

Mathematics and Science Education PhD Student Handbook

DEPARTMENT OF TEACHING AND LEARNING



College of Education

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Welcome and Introduction

The Department Chair

I would like to take this opportunity to welcome you to the Department of Teaching and Learning graduate program. The faculty supports a strong program of mentorship and encourages doctoral students to work closely with faculty of their choosing in investigating the world of research, knowledge generation and dissemination, pedagogical action, and advocacy.

We have extremely talented and knowledgeable faculty in the Department. The faculty are both excellent teachers and superb researchers. They are closely connected to the K-12 public school system, and also active contributors to research in their respective fields. The faculty conduct a wide range of research, some of which is integrated into the public school systems (e.g., writing interventions for students with disabilities, professional development for teachers) and some that is community-based (e.g., support for parents with children who have Autism). You have access to these faculty and their projects through course work and advising structures. Seek out this faculty expertise in teaching and research.

Please read through this handbook. It is designed to help you navigate all the transitions, procedures, and processes that graduate education involves. Discuss the items in this handbook with your advisor and graduate committee. Be aware of the deadlines described in the handbook.

We strive to facilitate and support a collaborative, positive, and productive culture for our graduate students. We are here to help you achieve your graduate goals. The faculty and staff in the Program and in the Department of Teaching and Learning welcome you to the graduate program and offer their assistance throughout your program.

Tariq Akmal, PhD
Chair, Department of Teaching and Learning

The Program Coordinator

Congratulations, and welcome to the Mathematics and Science Education Ph.D. program. PhD programs are self-driven and designed around your independent research. In our program, you are supported in your work by experienced professionals through formal coursework, seminars, and informal conversations. There is structure to the program but you have the opportunity to customize your program around your research interests. Further, like many things in life, you get out of it what you put into it. That is, the more time and thought you put into your studies, the more you will learn, grow, and prepare yourself professionally for your future endeavors. We are pleased to have you in the program and look forward to working with you in the coming years. Best of luck!

Andy Cavagnetto, PhD
Associate Professor of Mathematics Education and Mathematics
Coordinator, Mathematics and Science Education PhD

Introduction

The guidelines in this handbook are to assist you in planning and completing your program. Please read and discuss them with your advisor. If you have questions that are not addressed in this handbook, please contact your advisor or the staff in the Office of Graduate Education in the College of Education. You can also visit our website <https://education.wsu.edu/graduate/> for additional information.

The forms discussed in this handbook are available from the College of Education Office of Graduate Education and the Graduate School website: <https://gradschool.wsu.edu/facultystaff-resources/18-2/>

Mathematics and Science Education Program Overview

Program Vision

The Ph.D. in Mathematics and Science Education emphasizes the generation, application, and translation of research that will enhance the field of education in the context of mathematics and science. Students choose **an individualized path of study** that targets math and/or science education, guided by **faculty mentors**. Courses in math/science education, research, and a selected cognate area frame the core student experience, but numerous opportunities for individualized learning experiences exist up to and including the dissertation stage. The program is accessible at the following four sites of the WSU system - Pullman, Spokane, Tri-Cities, and Vancouver. All courses, advising, and weekly seminar occur over a state-wide teleconferencing system that supports a **broad learning community**. The degree prepares doctoral students for successful application to positions at research universities in the areas of mathematics, science, and STEM education. Graduates will also be well-suited for the growing number of positions in STEM education centers across the country (see Appendix C for a sample job announcement), or as STEM education professionals in K-16, community, or other professional contexts.

Mission

The mission of the Ph.D. in Mathematics and Science Education is to develop scholars and educators capable of making important contributions to the research base, professional context, and learning environments related to mathematics, science, and STEM education.

Student Learning Outcomes

The following student learning outcomes have been established for the program:

1. Program student locates, analyzes, and synthesizes research literature, and applies that synthesis to problems of practice.
2. Program student effectively communicates scholarly work through written, oral, and/or alternate formats.
3. Program student skillfully inquires into areas of program-related interest.
4. Program student develops scholarly habits of curiosity, inquiry, skepticism, and data-based decision making.
5. Program student expresses value of diversity and demonstrates this value in pedagogical and inquiry endeavors.
6. Program student conducts and disseminates original scholarship that demonstrates acquisition and application of new knowledge and theory.
7. Program student shows potential as an emerging expert in her/his area of study.

In addition, we identify the following goals for our graduates:

- An emergent research program in mathematics, science, or STEM education
- Knowledge of key aspects of the field (main journals, conferences, leading researchers, professional norms of the field)
- Awareness of key funding sources
- Ability to teach content methods and other preservice courses
- Ability to teach masters and doctoral level courses in mathematics, science, or STEM education
- Knowledge and awareness to pursue other occupations in STEM education outside of university settings

Student Handbook

The Mathematics and Science Education Doctoral Degree Handbook is designed for current and prospective students on the Pullman, Spokane, Tri-Cities, and Vancouver campuses. Students will find this Handbook helpful in understanding the degree program, the process for enrolling in coursework, and information regarding policies and procedures for successfully completing a degree program. If you have questions that are not addressed in these guidelines, please visit our website (<https://education.wsu.edu/graduate/mathematicsandscienceed/>), contact your advisor, or contact/visit the Academic Coordinators at any of the four participating campuses listed on page 26.

Doctor of Philosophy (Ph.D.)

The Ph.D. requires at least 72 credit hours of study and consists of graded and non- graded coursework. The Ph.D. program must include a minimum of 34 semester hours of graded credit beyond the master's degree (in the case of the Mathematics and Science Education PhD, the minimum is 43 semester hours beyond the bachelor's degree) and a minimum of 20 semester hours of Doctoral Research, Dissertation, and/or Examination (Ed_MthSci 800).

Program Content

In collaboration with the advisor/committee chair and other committee members, each student must file a doctoral degree Program of Study. The committee must approve the program, which is formalized by submitting the completed Program of Study form to the Department Chair and Graduate School. The [Program of Study](#) form can be found on the Graduate School's website.

The course of study for the Doctor of Philosophy in Math/Sci. Educ. includes a minimum of 43 graded credits plus a minimum of 20 dissertation credits (ED_MTHSC 800). Work with your advisor/program of study chair to plan a course of study that is intellectually coherent and relevant to your needs and interests.

The following is a breakdown of required foundational core, research, and elective requirements for the Ph.D. degree. For specific courses and semester offerings, please see the next section on Program Coursework and Requirements/General Overview. It is anticipated that completion of the degree will average three to five years.

Math/Science Education Doctoral Credit Overview	
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	Credits
Graded Credits	
Foundation Core Courses	16
Research Courses	15
Cognate Area and Additional Courses	12
Total Required Graded Credits	43
Additional Graded and/or Non-Graded Courses	9
Dissertation credits	20
Total Credits	72

Program Coursework and Requirements

General Overview

The Doctor of Philosophy in Education, with a specialization in Mathematics and Science Education is a research degree program that consists of a minimum of 72 credits. The program consists of a minimum of 43 graded credits and a minimum of 20 credits of ED_MTHSC 800. The remaining credits may include graded and non-graded course work relevant to the doctoral program. In collaboration with the advisor/committee chair and other committee members, each student designs his/her doctoral program of study. The committee must approve the plan, which is formalized by submitting the [Program of Study](#) to the department chair and Graduate School.

Required Foundational Core Courses (16 credit minimum)

All Mathematics and Science Education Ph.D. students are required to take the following Foundational Core courses. Changes and/or substitutions must be approved by the program coordinator and department chair.

Course Number	Course Name	Credit
TCH_LRN 581	Learning and Development in Mathematics and Science	(3)
TCH_LRN 584	Research in Teaching Mathematics and Science	(3)
ED_MTHSC 598	Research Seminar in Mathematics and Science Education (1 credit/semester: 4 credits required but may be taken for up to 6 credits)	(4)
<i>Two of the following courses</i>		
TCH_LRN 512	Language and Cultural Factors in Mathematics	(3)
TCH_LRN 561	Elementary School Mathematics Education	(3)
TCH_LRN 571	Research in STEM Education	(3)
TCH_LRN 574	Science for All: A Multicultural Perspective	(3)
MATH 532	Advanced Mathematical Thinking	(3)

The following courses are highly recommended but do not count toward the foundational core:

Course Number	Course Name	Credit
TCH_LRN 521	Topics in Education: Models of Teacher Education & Development ¹	(3)
TCH_LRN 585	Focused Reading and Conference in Math/Science Education ¹	(1-3)
TCH_LRN 591	Research Internship in Math/Science Education ¹	(2-3)
ED_RES 571	Dissertation Preparation	(3)

TCH_LRN 585 ¹ can be taken for up to 9 credits; TCH_LRN 591 ¹ can be taken for up to 6 credits

¹ Variable credit course in catalog. Be sure you are registering for the correct credits as listed on the course syllabi.

The following courses are offered on an as-needed basis, but are usually offered at least once every two years, and often during summer session.

