for the College of Education. His research centers on generalization and justification as well as specialized teacher knowledge development.


Charles Munter  
Assistant Professor

Dr. Munter’s research focuses primarily on in-service, secondary teacher learning, including foci on defining high-quality instruction, the institutional setting of teaching, and designing for equity. He joined the faculty in 2016, following the completion of a PhD at Vanderbilt University and a previous appointment at the University of Pittsburgh.

Munter, C., Stein, M. K., & Smith, M. S. (2015). Dialogic and direct instruction: Two distinct models of mathematics instruction and the debate(s) surrounding them. Teachers College Record, 117(11), 1–32.
Dr. Otten’s research centers on students’ mathematical participation in middle school and high school classrooms. He has studied their participation in mathematical discourse as well as their opportunities to engage in certain mathematical practices, such as reasoning-and-proving and attending to precision. He has been at Mizzou since 2012. He received his PhD from Michigan State University where he also earned a Master’s degree in mathematics.


Dr. Spain’s research interests includes instructional strategies to promote active learning, particularly with struggling learners. She also studies innovative ways to engage students in tasks and discourse to improve student achievement and classroom management. Dr. Spain joined the faculty in 2016. She earned her doctorate from the University of Missouri in 2015.

Spain, V. L. (March 2016). Instructional Strategies to Promote Active Learning. Columbia College Faculty Integration Conference, Columbia, MO.

Dr. Tarr’s research examines the impact of curriculum on student learning and the classroom-learning environment, and teaching, learning, and curricular issues in statistics education. He joined the faculty in 2000 after beginning his career at Middle Tennessee State University. In 1997, he earned his PhD in mathematics education from Illinois State University.


Dr. Webel specializes in mathematics teaching at the elementary level, including teacher education and professional development. His research is focused on understanding the internal and external factors that support or inhibit improvements to mathematics instruction, and is interested in designing tools and structures that can help teachers work collaboratively to learn from their teaching.

Doctoral Program Committee

Upon admission to our program, a student is assigned a Program Advisor (one of the Mathematics Education faculty) who works with the student to select courses and design a plan of study. During the first two years of study, the student is expected to identify a focus of research in preparation for writing the dissertation and, in consultation with the Program Advisor, form a Dissertation Program Committee. This committee is composed of four members, including three from the Mathematics Education faculty and one from outside of Mathematics Education, and is chaired by the dissertation advisor. This committee will comprise the student’s comprehensive exam committee (see p. 13 for more information on comprehensive exams). With the guidance of this committee and in close work with the chair, the student’s research focus is narrowed to a specific set of research questions. (Note: At least three members of the Doctoral Program Committee must hold doctoral faculty status in their respective departments.)

If the composition of the Doctoral Program Committee changes for any reason, a Change of Committee form, available from the Graduate School at http://gradschool.missouri.edu/downloads/, must be filed.
The PhD program in Mathematics Education requires a minimum of 72 semester hours beyond the Bachelor’s degree. Our program does not require that students earn a Masters degree, although up to 30 credits of Masters coursework may be counted toward the semester-hour requirements for the PhD. Graduate work completed at other institutions with recognized graduate schools may be accepted toward degree requirements. The Program of Study comprises three major components: (1) course work; (2) professional experiences; and (3) the dissertation study. Courses in the required mathematics education core, the LTC department core, and the educational research methodology are listed in the table that follows.

Although each Program of Study is unique and matched to the student’s own interests and background, the general program plan consists of two sets of core courses (one set in mathematics education and one set in the department of Learning, Teaching, and Curriculum) and at least 4 courses in educational research methodology. The student’s program also includes an outside area of study. A general timeline and program template is provided here to show the typical concentration of effort of the program over a four-year period. This timeline assumes that the student is a full-time student in the program.