- TCH_LRN 585: Focused Reading and Conference in Math/Science Education
- TCH_LRN 591: Research Internship in Math/Science Education

Foundation Course Rotation Schedule

Most of the above courses are offered on a two-year rotational basis. The current scheduling plan for these courses (subject to change):

	Fall Even (e.g., Fall 2020)	Spring Odd (e.g., Spring 2021)
Required Core	TCH_LRN 584 (3 cr) Research in Teaching Math & Science	
Required Core	ED_MTHSC 598 (1 cr) Research Seminar in Math & Science Education	ED_MTHSC 598 (1 cr) Research Seminar in Math & Science Education
Elective Core	TCH_LRN 512 (3 cr) Language & Cultural Factors in Mathematics	TCH_LRN 571 (3 cr) Research in STEM Education TCH_LRN 561 (3 cr) Elementary School Math Education

	Fall Odd (e.g., Fall 2021)	Spring Even (e.g., Spring 2022)
Required Core	TCH_LRN 581 (3 cr) Learning & Development in Math & Science	TCH_LRN 531 (3 cr) Frameworks for Research in Math & Science Education
Required Core	ED_MTHSC 598 (1 cr) Research Seminar in Math & Science Education	ED_MTHSC 598 (1 cr) Research Seminar in Math & Science Education
Elective Core		
Other	TCH_LRN 521 (3 cr) Models of Teacher Education & Dev	TCH_LRN 574 (3 cr) Science for All

Research Core (15 credit minimum)

All doctoral programs require completion of the College's research core with some variation by program. In the Mathematics and Science Education Ph.D. Program, the following courses are required. Changes and/or substitutions must be approved by the program coordinator and department chair. Note that prerequisites to the following courses are not considered advanced research courses. **Where needed, the prerequisites must be taken in addition to the 15 credits of advanced research.**

Prerequisite for EdRes 562: Ed_Psych 505 or concurrent enrollment

Prerequisite for EdRes 563: EdRes 562

Prerequisite for EdRes 564: EdRes 563

Prerequisite for EdRes 565: Ed_Psych 508; EdRes 563

Course Number	Course Name	Credit
EdRes 562	Epistemology and Inquiry in Educational Research	(3)
EdRes 563	Principles of Doctoral Research	(3)
EdRes 564	Qualitative Methods	(3)
EdRes 565	Advanced Statistical Analyses and Quantitative Research	(3)
Tch_Lrn 531	Frameworks for Research in Mathematics & Science Education	(3)

Required Cognate Area Courses (12 credit minimum) and Additional Courses (9 credit minimum)

Students are required to take at least twelve (12) additional credits in their chosen cognate area. These courses should be selected by the student in consultation with their committee chair.

In addition, nine (9) credits of graded or ungraded coursework are required to complete the program. Possible courses are shown below in WSU COE Ph.D. Cognate Options and on the Student Advising Sheet (Appendix A).

WSU College of Education PhD Cognate Options

General Overview

Education PhD programs at Washington State University are designed to provide focused, discipline-specific expertise to emerging scholars in the fields of 1) Cultural Studies and Social Thought in Education (CSSTE), 2) Educational Psychology (Ed_Psych), 3) Language, Literacy, & Technology (LLT), 4) Mathematics & Science Education (Ed_MthSc), and 5) Special Education (Spec_Ed). Each area contains core research and knowledge important to scholars in that given field.

However, educational research often draws from a wide array of theories, frameworks, and methodologies that cut across various fields of study. Because specific areas of research often have interdisciplinary foci that relate to two or more of the above areas, the five Education PhD programs at WSU have collectively developed sets of courses that represent possible *cognates* in specific areas of study. The courses should be selected in conjunction with your advisor and **can be used to satisfy the cognate area requirement of your program of study**, if applicable. Students have the option of obtaining a/an 1) discipline-specific cognate, 2) interdisciplinary cognate, or 3) dual-area cognate. These options extend any other set of options already offered by the student's given PhD program.

All courses listed below will be offered to all campuses via videoconferencing and will be scheduled in the evening, unless noted below. Scheduling and other logistical issues might prevent a student from being able to take the specified courses in a given cognate. It is recommended strongly that the list of courses be used whenever possible; however, we recognize the need for flexibility and are open to approved changes or course substitutions subject to the approval of the student's advisor and program committee. It is up to the student and faculty advisor to monitor cognate progress and completion.

Discipline-Specific Cognate Options

The following cognates are comprised of 3-credit courses recommended for students by faculty in the given areas, and intended for students not enrolled in the given area. They provide collectively a base of knowledge suitable for a cognate in that area.

Cognate in ...				
CSSTE	Ed_Psych	LLT	Ed_MthSc	Spec_Ed
<i>CSSTE 531</i> <i>Cultural Studies in Education</i> Fall Even	<i>Ed_Psych 502</i> <i>Theor Found. Of learning</i> Fall every year	<i>TCH_LRN 511</i> <i>Foundations of Theoretical Frameworks</i> Fall Odd	<i>TCH_LRN 581</i> <i>Learning & Development in Math & Science</i> Fall Odd	<i>Spec_Ed 589</i> <i>Seminar in Disability Studies</i> Spring Even

CSSTE 535 <i>Multicultural Education in a Global Society</i> Fall every year	Ed_Psych 573 <i>Motivational Theories</i> Spring Even	TCH_LRN 549 <i>Communicating in a Multilingual Society</i> Spring Odd	TCH_LRN 584 <i>Research on Teaching in Math & Science</i> Fall Even	Spec_Ed 592 <i>Single Subject Research Design and Methods</i> Spring Even
CSSTE 536 <i>Environment, Culture, and Education</i> Spring Odd	Ed_Psych 521 <i>Embedded Cognition</i> Fall Even	TCH_LRN 570 <i>Theory and Research in Electronic Literacies</i> Spring Odd	Choose 2: TCH_LRN 512 <i>Language & Cultural Factors in Mathematics</i> Spring Odd	Spec_Ed 593 <i>Diversity Issues in Special Education: Theory, Research, and Practice</i> Fall Odd
CSSTE 537 <i>Place Based Education</i> Spring Odd	Ed_Psych 521 <i>Data Management and Visualization</i> Every Summer	Choose 1: TCH_LRN 550 <i>Second Language Learning and Literacy</i> Fall Even	TCH_LRN 531 <i>Frameworks for Research in Math & Science Education</i> Spring Even	Spec_Ed 595 <i>Universal Design for Learning and Assistive Technology</i> Fall Odd
		TCH_LRN 562 <i>Foundations of Literacy: Theory & Research</i> Spring Even	TCH_LRN 571 <i>Research in STEM Education</i> Spring Odd	
			TCH_LRN 574 <i>Science for All</i> Fall Even	

Interdisciplinary Cognate Options

Students interested in obtaining an interdisciplinary cognate can do so by taking any four of the courses in the above grid. However, it is recommended strongly that the courses be connected by a given theme or focus; advisor and committee approval of an interdisciplinary cognate is required.

To assist students and advisors interested in the interdisciplinary option, the following cognates have been created that are comprised of 3-credit courses offered in several different WSU PhD programs, connected by a specific focus identified in the cognate title.

Cognate in ...				
Research Methods across Disciplines	Research on Learning and Cognition	Research on Equity in Education	Research on Instruction	Research on Social Aspects of Education

EDPSYCH 521 <i>Data Management and Visualization</i> Every Summer	Ed_Psych 502 <i>Theor Found. Of learning</i> Fall every year	CSSTE 535 <i>Multicultural Education in a Global Society</i> Fall every year	CSSTE 537 <i>Place Based Education</i> Spring Odd	Choose 4 of the 5 courses listed: CSSTE 536 <i>Environment, Culture, and Education</i> Spring Odd Ed_Psych 521 <i>Embedded Cognition</i> Fall Even Spec_Ed 595 <i>Universal Design for Learning and Assistive Technology</i> Spring Odd
Spec_Ed 592 <i>Single Subject Research Design and Methods</i> Spring Even	Spec_Ed 593 <i>Diversity Issues in Special Education: Theory, Research, and Practice</i> Fall Odd	Spec_Ed 593 <i>Diversity Issues in Special Education: Theory, Research, and Practice</i> Fall Odd	Spec_Ed 595 <i>Universal Design for Learning and Assistive Technology</i> Fall Odd	Ed_Psych 521 <i>Embedded Cognition</i> Fall Even Spec_Ed 595 <i>Universal Design for Learning and Assistive Technology</i> Spring Odd
TCH_LRN 511 <i>Foundations of Theoretical Frameworks (LLT)</i> Fall Odd	TCH_LRN 550 <i>Second Language Learning and Literacy</i> Fall Even OR TCH_LRN 562 <i>Foundations of Literacy: Theory & Research</i> Spring Even	TCH_LRN 512 <i>Lang./Cult in Mathematics</i> Spring Odd OR TCH_LRN 574 <i>Science for All</i> Fall Even	TCH_LRN 570 <i>Theory and Research in Electronic Literacies</i> Spring Odd	TCH_LRN 549 <i>Communicating in a Multilingual Society</i> Spring Odd TCH_LRN 512 <i>Lang./Cult in Mathematics</i> Spring Odd OR TCH_LRN 574 <i>Science for All</i> Fall Even
TCH_LRN 531 <i>Frameworks for Research in Math & Science Education</i> Spring Even	TCH_LRN 581 <i>Learning & Development in Math & Science</i> Fall Odd	TCH_LRN 549 <i>Communicating in a Multilingual Society</i> Spring Odd	TCH_LRN 584 <i>Research on Teaching in Math & Science</i> Fall Even	

Dual- and Multi-area Cognate Options

Students interested in obtaining a dual-area cognate can do so by taking four courses that are 1) thematically connected, 2) outside of the students' degree program, and 3) approved by the student's advisor and committee. The courses should provide students with core knowledge in both fields of study, as well as the basis for a collective focus across the areas.

If deemed appropriate, students could create a cognate by taking courses in three different program areas if they satisfy the three criteria outlined above.

Here are two examples of potential dual- and multi-area cognates:

Literacy in Special Education: Tch_Lrn 549, 562; Spec_Ed 593, 595

Equity in STEM Education: Tch_Lrn 512, 549, 574; CSSTE 535

Academic Requirements, Policies, and Procedures

Academic Standing and Annual Review

You are required to maintain a 3.0 cumulative grade point average (GPA) in your graduate program. If you fail to maintain a 3.0 cumulative GPA or receive an F in any course in the graduate program, your committee will review the situation and make a determination as to whether or not you will be allowed to remain in the program.

Each year, the Graduate School requires progress reviews of all graduate students. Towards the end of Spring Semester, you complete the annual progress review form (Appendix B), noting whether or not you are making satisfactory progress toward completion of your program, including detailed comments on each item. An updated vita is also required at this time. A meeting with your advisor is then required, at which time both you and your advisor sign the form. A meeting with all program faculty then occurs to discuss each individual students' progress in the program. If needed, a final meeting will occur.

Mandatory Research Training

All graduate students are required to complete the CITI Responsible Conduct of Research online training module. This is a web-based training located at <https://myresearch.wsu.edu/MandatoryTraining.aspx>. Students are encouraged to take this training as soon as they are admitted to the doctoral program. Once you have completed this training, you will receive email confirmation of your completion. Please forward this email to the College of Education (COE) Office of Graduate Education at gradstudies@wsu.edu. Delay in the completion of this training could delay a student's progression through their graduate program. The training will need to be repeated after a five-year period.

Program Retreat

All graduate students are required to attend the annual program retreat, usually held on a Saturday early in the Fall semester on the Tri-Cities campus. The purpose of the retreat is to enhance the learning community established amongst students and faculty in the program and engage in scholarly discussions pertinent to the fields of mathematics and science education.

Temporary and Permanent Advisor

Assignment of a Temporary Advisor

Your admission letter from the Department indicates the faculty member who will serve as your temporary advisor. The temporary advisor will assist you with the initial selection of course work and other program requirements. You should contact your advisor prior to enrolling in classes, and maintain regular communication throughout the initial stages of your program. The temporary advisor serves until you select a permanent advisor who will chair your doctoral committee. While you may decide to ask your temporary advisor to chair your doctoral committee, you are also free to ask another faculty member in your program. Once the doctoral committee is established, students are allowed to change members of their committee, including the chair, at any time. However, they must communicate with all faculty involved prior to officially requesting a change in the committee. The reason for the change, which should be clearly articulated, should be both compelling and substantive in nature, as changes in committee are not routine. In addition, program faculty members are under no obligation to serve on any committee.

Selection of a Permanent Advisor/Committee Chair and Doctoral Committee

You are encouraged to select a permanent advisor/committee chair as soon as possible after your first semester of study, or if you are a part-time student, after completing 20 credits or by your fifth semester, whichever comes first. By this time, you should know several faculty members and their areas of specialization. The permanent advisor/doctoral committee chair must have a doctoral degree and be qualified, according to COE guidelines, to chair doctoral committees. The individual must be a member of the Graduate Faculty in the Mathematics and Science Education Ph.D. Program (see Faculty List at the end of the Program Bylaws in Appendix E). The individual should also have expertise in the area that will be the focus of your study. This will be reflected in the faculty member's record of research and publication, teaching, and professional service. If you need additional assistance in selecting a permanent advisor/committee chair, consult with the department chair, a faculty member you know, or the staff in the COE Office of Graduate Education.

Your permanent advisor/committee chair will help you develop and file your Program for Doctoral Degree and identify other faculty members to serve on your doctoral committee. The doctoral committee must consist of at least two members, in addition to the committee chair, who hold a doctoral degree and are qualified, according to COE guidelines and Mathematics and Science Education Ph.D. program bylaws, to serve on doctoral committees. At least two of the three committee members must be members of the Mathematics and Science Education Ph.D. Program Graduate Faculty and the Department of Teaching and Learning. All three committee members should have expertise related to your program of study. One person who does not meet the COE criteria for serving on doctoral committees may be appointed to the committee as a fourth member. The committee must also include a faculty member from your chosen cognate area. The supporting cognate area may be from the COE or another college.

Once the doctoral committee is established, students are allowed to change members of their committee, including the chair, at anytime. However, they must communicate with all faculty involved prior to officially requesting a change in the committee. The reason for the change, which should be clearly articulated, should be both compelling and substantive in nature, as changes in committee are not routine. In addition, program faculty members are under no obligation to serve on any committee.

When selecting committee members, take into account whether each committee member

- has a Ph.D. or Ed.D.
- meets COE criteria for serving on doctoral committees
- is available for the duration of the dissertation (e.g., are there sabbatical or retirement plans?)
- has expertise related to the topic of research
- has expertise in the research methodology
- is accessible for meetings with you and other committee members
- provides prompt and constructive feedback
- is compatible with other committee members
- has the time to devote to your committee

Program of Study

The [Program of Study](#) (POS) lists your committee chair and other committee members and the courses that comprise your doctoral program. Your permanent advisor/committee chair, in collaboration with other members of your doctoral committee, will help you identify the appropriate course work for your program of study. When committee members sign the form, it indicates they agree to be on your committee and approve your program of study.

The core courses for the Mathematics and Science Education Ph.D. must include a minimum of 43 semester hours of graded course work beyond the master's degree. (Requirements are shown in the Advising Sheet, Appendix A.) These graded courses are listed in the "Core Program" section of the POS form. Details on these courses are provided in later sections. Generally, only graduate-level WSU and transfer courses can be included in the Program of Study. No course used for a previously completed masters or doctoral degree may be used. However, your doctoral program committee may approve up to 12 credits of non-graduate credit (300- or 400-level courses at WSU) for your program of study. Any course included in the POS in which a grade of "C-" or below is earned must be repeated as a graded course (cannot be repeated on an S/F basis).

In the "Research and Additional Studies" section of the program, list the Special Projects (Tch_Lrn 600, SpEd 600) and Doctoral Research, Dissertation, and/or Examination (Ed_MthSc 800) credits you plan to take, as well as courses taken on an S/F basis. You must enroll in Tch_Lrn 800 in the semesters in which you take your comprehensive assessment examination and work on your dissertation. Your program must include a minimum of 20 credits of Ed_MthSc 800.

The POS must be typed and circulated to the faculty members you asked to serve on your doctoral committee for their signature. You then submit the signed form to staff in the COE Office of Graduate Education, who then submit it to the chair of the major degree-granting unit, the chair of the minor department/program, if applicable, and to the Graduate School. Once approved by the Graduate School, an email will be sent to you and the COE Office of Graduate Education. The approved program becomes a part of the requirements for the degree.

Although Graduate School policy requires that this form be completed no later than the third semester of graduate work, or if you are a part-time student, no later than your sixth semester, or completion of 24 credits, whichever comes first, you are encouraged to submit it shortly after your first semester of course work, if you are a full-time student, or, if you are a part-time student, during your fifth semester or after completion of 20 credits. You are held to the doctoral program requirements in effect at the date of your admission, provided you submit a Program of Study and have it approved by the Graduate School within one year of your admission date. Otherwise, you will be held to the program requirements in effect at the time of approval of your POS.

You may change the course work listed on an approved POS by submitting a completed [Program Change](#) form to the COE Office of Graduate Education. Changes must be approved by your committee chair, the chair of the major department, and if applicable, the chair of the minor department. After approval at the departmental level, the form is forwarded to the Graduate School.

To request a change in committee membership, submit a completed and signed [Committee Change](#) form to the COE Office of Graduate Education. All new and current committee members must sign the form. Additionally, anyone dropped from a committee must initial the form. The form is then forwarded to the chairs of the major and, if applicable, minor departments for approval. If approved at the department level, the form is forwarded to the Graduate School for approval. ****Be sure to keep copies of all submitted paperwork.**

Deadlines

You should check the Graduate School's [Deadlines and Procedures for the Doctoral Degree](#) for submission of the Program of Study so that you get current information about due dates that affect you.

Continuous Enrollment Policy

All full- and part-time degree-seeking graduate students at all campus locations must maintain continuous enrollment in the Graduate School, registering for each semester, excluding summer sessions, from the time of first enrollment until all requirements for the degree are completed. Continuous enrollment is maintained by registering for a minimum of 2 graduate credits per semester (excluding the summer). For further information regarding the Continuous Enrollment policy go to the Graduate School Policy and Procedures at <http://gradschool.wsu.edu/chapter-five-a2/>. If a student needs to request leave, a form (See Appendix C) must be submitted to the Graduate School.

Grade Point Average

You are required to have a 3.0 cumulative and a 3.0 program GPA in order to be awarded a graduate degree. No work of B- or below may be dropped from a program, nor can a course be repeated for a higher grade if the final grade is C or higher. Any course listed in the Program of Study for a doctoral degree with a grade of C- or below must be repeated, and the course cannot be repeated on an S/U (satisfactory/ unsatisfactory) basis.

If you are a regularly admitted graduate student who has completed only one semester or one summer session of graduate study with a GPA of 2.75 or above, you are eligible for continued enrollment. Upon completion of two semesters, one semester and one summer session, or two summer sessions of graduate study and thereafter, a 3.0 GPA or above is required for continued enrollment in the Graduate School. If you are admitted on a provisional status, you must maintain at least a 3.0 GPA in order to continue your enrollment in the Graduate School.

If you fail to maintain a cumulative GPA of at least a 3.0 for two semesters, one semester and one summer session, or two summer sessions, your enrollment will be terminated. If your GPA is between 2.75 and 2.99, you may be reinstated by the Dean of the Graduate School upon favorable recommendation of the department chair. Upon reinstatement, you will have one semester to raise your cumulative GPA to at least a 3.0.