### Program of Study

<table>
<thead>
<tr>
<th>Year One</th>
<th>Year Two</th>
<th>Year Three</th>
<th>Year Four</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Math Ed and LTC courses</td>
<td>Core Math Ed and LTC courses</td>
<td>Comprehensive Exam</td>
<td>Dissertation</td>
</tr>
<tr>
<td>Research Methodology courses</td>
<td>Research Methodology courses</td>
<td>Complete remaining coursework</td>
<td>Friday seminar</td>
</tr>
<tr>
<td>Outside emphasis area courses</td>
<td>Outside emphasis area courses</td>
<td>Dissertation Prospectus &amp; Proposal</td>
<td></td>
</tr>
<tr>
<td>Friday seminar</td>
<td>Friday seminar</td>
<td>Begin dissertation</td>
<td>Frday Seminar</td>
</tr>
<tr>
<td>Program of Study meeting</td>
<td>Second-Year Study</td>
<td>Frday Seminar</td>
<td></td>
</tr>
</tbody>
</table>

Note: The above is a typical progression, however individual’s timelines might vary

The student works initially with the Program Advisor to plan coursework through the first year of the program. In the second year, the Program Advisor and student develop a draft of a complete program of study, based on the student’s interests, career goals and program requirements. The Program Committee reviews, revises, and approves the final Program of Study. The committee is responsible for ensuring that the Program of Study is in compliance with Mathematics Education, Departmental, College of Education, and University guidelines. Upon approval, the D-2 Form is submitted to the C&I Graduate Office.

D-forms are available at: [http://gradstudies.missouri.edu/forms-downloads/](http://gradstudies.missouri.edu/forms-downloads/). All coursework must be completed prior to the comprehensive exam.
Mathematics Education Core Courses

The centerpieces of the coursework in the PhD program are four courses focused on mathematics education scholarship. For most students, these courses will be taken one-per-semester over the first two years of the program.

**Mathematical Thinking and Learning** – This course focuses on the ways in which mathematics researchers have studied mathematical thinking. Emphasis is given to both the methodologies employed and the mathematical topics addressed in elementary, middle, and high school. Throughout the course, students will have opportunities to develop skills in clinical interviewing.

**Mathematics Curriculum** – This course focuses on historical shifts and influences on mathematics curriculum, frameworks for studying mathematics curriculum, and an examination of current research related to curriculum materials and curriculum enactment.

**Mathematics Teaching in Schools** - This course focuses on mathematics teaching - how to describe it, how to study it, how it influences learners’ experiences, and how it can improve. Students will consider not only the knowledge, beliefs, and practice of teachers as individuals, but also the institutional setting and professional norms inherent in classroom mathematics teaching.

**Research on Equity and Diversity in Mathematics Education** – In this course we examine studies of equity and diversity in mathematics education. In particular, we explore the underlying theory of such studies and the counter-narratives of common assumptions in the teaching and learning of mathematics.

As a set, these courses are meant to introduce students to a range of scholarship, both historical and current, in the field of mathematics education. They also support students in learning to read and write academically. The courses are meant to complement the learning opportunities that will occur simultaneously and subsequently through assistantships, internships, and other experiences.

Learning, Teaching, & Curriculum Core Courses

Each student must complete three of the four core departmental courses—the first two are required, and students may choose between the remaining two courses. The core allows students to collaborate with other doctoral students in the Department of Learning, Teaching, and Curriculum.

**Philosophical Perspectives in Education Research** - An examination of the history and philosophy of social science research, including perspectives on ontology, epistemology, and axiology. Students will consider how various philosophical assumptions shape research paradigms, purposes, interests, and methodologies.

**Teacher Education Research** - This course is designed to prepare doctoral students as researchers who understand current trends and challenges for teacher education across the professional continuum and who have the ability to formulate, compare, and problematize relevant research in the field.

**Curriculum Theories** - the purpose of this course is to examine some of the key theoretical and ideological orientations surrounding curriculum theory. This course explores the notion of “curriculum” as more than “a course of study” or “structured knowledge.” This course asserts that the creation and development of curriculum is embedded within various historical discourses and practices of race, class, gender and sexuality.