If you are a newly admitted student who fails to obtain a cumulative GPA of at least 2.75 at the end of one semester or one summer session of graduate study, your enrollment will be terminated. You may be reinstated by the Dean of the Graduate School upon favorable recommendation of the department chair.

Registration and Credit Load

Graduate Students are responsible for completing appropriate enrollment procedures each semester. Full-time graduate students must register for a minimum of 10 credit hours to maintain full-time enrollment status in the fall and spring semesters. All full-time graduate students must register for at least one (1) 800 (doctoral) level research credit each semester to track faculty advisor effort. Part-time graduate students must register for a minimum of 2 credit hours and no more than 9 credit hours to maintain part-time enrollment status in the fall and spring semesters. For further information regarding the Registration and Credit Load policy go to the Graduate School Policy and Procedures at <https://gradschool.wsu.edu/policies-procedures/>.

Transfer Credit and Credit Restrictions

The number of transfer credits allowed for the Mathematics and Science Education Ph.D. program is 12. If approved, up to 12 credits appropriate to the program of study (with a grade of B or higher) earned in other accredited graduate schools after the award of the bachelor's degree may be transferred and applied toward your graduate degree program. Graduate credit earned (with a grade of "B" or higher) at Washington State University prior to formal admission to the Graduate School, other than credit earned while enrolled as a Class 5E or Special 8 student, may be included in the number of prior credits allowed. The total of such credits from the two categories (transfer and prior WSU credits) is subject to the usual time restrictions and approval by the department and the Graduate School. None of these credits may be applied toward another advanced degree.

Extension courses, special problems, research and thesis, workshops, and correspondence courses will not receive graduate transfer credit. For necessary interpretations, inquiries should be sent to the Dean of the Graduate School.

Transfer credit is requested formally by listing the courses on the Program of Study, but preliminary determination will be made earlier upon request to the Graduate School. Graduate credit from non-accredited institutions will not be accepted for transfer to graduate degree programs. Graduate credit earned within the State of Washington from an accredited institution whose main campus is outside the state will be considered for transfer to a graduate degree program only upon special petition to the Dean of the Graduate School.

Non-required but Highly-recommended Activities

- Submit a proposal to present research at a major conference
- Submit papers for publication in refereed journals
- Volunteer as a proposal reviewer for a publication or conference
- Engage in scholarly and/or teaching activity through a lens of equity and diversity, or in settings that involve or take into account equity and diverse learners
- Collaborate with faculty on grant development, submission, and/or enactment
- Work closely with a faculty member on a research project
- Conduct presentations to peers in courses
- If possible, teach undergraduate courses in pedagogy and/or content
- Complete the IRB CITI course (required)

Endorsement Information

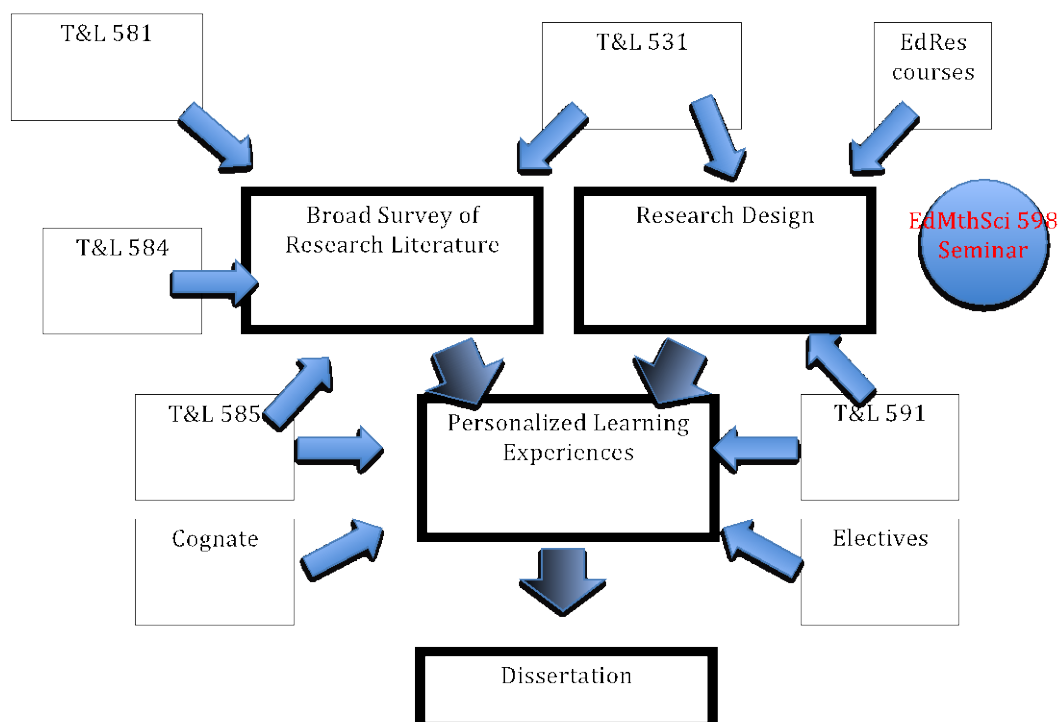
Students wishing to add an endorsement to their teacher certification must apply to WSU's add-on endorsement program. Once all coursework and testing requirements are met, students must submit a separate application to have the endorsement added to their certificate. More information and both applications can be found on the Student Services' website

<https://education.wsu.edu/undergradprograms/teachered/endorsements/>

Courses related to the middle level mathematics endorsement and the middle level science endorsement can become part of the Program of Study for your doctoral degree. Consult with your doctoral advisor and campus advising staff for more information.

Program Flow Chart

Mathematics and Science Education PhD Program Flow Chart



Broad overview	Learning Outcomes	Probable course
Survey of research on learning, teaching, and research paradigms in math/science education	Synthesize literature around a specific topic Theoretically frame a puzzle of practice Understand and compare various methodological approaches and study designs in math/science education	Tch_Lrn 531 Tch_Lrn 581 Tch_Lrn 584 (Tch_Lrn 591, Ed_MthSc 598)
Overview of general approaches to educational research	Understand and compare various educational methodological approaches and study designs	EdRes 562, 563, 564, 565 (Tch_Lrn 591)
Survey of research on equity in the context of a specific aspect of math/science education	Understand and apply equity into problems of math/science education	Tch_Lrn 512, Tch_Lrn 574
Readings and projects on student's specific area of interest	Expert fluency in a specific area of math/science education Focused research question Experience implementing research designs	Electives Cognate Research courses
Large-scale research project	Design and implement large-scale research	Dissertation Ed_MthSc 800

Preliminary Examination

(also known as the Comprehensive Written and Oral Assessment)

Notes

The WSU Graduate School has many policies and procedures that are not included in this handbook. The Mathematics and Science Education policies and guidelines in this document compliment, clarify, and extend the policies of the Graduate School. Students are responsible for following all WSU Graduate School policies in addition to the policies contained in this document.

For example, students are required to complete all requirements, including dissertation defense, within three years of successful completion of Preliminary Examinations. Students are encouraged to consider this requirement when scheduling Preliminary Examinations.

Students are also discouraged from scheduling D1 in summer session due to faculty availability; however, if the entire committee is amenable to a summer D1 scheduling date, the student should feel free to proceed.

Purpose

After the [Program of Study](#) has been approved and most or the entire program has been completed, the Comprehensive Assessment is designed and scheduled. The student must complete the [Preliminary Examination Scheduling Form](#) and submit it to the COE Office of Graduate Education at least 15 business days prior to the exam date. *Forms will be returned and defenses delayed if the form has missing information.* Students must be enrolled for a minimum of two (2) Ed_MthSc 800 credits to take the exam. The products used for this assessment should illustrate the student's ability to **synthesize relevant research** in order to evidence her or his working knowledge of:

- important area(s) of science and/or mathematics education,
- tensions that exist in a given field and the various stances towards them, and
- various research methodologies and implications of choosing one over another.

Assumptions

The following three assumptions must be met:

1. The comprehensive assessment includes both written and oral components.
2. The committee chair and the student will identify the appropriate option for committee approval.
3. The comprehensive assessment must be passed before defending a dissertation proposal.

Options

There are three options to consider for the Comprehensive Assessment:

1. *Publishable paper and oral defense.* This option involves an original, single-authored research article that will be submitted for publication. A time line will be established for this option. The product must be empirical or theoretical in nature and submitted to an appropriate peer-reviewed journal for potential publication. Once the paper is received and reviewed by the committee (journal review is independent of this step), an oral defense will occur. The oral defense may involve aspects of the criteria related to your working knowledge (found above) that were not fully developed in the paper.

2. *Critical synthesis of research, theory, and practice, and oral defense.* This option will stem from three questions posed by the chair and committee members in consultation with the student. The student has three weeks total time to respond to all questions. Once all responses are received and reviewed, an oral defense will occur.
3. *Alternative comprehensive product.* This option allows the student to submit a written proposal to his or her chair and committee that describes an alternative comprehensive assessment product.

Overview of Process

In regard to Option #1, the student must first discuss whether this is an appropriate option with the committee chair. If the chair approves, the committee will then be asked to approve this option. The student will then develop a work plan and submit this for committee approval. The work plan must include details regarding the paper's focus, research design, target journal, and timeline (including anticipated date of paper completion and date of defense). The student can plan to collect and analyze new data, or utilize data collected previously. The chair and committee can provide feedback to the student on any aspect of the plan. Once the committee approves the written plan, the student can proceed with the research and/or writing of the paper. In the case where new data will be collected, the chair and committee may provide *feedback* to the student during research design, data collection, and analysis, as needed. However, once the data collection and analysis have been completed and/or identified, the manuscript will be developed by the student without the assistance of the chair and committee members. The student will defend the paper in an oral exam. After the oral exam, the committee can provide feedback on the written document to help the student prepare it for submission to the selected journal.

In regard to Option #2, it is likely that the chair will involve the student in generating the examination questions, but the chair and committee are responsible for the final versions. Students have three weeks to prepare the written response. The responses are expected to be clear and concise, and with sufficient depth to address the questions in full. Each response should be approximately 10-15 pages, though this can vary depending on the question. The entire collection of responses should never exceed 50 pages. Students are allowed to ask clarifying questions of their chair and committee, but must compose question responses without feedback or support from anyone. Question topics vary, but it is likely that the questions will involve theoretical frameworks (i.e., WHAT is the grounding for your research interests), literature review (i.e., WHY your research interests are important), and methodology (i.e., HOW your research interests will be operationalized). The student will be expected to prepare a brief presentation (approximately 15 minutes) to begin the oral defense, to be followed by questions from and discussion with the committee members. The rubric to evaluate the preliminary examination will be used initially by committee members to evaluate the written response; students should ask their chair for a copy of the rubric. However, the final evaluation of the examination will apply the rubric to the totality of the examination, which includes the written response and the oral defense.

Scheduling the Preliminary Exam (Official Defense)

After all committee members have had the opportunity to read the written component of the examination, the oral component is scheduled. Students must be enrolled in a minimum of two (2) credits of Ed_MthSc 800 to take the exam. Scheduling the [Preliminary Examination](#) with your committee includes setting the date, location and time of the meeting. It is your responsibility to insure that all members of the committee sign and the location is reserved. If approved by the committee, the form is forwarded to the COE Office of Graduate Studies who will submit to the chair of Teaching and Learning for approval before routing to the Graduate School for final approval. The completed form is due in the Graduate School ten (10) working days *prior* the date of your examination.

Oral Component and Balloting

Once all committee members have had the opportunity to read the written component of the assessment, the oral component of the assessment is scheduled. All committee members must be present with at least one faculty member in the room with the student during the oral exam. Following the oral examination, committee members meet to discuss the results and ballot on whether you pass or fail the assessment. The ballot meeting, which is scheduled in coordination with the Graduate School, may occur immediately following the oral exam or up to four weeks after the examination. All members of your committee must attend the oral exam and the ballot meeting and all must vote. The final ballot result is either a pass or fail. After the ballot meeting, the Office of Graduate Education will notify you in writing regarding the results. You are also free to contact your chair after the ballot meeting to receive and discuss the results.

Repeating the Preliminary Examination

In the event of a failed assessment, you may be re-assessed a second and final time only at the request of the department/program that previously voted to fail you. There is no automatic right to a second assessment. At least three months must elapse between a failed assessment and a re-examination. Failure of two comprehensive assessments results in termination of enrollment in the doctoral program and the Graduate School.

Thesis/Dissertation Guidelines

Dissertation Overview

The following section describes the dissertation proposal, how to complete a dissertation proposal, and the various steps involved in completing the dissertation. Please read the descriptions and guidelines carefully.

While you may begin work on the D1 prior to the comprehensive assessment (i.e., preliminary exam), you may not formally present your proposal until you successfully complete the examination.

Dissertation Proposal (D1)

A dissertation proposal (D1) is a concise and convincing overview of the research you propose to undertake for the dissertation. While the format for a D1 is variable, your committee chair and committee members may have specific requirements regarding the format. Discuss the format options with your chair, as well as the members of your committee. You may enroll in research credits (Ed_MthSc 800) during the semesters in which you develop the proposal.

Typically, a semester or two prior to your comprehensive assessment you should begin working with your committee to define your area of research, identify specific research questions, and prepare the D1. The format should adhere to the style set forth in the latest edition of the Publication Manual of the American Psychological Association (APA). The D1 should address the following questions:

1. What is the rationale for the study? Why is it important?
2. What is the problem, issue, question, or hypothesis?
3. What theoretical perspectives will frame the study's formation, execution, and implications?
4. What have others speculated, asserted, found, and/or concluded about this problem, issue, question, or hypothesis?
5. What do you propose to do to investigate, explore, or examine your topics?

- a. What is the research methodology and why is it appropriate for the specific research questions?
 - b. Who will you observe, test, teach, interview, etc. (i.e., who will be the participants/subjects)?
 - c. What instruments or measures will be employed to conduct those activities?
 - d. How will you conduct the study (procedures)?
 - e. How will you organize or analyze the resulting data (analysis)?
 - f. What will be your intervention (if applicable)?
 - g. What are your study's limitations? Are there threats to validity or trustworthiness?
6. What knowledge will be added to the literature that was not known before? How is your study proposal going to significantly impact the field?

Development of a Dissertation Proposal (D1)

There are two options for the D1, described below. Students are expected to work closely with their dissertation chair and committee in constructing the D1. Written drafts of the D1 should be submitted to your committee chair, who will provide feedback. Your chair's feedback should be used to revise and clarify the D1. When you and your committee chair are satisfied with the D1, provide a copy to your committee for feedback. You and your chair will decide upon the means of obtaining your committee's feedback (e.g., a meeting, presentation, written comments submitted to you or the chair).

The writing process varies from one committee to the next. It is important that the proposal be clearly written and thorough prior to submission to the full committee. The committee should focus on substantive feedback, not writing and formatting errors. Students will be expected to seek support, such as the Writing Center, for substandard writing wrought with structural errors. Once your chair has agreed that the proposal is complete and ready to be viewed by the other committee members, provide adequate time (minimum of two weeks) to review drafts of your proposal. Committee members will assess the completeness and quality of the proposal and could request further revisions once they have reviewed the proposal draft.

Writing the Dissertation Proposal (D1)

The dissertation proposal must be written according to the style specified in the latest edition of the Publication Manual of the APA. While you will develop the format for the proposal with your chair, the proposal should address the six questions on page 14 in great detail.

Suggested format of D1 for Option 1:

Chapter I. Introduction (or Statement of Problem). This section should address Questions 1-3 on Page 14. This chapter provides a clear and concise view of what is to be studied and why. The phenomenon under study should be described, along with a brief analysis of the manner in which this phenomenon has been addressed in the extant literature. A discussion of the theoretical frameworks involved in the study should be discussed, and then expanded upon in Chapter 2. When appropriate, relevant contexts and autobiographical information may be provided to situate the study. Note that this chapter does not provide a complete literature review. In addition to the research question/hypotheses and analysis of how the phenomenon has been addressed in the literature, you should provide an overview of your research methodology and the implications of your proposed research. It is recommended that research questions are clearly stated somewhere in this chapter.

Chapter II. Review of the Literature. This section should address Question 4 on Page 14. The structure of the literature review chapter will vary according to your topic and the approach you take to justify, based on the extant literature, your research questions and proposed method of investigating them. The

review is a well-integrated document in which material is organized logically under headings and subheadings, consistent with the APA Publication Manual format. The review is selective. It does not include material unrelated to the research questions. Summary tables of relevant research are often appropriate. A good review identifies the theories, frameworks, primary research findings, adequately and inadequately documented conclusions, needed research, and implications of findings for theory and practice. Views and findings are more often restated, synthesized, and/or critiqued rather than quoted. Expansion on the theoretical framework should occur throughout, and/or in a specific subsection.

Chapter III. Methodology. This section should address Questions 5 and 6 on Page 14. The material in this chapter will vary depending on the nature of your proposed study. In general, the chapter should provide detailed information about the participants (who), procedures (how, when, where), data (what), and analysis. Topics may include:

1. Operational definitions.
2. Characteristics of participant(s). Provide a complete description of the participants, including the number of participants, how they will be selected, and the participant characteristics that are important to the study (e.g., age, gender, experience, education level).
3. Research design. If it's an ethnographic study, for example, describe your approach (e.g., participant-observer) and elaborate on what that will mean. For a quantitative study, describe the type of research (e.g., quasi- experimental), experimental and control groups, dependent and independent variables, and research design (e.g., post-test comparison of randomly selected control and experimental groups). Be clear and provide an argument as to why the chosen research design is appropriate for the research questions. A discussion of the epistemological stance you have as a researcher and the degree to which this surfaces in your research design is helpful.
4. Instrumentation. Include a detailed description of any data collection instruments and/or procedures, including, if relevant, information about their validity and reliability. If you develop a new instrument, provide details about how you will develop the instrument, including, if relevant, how you will assure the instrument is valid and reliable. Instruments that are not commonly known should be appended to your proposal.
5. Apparatus. Thoroughly describe any equipment to be used in the conduct of the study.
6. Materials. Give a complete description or provide examples of any materials to be used in the study (e.g., written scenarios to which participants will respond).
7. Procedures. Provide a step-by-step description of how you will conduct the study. This should incorporate and tie together the other elements of the methodology (i.e., participants, research design, instrumentation, etc.).
8. Analysis. Describe in detail how you will analyze the data. It's insufficient to simply state an analytic method (e.g., constant comparative method, ANOVA). Instead, indicate which data, including subsets of data, will be subjected to which analytic methods and how the results relate to specific research questions.

The D1 should end with a discussion of the anticipated implications of your work, as well as potential limitations of the study and threats to validity or trustworthiness.

Suggested format of D1 for Option 2:

Because the D1 for Option 2 will support the creation of two publications, it should be consistent with the front matter (Introduction, Conceptual or Theoretical Framework, Literature Review, Methodology) of the eventual articles to be produced, but in a more expanded form. In general, the D1 should be consistent with the content expected of the D1 for Option 1, and should also be grounded in the six questions on page 14.