**Theories of Learning and Implications for Education** - The purpose of this course is to develop students’ ideas about learning in general, and their specific content area in particular. Students will survey a number of perspectives on learning including the historical and theoretical underpinnings and related research.
<table>
<thead>
<tr>
<th>Component</th>
<th>Requirements/Expectations</th>
</tr>
</thead>
</table>
| **Mathematics Education**         | About 30 credit hours, 12 of which are the “core” courses listed at the right  
Core Courses:  
LTC 8860 Mathematics Curriculum  
LTC 8870 Mathematics Teaching in Schools  
LTC 8880 Mathematical Thinking  
LTC 88** Research on Equity and Diversity in Mathematics Education  
Other Recommended Courses:  
LTC 8900/8990 Seminar on Research in Mathematics Education (1-credit every semester)  
LTC 8900 Special Topics in Mathematics Education |
| **LTC**                           | Minimum of 9 credit hours  
Required Courses:  
LTC 9060 Teacher Education  
LTC 9050 Philosophical Perspectives in Education Research  
Choose One of the Following Courses:  
LTC 9070 Learning Theories  
LTC 9040 Curriculum Theories |
| **Outside Emphasis Area**         | Minimum of 12 credit hours  
Students identify an outside emphasis area related to mathematics education such as mathematics, statistics, psychology, or educational leadership. Students take a minimum of 12 credit hours in the area. Students planning for a position within a mathematics department are strongly advised to do their support area in mathematics and to earn the equivalent of a Master’s degree in mathematics. |
| **Educational Research**          | Minimum of 12 credit hours  
Required Courses:  
ESCPS 8830: Quantitative Analysis in Educational Research  
ESCPS 8630: Qualitative Methods of Ed. Research I  
EDLPA 9620: Qualitative Methods of Ed. Research II  
At Least One Additional Course in Quantitative Methods, such as:  
ESCPS 7170: Introduction to Educational Statistics  
ESCPS 8020: Overview of Educational Research  
ESCPS 8087: Hierarchical Linear Modeling (HLM) |
| **Experiences in Research, College Teaching, Design, Teacher Development** | In consultation with Advisor  
It is expected that doctoral students will have a range of “beyond-course” experiences, including:  
• Completing a second-year study;  
• Teaching mathematics teaching methods course(s);  
• Supervising and working with student teachers.  
• Preparing grant proposals;  
• Design;  
• Planning and facilitating professional development for teachers;  
• Formulating and delivering presentations at professional meetings;  
• Critiquing submissions to mathematics education journals or professional conferences.  
See page 10 for details. |
| **Dissertation**                  | 12 semester hours  
LTC 9090: Dissertation Research  
Writing the dissertation includes proposal approval by the student's Dissertation Committee and Institutional Review Board Approval. |
Professional Experiences

Many of the learning opportunities you will experience in the program come from experiences beyond coursework. You will be expected to accumulate a variety of professional experiences through assistantships, internships, and ad hoc work. Internships provide doctoral students with closely mentored, in-depth experiences designed to enhance knowledge and expertise related to college teaching, research, and teacher development. They serve as vehicles to connect coursework with the practical work of mathematics education faculty. Doctoral students typically complete at least one internship in each of the areas noted below. However, if a student’s graduate assistantship assignments provide equivalent experiences related to any of the following areas, that assistantship may be substituted for a transcripted internship at the discretion of the major advisor.

College Teaching - the student assists a faculty member in teaching a college level course for preservice or inservice teachers. The course may be a mathematics content or methods course.

Research – prior to the dissertation, the student engages in a research study, either a small-scale study he or she designs or as a team member of a study directed by a faculty member.

Teacher Development – the student works with a faculty member in planning, implementing and evaluating a single or series of professional development experiences for teachers.

Internships are transcripted courses (1 to 3 credit hours each registered under LTC 8941). Students are strongly encouraged to participate in a set of internships that span the K-16 environment. The faculty advisor and student will work together to tailor experiences to enhance the individual student’s background and career goals.

Identifying Internship Opportunities and Making Assignments
Each spring a list of Internship opportunities for the following academic year is prepared by a committee of the faculty and shared with doctoral students. Students review the opportunities and consult with their major faculty advisor in order to determine the best course of action. If recommended by the major advisor, the student submits a request for consideration for one or more internship opportunities to the chair of the faculty internship committee. The Committee reviews all requests and makes recommendations to the mathematics education faculty for review and final approval.

Evaluation of the Internship is done as with any graduate course – the instructor of record (faculty mentor) articulates at the beginning of the experience expectations (generally with an Internship Contract). At the end of the experience, the faculty mentor evaluates student performance, assessing a letter grade.
Annual Doctoral Student Review

The purpose of the Annual Review is to provide specific feedback to the student regarding his/her progress and to identify areas where additional growth would be helpful. The annual review increases communication and collaboration among faculty and doctoral students and simulates the promotion and tenure process of tenure-track faculty members. The Annual Review begins with the preparation and submission of a student portfolio (see below) – usually in May.