For the D1 for Option 2, students are expected to compose a rationale and description of the study(s) related to *each* of the two papers. Although many published articles have abbreviated theoretical

framework, literature review, or methodology sections due to space constraints or journal norms, these should not be abbreviated for the Option 2 D1. It may be appropriate to edit down these sections at a later time for publication, but a substantive review of the literature and detailed description of the theoretical frameworks and methodology are required.

The first two chapters should be similar to Option 1. The contents of the Option 2 D1 should include 1) an Introduction, 2) a conceptualization of the study or studies that will result in the construction of the two papers to be written, with detailed discussion of the research questions and plans for the nature and dissemination outlets of the two papers, 3) discussion of Theoretical Framework and Literature Review related to all research questions, and 4) description of the methodology(s) related to each.

The D1 should end with a discussion of the anticipated implications of your work, as well as potential limitations of the study and threats to validity or trustworthiness.

Scheduling the D1 Defense

When you and your committee determine you are ready for the formal presentation of the proposal, you must complete and submit a [Dissertation Proposal \(D-1\) Scheduling form](#) that can be obtained in the College of Education Office of Graduate Education. This includes reserving a room for your defense, which can be done in the College's Dean's office. You must secure the signatures of your committee and submit the D1 Scheduling Form to the Office of Graduate Education who will then secure the signature of the department chair and place the form in your file. Non-Pullman students should work with their campus advisors to facilitate this process.

The formal dissertation proposal consists of a presentation in a colloquium that is open to the public. The presentation includes the opportunity for questions from your committee members and others in the audience. Immediately following the colloquium, your doctoral committee will meet to recommend approval or disapproval of the D1 on the [Dissertation \(D1\) Proposal Approval Form](#). The committee will indicate one of the following decisions on the Dissertation Proposal Approval Form (D-1): (a) approve as presented; (b) approve, subject to revisions as specified by the committee; (c) approve, subject to revisions as specified and subject to further review and approval by the committee; and (d) approval denied. Approval or disapproval of the dissertation proposal is documented by committee members' signatures on the D-1 form.

Human Subjects Form and CITI training

CITI training can be obtained at any point prior to submission of your IRB forms, but you are encouraged to do so as early as possible. After approval of the D-1 and prior to any data collection, you must obtain WSU Institutional Review Board (IRB) approval to conduct your dissertation research involving human subjects. The IRB letter of approval must be submitted to your committee chair and the College of Education Office of Graduate Education *before* you commence data collection. You may submit a copy to the Office of Graduate Education when you receive the confirmation but it must be submitted no later than when your Dissertation/Thesis Acceptance/Final Examination scheduling form is submitted. Failure to gain approval prior to data collection shall result in rejection of the final dissertation and prevent you from scheduling the final doctoral examination.

The IRB form for approval of human subjects research is available on the IRB website <http://www.irb.wsu.edu/>. The IRB form must be signed by the chair of your committee and the department chair before it is submitted. Review of the request generally takes 5-10 days, at which time you will inform you by email as to whether your research is approved.

Writing the Dissertation

The dissertation "...is a scholarly, original study that represents a significant contribution to the knowledge of the chosen discipline" (WSU Graduate School Policies and Procedures). You must enroll for research credits (Ed_MthSc 800) in the semesters you work on the dissertation.

Upon approval of the D-1, CITI training and receipt of the IRB approval for human subjects research, you may begin the study as outlined in the methods section of your proposal. Upon completion of data collection and analysis, you are ready to write the dissertation.

Option 1: Standard Form

In its final form, the standard dissertation usually includes five chapters—the three described in the previous section plus the results and discussion chapters. It is not uncommon for these chapters to undergo several iterations before final approval.

Chapter IV. Results. This chapter provides a detailed presentation of the results. Do not interpret the results, draw conclusions, or relate the findings to the extant literature. Examples of results include descriptive and/or inferential statistics, and themes, with supporting data, that emerged from analysis of qualitative data. The chapter is often organized around the analyses conducted for each research question.

Chapter V. Discussion. This chapter focuses on the meaning of the study and the significance of the results. The chapter typically begins with a brief summary of what was done and why. This is followed by a presentation of the results as they relate to the research questions. The discussion tends to be more conceptual than empirical and specific results are noted only as evidence to justify the assertions and conclusions related to the research questions. The discussion explains what the results may mean. This discussion may focus on why more support was not found to support or refute the research questions, or on the meaning of the support that was found. This discussion is a thoughtful analysis of the results obtained. It's appropriate to acknowledge the limitations of the research, state the implications of the findings for both theory and practice, and make recommendations for future research.

Option 2: Two Publishable Papers

Students who undertake this option are required to prepare two publishable papers. The papers are expected to be "publication ready" and eventually submitted to appropriate outlets. The student may collaborate with committee members and others in the writing process, but should be the sole or first author of both papers. See the above discussion of Preliminary Examination, Option 2 for further guidance. The committee will formulate specific recommendations regarding appropriate outlets for the papers. These could include research journals, practitioner journals, book chapters, or other such scholarly outlets. On balance, the papers should represent scholarly work in line with the expectations outlined in a traditional dissertation.

The following format should be followed for submission of the Option 2 Dissertation:

- WSU front matter [Title, copyright, signature, Acknowledgements, Table of Contents, List of Tables (if any tables), List of Figures (if any figures), Dedication (optional)]
- Body of the work
 - Ch. 1: Introduction, similar to that described in the suggested format of D1 for Option 1, found above; a brief overview of the two articles should also be included
 - Ch 2: Article #1
 - Ch 3: Brief transition chapter explaining connections between the two articles
 - Ch 4: Article #2
 - Ch 5: Conclusions and Implications

- References
- Appendices

Note: If an additional chapter is deemed necessary, such as a separate Theoretical Frameworks chapter, such flexibility.

Alternative Formats

Alternative formats to the dissertation formats described above must be approved by the Department and the Graduate School. Once your committee has approved the alternative format proposal, your committee chair requests approval from the Department's Graduate Committee. They, in turn, seek approval from the Graduate School.

Final Examinations

Scheduling the Final Examination (D2)

Your committee will review the entire dissertation. Revisions may be and often are required before the committee is satisfied that you are ready for the final oral defense. With the committee's consent that the written document is ready, schedule the final oral examination by providing your committee a completed [Scheduling Final Examination Form for Dissertation/Thesis degrees](#). You must be enrolled in a minimum of two (2) credits of Ed_MthSc 800 the term you defend your D2. Please be aware that you will need to have a completed draft of the entire dissertation at least 30 days prior to your final defense date. For Fall semester this means you will need to have a completed draft by at least mid-October and for Spring semester, you will need to have a completed draft by mid-March. Committee members' signatures signify preliminary approval of a typed or electronic form of the dissertation that is suitable in content and format for submission to the WSU Graduate School. Their signatures also indicate their acceptance of the date, time, and place of the final examination. Committee members must be given the entire dissertation a minimum of ten (10) days prior to any deadline for scheduling the defense.

The signed form is submitted to the COE Office of Graduate Education with your abstract. This office will then circulate the materials to the department chair for signature then onto the Graduate School for scheduling your exam. The completed form and dissertation must be submitted at least 15 business days in advance of the examination date. At the same deadline your dissertation draft must be uploaded to ETD/UMI/Proquest at <https://www.dissertations.wsu.edu>. Although the Graduate School & ETD/UMI/Proquest checks the dissertation, this check does not constitute final acceptance as this check is for formatting issues only, content will be reviewed by your committee.

The examination must be scheduled at least four months, but less than three years, after satisfactory completion of the comprehensive assessment. The Graduate School will schedule the final examination and publicly announce the examination in an appropriate campus-wide publication. Final examinations shall be scheduled during regular working hours and only during academic sessions.

At least five working days prior to the final examination, a copy of the dissertation must be made available for public review in the Office of Graduate Education. At the same time, an abstract must be submitted electronically to the Office of Graduate Education.

Final Examination

The final oral examination is primarily a defense of the dissertation, but may also cover the general fields of knowledge pertinent to the degree. You must register for Ed_MthSc 800 (minimum of two credits) in the semester in which you take the final examination. The examining committee shall include your doctoral committee and any other members of the faculty in attendance who are eligible, according to COE criteria, to participate on dissertation committees. Your committee chair will be responsible for conducting the final examination. While the examination is open to the public, only those faculty members eligible to participate on doctoral committees may ask questions and vote. All members of your doctoral committee must attend and vote with at least one faculty member in the room with the student during the defense. In order to pass the final oral examination, a minimum of three-fourths of those voting must vote to pass you. In the event of a failed final examination, a second and last attempt may be scheduled, at the request of the major department, after a lapse of at least three months. There is no automatic right to a second defense.

Dissertation Submission and Binding

After you pass the final oral examination, you have five (5) working days to submit your final corrected digital copy of the dissertation to UMI/Proquest. For information about the format of the dissertation, please refer to the digital [Dissertation/Thesis Submission Guidelines](#) that can be found on the Graduate School website.

Additionally, you must submit to the Graduate School one copy of the original signature page (in black ink), title page and abstract page. These pages must be on 100% cotton paper. You must also submit a [Hold Harmless Agreement/Copyright Acknowledgement](#), [Final Dissertation/Thesis Acceptance Checklist](#), and a completed and signed [Survey of Earned Doctorates](#). Each dissertation is placed on microfilm, so you must pay a microfilming fee. If you wish to copyright your dissertation, there is a copyright fee.

All students are required to submit one electronic (PDF) copy of the dissertation to the department, and a second copy (does not have to be on 100% cotton paper) to the committee chair (binding is optional and decided upon by the chair/advisor). Any additional copies submitted to the other committee members are up to the student's advisor. Upon submission of the dissertation, students must complete an exit survey provided by the COE Assessment Office.

Graduate Student Exit Survey

After you complete the final examination, complete the Graduate Student Exit Survey online (COE - Office of Assessment will send you an email). In addition the Mathematics and Science Education program will send you a program specific exit survey to help improve the program.

Awarding of the Degree

After you have completed the degree requirements for the doctorate and your student account is cleared, your transcript will be posted with your degree at the end of your defense term. You will receive the diploma approximately 8-12 weeks after your degree is posted and be eligible to be hooded by your committee chair or designee at the next commencement.

Graduate Assistantships and Financial Aid

Teaching and Research Assistantship Appointments, Scholarships and Financial Aid

Funding for graduate students varies across the campuses. The Department of Teaching and Learning has approximately 10 teaching assistant (TA) positions on the Pullman campus. These positions are competitive and are awarded primarily to graduate students with previous teaching experience in the United States. The department attempts to support graduate students for more than one year, so a limited number of TA appointments become available each year. TA appointments are half-time positions that come with a tuition waiver, monthly stipend, and health benefits. The department discourages additional employment while holding a TA appointment.

Availability of assistantships on other campuses are available periodically; students should inquire with faculty and academic advisors on those campuses for information on possible opportunities.

TA appointments require full-time enrollment (i.e., minimum of 10 semester hours during the spring and fall terms). A TA typically teaches two courses each semester under the supervision of a faculty member. A TA must enroll in Tch_Lrn 527 for one-credit in each semester of the TA appointment, up to a total of three credits (i.e., three semesters). The course covers teaching and learning, inquiry, and professional issues.

Research assistantships (RA) may be available through funded projects on all four WSU campuses. RA appointments require full-time enrollment. RAs typically work under the direction of a faculty member. RA appointments include a tuition waiver, monthly stipend, and health benefits. In addition, other assistantship opportunities are available in other units on campus. Whenever possible the department will provide assistance in identifying possibilities for funding outside of the college.

To be considered for a TA or RA position, complete a graduate assistant application, available from the department and the COE Office of Graduate Education <http://education.wsu.edu/employment/assistants/>. At the time of appointment, you will receive a letter that delineates the specific responsibilities of the appointment.

Scholarships and Other Financial Aid

College of Education Scholarships: Scholarships are available through the COE. Applications are available through University Scholarship Services in November and are due January 31st of the following year for the upcoming academic term. Awards generally begin at approximately \$2000. For more information, contact the COE Scholarship Coordinator (509-335-7843) or visit the website: <https://education.wsu.edu/students/scholarships/>.

Other Financial Aid: For additional financial aid information, contact the WSU Office of Student Financial Aid and Scholarship Services (509-335-9711) or visit the website: <http://finaid.wsu.edu/>.

Travel

Students are strongly urged to attend professional meetings; however, the department does not have funds to pay travel expenses of students on appointment. Advisors may use grant or project monies to pay partial travel expenses for graduate students attending meetings. The Graduate School disburses some grant-in-aid travel funds, which can be used for travel to professional meetings. Application forms for student travel grants may be obtained from the Graduate School. It is advisable to apply for a travel grant if you are presenting a quality paper at a professional meeting. In addition, space may be available in

University vehicles or some faculty members may share travel expenses. Please see the note in the next section regarding obligations in regard to work-related travel.

Business Policies

Leave Guidelines

During the term of their appointments, all graduate student service appointees are expected to be at work each normal workday, including periods when the University is not in session with the exception of the legal holidays designated by the Board of Regents. All University holidays are designated by the Board of Regents and are published in the WSU Announcements/Insider and posted on the Web at <http://hrs.wsu.edu/>. Graduate students on appointment do not earn annual leave or sick leave.

Non-resident graduate students holding either state funded or non-state funded graduate service appointments on a quarter-time or greater basis may be awarded a waiver of the non-resident differential. The department is responsible for awarding non-resident “NR” differential waivers in the waiver section of the PERMS action. Domestic graduate students who have residency outside of Washington State are highly encouraged to apply for Washington residency to avoid paying out-of-state tuition after their first year of their graduate appointment. Residency website; <http://residency.wsu.edu/>

- a. Appointments for 50% or greater may receive a full non-resident “NR” waiver.
- b. Appointments less than 50% but at least 25% may receive half of a non-resident “1/2NR” waiver.
- c. Non-resident waivers cannot be guaranteed beyond one year. Contact the Graduate School for information regarding residency requirements and establishing residency.

For more information please contact the Graduate School at gradschool@wsu.edu or 509-335-6424.

Travel:

For liability purposes, all students seeking to obtain financial reimbursement for work-related travel must complete a Travel Authority form. Contact your campus academic advisor for access to this form. This form must be submitted, signed by the Department Chair, and initialed by your advisor/chair at least 21 days before a trip. In some circumstances, work-related travel advances may be obtained by submitting a request at least four weeks before the trip. If funds are available, reimbursement for travel expenses is made by completing and submitting a Travel Expense Voucher within one week upon return. Only approved travel will be reimbursed.

Checkout/Exit:

Before departure from WSU-COE, students must leave a forwarding address with the COE Office of Graduate Education, return all keys and equipment to the main office, and consult with the advisor about the student’s research and office space.

Grievances:

If grievances arise, the student should discuss the problem with their advisor/chair and the Graduate Coordinator(s). If additional consultation is needed, please consult the Department Chair or Unit Director, or as a final resort, the WSU Ombudsman. The WSU Ombudsman Office is in Wilson Hall, Room 2, phone (509) 335-1195, and is available to students on all campuses.

Dissertation Library:

The department maintains a dissertation library for graduates in Cleveland Hall 315.

General Information

Department Offices

Washington State University-**Pullman**
 Department of Teaching & Learning
 321 Cleveland Hall
 Pullman, WA 99164-2132
 Phone: (509) 335-6842
 Fax: (509) 335-5046
education@wsu.edu

Washington State University-**Spokane**
 College of Education
 PO Box 1495
 Spokane, WA 99210-1495
 Phone: (509) 358-7537
 Fax (509) 358-7933
enroll@wsu.edu

Washington State University-**Tri-Cities**
 College of Education
 2710 Crimson Way
 Richland, WA 99354-1671
 Phone: (509) 372-7394
charlene.wagner@wsu.edu

Washington State University-**Vancouver**
 College of Education
 Undergraduate (VUB) 300
 Phone: (360) 546-9660
 Fax: (360) 546-9040
debarnett@vancouver.wsu.edu

Program Administration

Program Coordinator

Andy Cavagnetto, Ph.D.
 Associate Professor
 Phone: (509) 335-6391
andy.cavagnetto@wsu.edu

WSU - Pullman
 Cleveland Hall 335
 Pullman, WA 99164-2132

Academic Coordinators

Washington State University-**Pullman**
Office of Graduate Education
 College of Education
 Cleveland Hall 70
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 College of Education
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 Fax: (360) 546-9040
 Email: dan.overbay@wsu.edu

New Student Information

Residency Requirements

<https://gradschool.wsu.edu/establishing-residency/>

Email

office365.wsu.edu Log in with your WSU NID and password

Parking and Map

Pullman: <https://transportation.wsu.edu/> <https://transportation.wsu.edu/parking-maps/> or <http://map.wsu.edu/>

Spokane: <https://spokane.wsu.edu/facilities/parking/>

Tri-Cities: <http://tricities.wsu.edu/campusmaps/#top>

Vancouver: <http://admin.vancouver.wsu.edu/parking/parking-services>

I-9 Forms

WSU employs only U.S. citizens and aliens who are authorized to work in the U.S. in compliance with the Immigration Reform and Control Act of 1986. A list of acceptable documentation may be found here <http://hrs.wsu.edu/wp-content/uploads/2016/05/I9-Acceptable-Documents-9-27-17.pdf>

W-4 Forms

U.S. Citizens: <http://www.wsu.edu/payroll/taxes/completeW4.htm>

Non U.S. Citizens: <http://www.wsu.edu/payroll/nonUS/newInstIRSFomW4.htm>

Tax Information

U.S. Citizens: <http://payroll.wsu.edu/ppt/StudentTaxPresentation12.ppt>

Non U.S. Citizens: <https://payroll.wsu.edu/non-u-s-citizens/>

Automatic Payroll Deposit

<https://payroll.wsu.edu/graduate-student-payroll-deduction/>

Social Security Numbers

Significance and correction of an SSN and application pointers:

<http://www.wsu.edu/payroll/stntpay/sscardappoint.htm>

Central Services and Facilities

Student Services, including Health and Counseling Services

Pullman: <http://osae.wsu.edu/>

Spokane: <https://spokane.wsu.edu/studentaffairs/>

Tri-Cities: <https://tricities.wsu.edu/current-students/student-affairs/>

Vancouver: <http://studentaffairs.vancouver.wsu.edu/>

Libraries

Pullman: <http://www.wsulibs.wsu.edu/>

Spokane: <https://spokane.wsu.edu/library/>

Tri-Cities: <http://www.tricity.wsu.edu/Library/index.html>

Vancouver: <http://library.vancouver.wsu.edu/>

Parking

Pullman: <http://transportation.wsu.edu/>

Spokane: <https://spokane.wsu.edu/facilities/parking/>

Tri-Cities: <http://tricities.wsu.edu/admission/visit>

Vancouver: <https://www.vancouver.wsu.edu/campus-map-directions-and-parking-information>