The portfolio is reviewed by mathematics education faculty. The faculty then meet with the student to provide feedback and discuss areas of strength and need. The student’s advisor prepares a written summary highlighting the salient points of the meeting and listing the specific goals to work toward for the next annual review. The Annual Review is required of all doctoral students until they have passed the comprehensive exam.

The portfolio should include the following elements, ordered as specified:

1. Name and year in program
2. Name and year in program
3. Statement of long-term career goals (1 paragraph)
4. Coursework (include a complete list of courses with semester taken and grade earned using the Program of Study format)
5. Self-Reflection (discuss progress and experiences during the past year as well as experiences you would like to have in the coming year)
6. Vita including:
   - Name
   - Academic background (list degree, year and institution for each undergraduate and graduate degree)
   - Teaching experience (schools, grades, number of years)
   - Teaching certifications (list grade level, subject and state)
   - Teaching assignments (list K-12 and university teaching assignments, include date and course title)
   - Grant work (summarize experiences developing or implementing grant activity)
   - Awards or Scholarships
   - Publications & Writing (list manuscripts submitted or published. Use APA style. Also include major papers prepared for course or work assignments.)
   - Workshops & Presentations (list of presentations. Include title, date, place, co-presenters)
   - Service Activities (list of committee assignments, participation in professional organizations, etc.)
7. Copies of articles (published or in press). If there are no publications then students should include one sample of scholarly writing (e.g., major paper prepared for seminar).
Second-Year Study

**Purpose.** The second-year study is designed to provide an opportunity to practice doing research prior to the dissertation. Although a publication or presentation may result from the second year study, it primarily serves as a setting in which mistakes can be made and learned from. With support from their advisor, students will develop an appropriately-scaled research question, generate or find data that addresses the question, conduct an analysis of this data, and share their findings with a group of professionals. In doing so, the student is expected to encounter, work through, and learn from challenges that arise. Through this process, the second-year study will help students prepare for their dissertation by giving first-experience in designing and carrying out a research study.

**Requirements.** The second-year study should involve the analysis of data and a presentation of results, situated in research literature and aligned with a set of research questions. It is desirable (but not required) that the study include data collection and eventual submission to conference or journal.

A presentation of findings during the LTC 8890 Seminar on Research in Mathematics Education is required. Feedback will come in the form of interaction at that seminar, but the Advisor will also provide written feedback. A letter of completion will be included in the Annual Review materials that year.

**Timeframe.** The student should complete the second-year study after they have completed some of their Mathematics Education Core and LTC Core courses but before they have completed all of these Core courses. In most cases, the second-year study will begin during the Fall semester of the student’s second year and conclude by the end of the Spring semester of the student’s second year, with the culminating presentation occurring in or near April. Support for the initial steps of the study will be provided by the Advisor and through experiences in the LTC 8890 Seminar on Research in Mathematics Education, where each semester students are expected to share and get feedback on their second-year study progress.
Comprehensive Exam

**Purpose.** The comprehensive exam is designed to: (a) evaluate students’ understanding and knowledge of ideas drawn from the core elements of the program including coursework, internships, and other relevant experiences; and (b) assess students’ readiness to enter the dissertation stage of the program. More specifically, the comprehensive exam:

- Provides an opportunity for the student to synthesize and extend ideas from multiple courses and other experiences;
- Provides an opportunity for the student to develop ideas and products that will be useful in meeting the student’s own professional goals;
- Simulates aspects of professional scholarly work, such as working within a flexible yet limited timeframe and having the same access to resources that a faculty member would have; and
- Provides an opportunity for faculty to determine whether further support is needed for the student to develop additional knowledge or skills prior to beginning work on his or her dissertation. This protects students from being placed in a situation for which they are unprepared.

**Eligibility.** The Doctoral Program Committee must approve the Program of Study and the D-2 (Plan of Study) Form must be on file in the Graduate School before the comprehensive examination. Please note that the D-1 (Qualifying Examination Results and Doctoral Committee Approval) Form must be submitted to the Graduate School prior to the D-2 Form. The comprehensive exam will be scheduled at a time approved by the Doctoral Program Committee in consultation with the student and should be after the completion of the Mathematics Education Core and the LTC Core courses. Under certain circumstances, the Doctoral Program Committee may allow the comprehensive exam to occur concurrently with the final Core course.

**Written Component.** The Mathematics Education Ph.D. Comprehensive Exam is individualized for each student. The written exam component consists of three writing prompts that are collaboratively conceived and prepared by faculty on the student’s Doctoral Program of Study Committee. There will be one writing prompt from each of the following categories:

- A literature review requiring the synthesis of ideas across multiple courses taken by the student, with emphasis placed on the core mathematics education courses;
- A writing task related to an area of research specified by the student and approved by the Doctoral Program of Study Committee; and
- A writing task determined by the Doctoral Program of Study Committee, tailored to the students’ professional interests and goals. This could be a critical review of a manuscript, the creation of a professional artifact (such as a conference proposal, a practitioner article, a course outline, etc.), or another appropriate product.

**Timeframe.** Students, with the Doctoral Program of Study Committee’s approval, will decide on a six-week period in which the exam will be administered. All three of the exam prompts will be distributed at the beginning of the exam period. One response must be submitted no later than four weeks after the beginning of the exam period, one no later than five weeks after the beginning of the exam period, and the final response no later than the end of the six-week exam period (the student may choose the sequence in which to submit his or her responses). All deadlines will be clearly established and communicated to the student prior to the examination period. The Doctoral Program of Study Committee will determine page limits for each written response.
Oral Component. Within one month of the completion of the written exam period, the oral component of the comprehensive exam must be completed. This component, approximately two hours in length, consists of Doctoral Program of Study Committee-directed questions and discussion of student responses to the writing prompts. In the oral defense, the student has the opportunity to elaborate on written exam responses. Faculty have an opportunity to probe more deeply on the responses or to engage in discussions with the student about other questions.

Evaluation. Written responses will be shared with the Doctoral Program of Study Committee and mathematics education faculty. After the oral defense, the committee will meet to review the student’s performance and collaboratively determine the outcome of the comprehensive exam, with input invited from all mathematics education faculty members. The possible outcomes for each written response are: Pass, Revise and Resubmit, or Fail. These outcomes will be shared with the student following the completion of both components of the exam.

In the case of a Revise and Resubmit outcome on a written response, the committee will supply the student with feedback for improving his or her response to the writing prompt. The student must make appropriate revisions within a reasonable deadline as agreed upon by the student and the committee, not to exceed the timeframe set by the Graduate School. The revised written response will be accompanied by a statement authored by the student describing the revisions made. After review of the revisions, the committee may change the outcome to Pass or Fail. If the revised written response is changed to a Pass outcome, the committee will determine whether a second oral defense is required. If the revised written response is determined to Fail (or an original response is determined to Fail), the committee will determine the nature and structure of a "retake" opportunity based on the student’s particular situation. A retake will include a second oral exam.

Per University policy, the exam cannot be retaken until at least a twelve-week period has passed. If the student fails the second exam, he/she is removed from the program. Upon successful completion of the Comprehensive Exam (i.e., a Pass outcome on all written responses and a successful oral defense), the Advisor files Form D-3 (Comprehensive Exam) Form with the Graduate School within one month of exam completion.

Candidacy. Once the Comprehensive Exam has been passed and the student has completed all coursework included in the Program of Study, the student is advanced to Candidacy by committee consensus.

Other relevant University policy (see http://gradschool.missouri.edu/academics/process/doctoral-process/comprehensive-exam.php):

- Comprehensive exam must be completed at least 7 months before the final defense of the dissertation.
- The two components of the exam (the submission of the written responses & the oral defense) must be completed within one month of each other.
- If a student fails the comprehensive exam, a second exam can be taken after at least a 12-week study period.
- Failure to pass two comprehensive examinations automatically prevents candidacy.
- The doctoral degree program must be completed within 5 years of passing the Comprehensive Exam.
Dissertation Prospectus

To facilitate communication between the student and his or her committee and to provide the student with input on their dissertation study idea before they have written their full dissertation proposal (see below), students will write a dissertation prospectus and receive feedback on the prospectus from the committee. In most cases, the feedback will come in the form of a committee meeting. In all cases, the feedback, processed by the student and her or his advisor, will inform the writing of the full dissertation proposal.

The dissertation prospectus is a 2–3 page (double-spaced) narrative that includes the following:

- A brief statement of the problem or motivation for the topic of study;
- Connections to relevant literature that situate the study—this is not an extensive literature review but rather an acknowledgment of the existing work that most directly impacts the study;
- A draft research question or research questions;
- An overview of the study to be proposed, including initial ideas about theoretical framing, data collection, and data analysis.

The dissertation prospectus should be reviewed by the advisor before sending it to the full committee. It is also possible that the dissertation prospectus includes a small number of options for the study (e.g., two different approaches to data collection) so that the committee may advise on which option may be the preferred choice for the dissertation proposal.
The format for the dissertation proposal may vary depending upon the type of study being proposed and the methodology to be employed. Thus, the specific format for the proposal should be worked out in consultation with the Dissertation Advisor. Nevertheless, the dissertation proposal generally include the following components. All dissertations must adhere to format guidelines established by the Graduate School.

**Title Page.** A one-page cover sheet that includes relevant information (proposal title, date, name of student, dissertation advisor).

**I. Opening Section/Rationale.** The primary function of the opening section of the proposal is to build a rationale for the proposed study. In this section, the purpose of the study is explained and its relationship to the relevant scholarship is described. In addition, this section establishes the theoretical framework for the study. The opening section of most proposals will include the following components in some form:

- **Introduction/Statement of Purpose.** A brief description of the project and its main purpose.
- **Statement of the Problem.** A detailed discussion of the problem to be addressed by the proposed project in the context of the current state of scholarly understanding of the issue in question. This section clearly establishes the need for the proposed project.
- **Theoretical Framework.** A discussion of the theoretical framework of the proposed study. This section establishes a theoretical orientation for the study and sets forth the assumptions on which the study rests.
- **Research Questions and/or Hypotheses.** A clear statement of the research question(s) and/or hypotheses on which the proposed study will be based. These should grow out of the statement of the problem and the review of the relevant literature.

**II. Review of Literature.** This chapter contains a review of the research and scholarship that informs the proposed study. This section links the project with the body of knowledge in which it is grounded. Although this review is not expected to be as extensive as the review in the dissertation itself, it should be thorough enough to demonstrate the connections between the proposed study and related scholarship and empirical research.

**III. Methodology.** This section describes the research methods to be employed in the proposed study. It should establish the appropriateness of the chosen methods for addressing the questions identified in the previous section. The following elements may be included in this section, depending upon the type of study being proposed:

- Design of the study
- Research tradition/paradigm (including ontological, epistemological, and methodological assumptions)
- Context of the study
- Sample/Participants (including criteria for selection, sampling techniques)
- Data collection instruments and management techniques
- Data analysis techniques
- Role of the researcher
- Potential limitations of the proposed methods

**References.** Full APA bibliographic citations for articles, books, monographs, etc., referred to in the proposal must be included.

**Appendices.** Instruments and interview protocols used in the study.
Dissertation Advisor and Program Committee. During the first two years in the program, the candidate meets with all members of the mathematics education faculty to learn of their research interests. Upon completion of the Program of Study and comprehensive exam, the candidate may request a Dissertation Advisor different from the Program Advisor. This is generally done if the candidate’s research goals and professional interests are more closely aligned with those of a particular faculty member. The Dissertation Advisor must have Doctoral Faculty status. The request is made through the Program Advisor to the Mathematics Education Faculty. The Mathematics Education Faculty make final decisions regarding assignment of Dissertation Advisors to doctoral students.

As with the Program Committee, the Dissertation Committee must be composed of five faculty members – the Dissertation Advisor, who chairs the committee, and at least two other members from Mathematics Education, one from the outside area of emphasis, and one other member. At least three committee members must be from the Learning, Teaching, and Curriculum Graduate Area faculty. At least three of the committee members must hold Doctoral Faculty status in their respective departments. If the composition of the Doctoral Dissertation Committee changes for any reason, a Change of Committee form, available from the Graduate School at http://gradschool.missouri.edu/downloads/, must be filed.

Dissertation Process. The dissertation provides the student an opportunity to demonstrate and hone his/her skills as a researcher. The general guidelines for completing the dissertation are outlined below.

1. With assistance from the Dissertation Advisor, the candidate identifies a research question and methodology. They also work together to identify a Dissertation Committee.

2. The candidate develops a written proposal that is reviewed by the Dissertation Advisor. The written proposal is a thorough plan for the dissertation study that consists of a rationale for the study, a review of the literature, methods, and copies of any proposed instruments that will be used to gather data for the study. The proposal typically includes the first three chapters of the dissertation, and is typically 40-80 pages in length, excluding the bibliography (See the next section for a recommended outline for the proposal). The student should follow format guidelines prepared by the MU Graduate School: Thesis and Dissertation Guidelines can be found at http://gradschool.missouri.edu/downloads/. When the advisor judges the proposal to be ready for review, it is submitted to the Dissertation Committee.

3. Each member of the Dissertation Committee reviews the proposal independently, then meets with the student to provide feedback. Committee members should have the proposal at least two weeks prior to the scheduled meeting. During the proposal meeting, the committee members can make any or all of the following recommendations: a) proceed with the study as proposed, b) consider additional activities as recommended by the committee, or c) make explicit revisions in the written proposal, request the written proposal be resubmitted, and reconvene the committee again to discuss the proposal.

4. Once the proposal is approved by the Dissertation Committee, all members sign the D-Prop form, which is then filed with the Learning, Teaching, and Curriculum Graduate Studies Office.
5. If the proposal involves human subjects (e.g., students or teachers), after the proposal has been approved, but before the study takes place, the candidate must apply for and be granted approval by the Institutional Review Board (for more details of the MU IRB see: http://www.research.missouri.edu/cirb/index.htm).

6. After completion of the study, drafts of the dissertation are reviewed by the Dissertation Advisor. When the Dissertation Advisor deems the dissertation to be near final form, he/she generally asks another member of the Dissertation Committee to serve as a “second reader.” The Dissertation Advisor works with the candidate to respond to questions and suggestions made by the second reader. When these changes have been made, the dissertation is submitted to all Dissertation Committee members for review. An oral defense is scheduled for no less than 2 weeks after submitting the dissertation to the committee. (Note: The oral defense should be scheduled to allow sufficient time to make edits as requested by the committee before the final graduation deadline.)

7. Following the oral defense, one of the following decisions will be made by the Dissertation Committee: a) the dissertation is approved with minor edits/revisions, b) the dissertation is tentatively approved with the requirement the student make substantive revisions - upon completion of the revisions, written copies of the dissertation are again distributed to committee members, or c) the dissertation is not approved and plans for successful completion are developed.

8. As soon as possible after the defense, the Dissertation Advisor completes D-4 (Dissertation Defense) Form and submits it to the Graduate School.

9. The candidate files the final complete dissertation with the Graduate School.
D-Form Summary

The Graduate School obtains students' official academic records as soon as a student completes his or her first term of enrollment. Each of the following forms is completed at the departmental level, routed for required signatures, and forwarded to the Graduate School, 210 Jesse Hall. Each form is reviewed by staff in the Graduate School, given the dean's signature if approved, and a copy is returned to the department. If changes/corrections need to be made, or if signatures are missing, the forms will be returned to the department for corrective measures. If any faculty signatures are illegible, we ask that departments print a correct spelling below any such signatures.

D-1 Form: Qualifying Examination Results & Doctoral Committee Approval Form

This form combines the information from the previous D-1 and D-2 forms. It provides the Graduate School with a record of the student’s proposed doctoral committee and a record of the results of the qualifying process. Note: the qualifying process often does not require the participation of a student’s doctoral committee. This form should be submitted to the Graduate School by the end of the student’s second semester of enrollment. A Graduate Student Change of Committee Form (available in departments and through the Graduate School) can be used if there is a change in the composition of a student’s committee.

D-2 Form: Plan of Study for the Doctoral Degree Form

This form is used to provide the student, the department, and the Graduate School with a plan for the course work, transfer credit, and research hours that will comprise a student's program of study. Committee signatures are required; therefor, the D-1 form must be approved before a D-2 form can be approved. The D-2 (plan of study) form should be submitted to the Graduate School no later than the end of the student’s third term of enrollment. Changes to a student’s plan of study can be made easily by submitting a Course Substitution Form, available from departmental contact staff and the Graduate School.

D-3 Form: Doctoral Comprehensive Examination Results Form

Within one month of completing the doctoral comprehensive examination, this form needs to be completed and filed with the Graduate School. With the usual committee of five, there can be one “Fail” or abstaining vote allowable for a final “Pass.”

D-4 Form: Report of the Dissertation Defense Form

This form records the official results of the dissertation defense. There can be one “Fail” or abstaining vote allowable for a final “Pass.” It is recommended that this form be taken to the dissertation defense, along with the dissertation approval page (printed on the required cotton bond paper) so that the committee members can sign both forms for students who successfully defend their dissertation.

Doctoral degree program forms are available at http://gradstudies.missouri.edu/forms-downloads/