Appendix A

Student Advising Sheet

Student Name: _____ **WSU ID:** _____
Degree Program: _____ **E-mail:** _____

Course #	Course Name	Credits	Date	Grade
Required Foundational Core Courses (16 credit minimum)				
<i>Required courses:</i>				
TCH_LRN 581	Learning and Development in Mathematics and Science	3		
TCH_LRN 584	Research in Teaching Mathematics and Science	3		
ED_MTHSC 598	Research Seminar in Mathematics and Science Education (1 credit/semester: 4 credits required but may be taken for up to 6 credits)	4		
<i>Two of the following courses:</i>				
TCH_LRN 512	Language and Cultural Factors in Mathematics	3		
TCH_LRN 561	Elementary School Mathematics	3		
TCH_LRN 571	Research in STEM Education	3		
TCH_LRN 574	Science for All: A Multicultural Perspective	3		
MATH 532	Advanced Mathematical Thinking	3		
Required Research Core (15 credits)				
ED_RES 562	Epistemology and Inquiry in Educational Research	3		
ED_RES 563	Principles of Doctoral Research	3		
ED_RES 564	Qualitative Methods	3		
ED_RES 565	Advanced Statistical Analyses and Quantitative Research	3		
TCH_LRN 531	Frameworks for Research in Mathematics and Science Education	3		

Supporting Cognate Area (12 credit minimum)				
	Enter your courses here			
Additional Optional Courses**				
TCH_LRN 521	Models of Teacher Education & Development	3		
TCH_LRN 585	Focused Reading and Conference in Math/Science Education (May be taken multiple times for up to 9 credits)	3		
TCH_LRN 591	Research Internship in Math/Science Education (May be taken multiple times for up to 6 credits; in the future, may be available for variable credit [1-3 credits/semester])	3		
ED_RES 571	Dissertation Preparation	3		

TOTAL GRADED CREDIT (43 minimum) _____

Research, Dissertation, and/or Examination (20 credits minimum)				
ED_MTHSC 800	Research, Dissertation, and/or Examination			

TOTAL CREDITS (72 minimum) _____

NOTES:

** Faculty strongly suggest taking these courses only after completing at least 2 semesters and 12 or more credits.

*** Graduate School Policy regarding undergraduate courses:
No more than 9 credits of non-graduate (300-400 level) credit graded course work may be used for the total credits for the Program of Study.

Student Signature: _____
Signature date

Advisor Signature: _____
Signature date

Addendum

Additional courses students or faculty suggest might be of interest:

PHIL 540 Ethics in Research for the Social Sciences (3 credits)

Tch_Lrn 582 Academic Writing for Dissertations and Publications (3 credits)

Appendix B

Mathematics and Science Education Ph.D. Program Student Annual Review

According to policies established by the WSU Graduate School and Mathematics and Science Education Ph.D. Program faculty, students are required to complete a written annual review of progress by completing this form. Please provide particular detail in the **commentary sections** of Part 3 (“Progress on Learning Goals”) and ending **statement of progress**, including any steps taken to address comments from past annual reviews. A list of scholarly work over the past academic year should be listed after the final prompt. In addition, please submit an **updated vita**. All students will be informed in writing of the results of this review.

Student progress through the program, partly based on these materials, will be discussed annually by the program faculty.

Please schedule a meeting with your advisor/chair to discuss your progress and future plans after submitting your written report.

Student:

Advisor:

Program Committee Members (if known):

1. Goals and Plans

Please describe your professional goals for after you complete your Ph.D.

Please list key activities and accomplishments that you plan to engage in/produce during your program so that you are prepared to meet your goal. If possible, include approximate dates/timeline for these activities.

2. Program Status

Program entry year: _____ Anticipated graduation date: _____

Credits completed by the end of the current semester: _____

Full-time or part-time program attendance (*if part-time, indicate credits taken per semester this year*):

Completed CITI Training? Yes No

Approved Program of Study submitted to Graduate School? Yes No

Scheduled or successful completion of Comprehensive/Preliminary Exam? Yes No

3. Overall Academic Performance

a. Most recent cumulative GPA in program: _____

b. List any courses with grades below “B”:

c. List any courses with incomplete (“I”) grades:

4. Progress on Learning Goals (The student completes the following, including comments, to use in discussion with the advisor)

a. I can locate, analyze, and synthesize research literature, and apply that synthesis to problems of practice.

Not yet applicable Emerging Proficient

Satisfactory Progress _____

Comments:

b. I can effectively communicate scholarly work through written, oral, and/or alternate formats.

Not yet applicable Emerging Proficient

Satisfactory Progress _____

Comments:

c. I can skillfully inquire into areas of program-related interest.

Not yet applicable Emerging Proficient

Satisfactory Progress _____

Comments:

d. I show scholarly habits of curiosity, inquiry, skepticism, and data-based decision making.

Not yet applicable Emerging Proficient

Satisfactory Progress_____

Comments:

e. I value diversity and demonstrate this value in pedagogical and inquiry endeavors.

Not yet applicable Emerging Proficient

Satisfactory Progress_____

Comments:

f. I can conduct and disseminate original scholarship that demonstrates acquisition and application of new knowledge and theory.

Not yet applicable Emerging Proficient

Satisfactory Progress_____

Comments:

g. I show potential as an emerging expert in my area of study.

Not yet applicable Emerging Proficient

Satisfactory Progress_____

Comments:

Please provide a statement of progress documenting your yearly and cumulative progress, including any steps taken to address comments from past annual reviews.

Please list any publications and presentations you completed over the past academic year.

List 3-5 specific goals for the next year.

An updated cumulative vita should also be submitted.

Appendix C

Required Forms for Program

All current/updated Graduate School Forms may be found on their website

<https://gradschool.wsu.edu/facultystaff-resources/18-2/>

Tch_Lrn Independent Study form – A form to be used every time you enroll in 521, 522, 523, 524, 590, 600, 700 or 800. For majors: CSSTE, Ed_MthSc, LLT, MIT, Spec_Ed, Tch_Lrn.

<https://education.wsu.edu/documents/2015/09/tl-independent-study-enrollment-form.pdf/>

Deadlines and Procedures – These are the deadlines and procedures for graduation set by the Graduate School and updated yearly.

Program of Study – Your advisory committee assists you in the development of your proposed program of study.

Preliminary Exam – Must have approved program of study on file, and permission from committee. Check deadlines.

Proposal Defense (D1) – To schedule your dissertation or thesis proposal meeting, please have your committee sign the D-1/T-1 scheduling form. A D-1 form must be completed at a dissertation proposal meeting. Found at <https://education.wsu.edu/graduate/dissertationforms/>

Final Scheduling form – Must have approved form on file at the Graduate School before scheduling final defense or exam.

Application for Degree –

The Application for Graduate Degree and Graduation should be submitted early in the semester *prior* to graduation and by posted deadlines. Apply online through your myWSU account, see instructions at <https://gradschool.wsu.edu/graduation-application/>. The Graduate School will generate an official “To Do” list that specifies any deficiencies that students have in their program. Please note: *The Apply for Graduations link will not be active if the Graduate School does not have an approved Program of Study on file.*

Guidelines for Theses and Dissertation Formatting and Submission – Instructions for finalizing and submitting your dissertation.

Final Dissertation/Thesis Acceptance Checklist – A list of tasks to be completed in the semester in which you are planning to graduate.

Graduation Checklist – A list of tasks to be completed in the semester in which you are planning to graduate.

Survey of Earned Doctorates – Submit online after your final defense. Submit the confirmation certificate to gradschool@wsu.edu.

Additional Forms:

Committee Change – to add or remove a committee member.

Change of Program – if a change is made to a program of study after the program has been approved by the Graduate School.

Graduate Leave Form – For graduate students who wish to go on official graduate leave.

Petition Form – Petition changes in enrollment and/or academic calendar deadlines.

Re-enrollment – If you are unable to attend courses for a semester, you will be required to submit a re-enrollment form. This has a \$25 nonrefundable processing fee.

A Note on official Graduate School Forms: Forms must have complete information and any/all required signatures before submission through the Office of Graduate Education before they will be routed to the Graduate School for final approval. Any forms received that are missing required information will be returned; this may result in delayed processing time and effect deadlines.

Appendix D

College of Education

Graduate Programs Exit Survey

NOTE: We are interested in feedback from your program experience. Your responses will be held in strict confidence, and you will not be identified in any reports or release of survey data. Survey results will be aggregated and reported as group data. For questions/concerns, contact the Office of Graduate Education at 509-335-9195 or 335-7016; gradstudies@wsu.edu or a Department Chair.

Last 5 digits of your WSU ID#: _____

Your ID Number will not be associated with the results; nor will the departments know the identity of survey respondents.

Please circle your response to each question below:

What semester and year did you graduate or complete a certification/endorsement?

Spring Summer Fall 20__

What semester and year did you graduate or complete a certification/endorsement?

M.I.T Ed.M. M.A. Ed.D. Ph.D. Certification/ Endorsement

If you obtained a degree which program specialization did you complete?

Department of Educational Leadership and Counseling Psychology

Counseling Psychology	School Counseling	Community Counseling
Higher Education	Student Affairs	Community College Leadership
Educational Leadership	Educational Psychology	Sport Management

Department of Teaching and Learning

Language & Literacy Education (LLE)	English Language Learners (ELL)
Focus: Language or Literacy	Focus: ESL/Bilingual Education or Literacy
Cultural Studies and Social Thought	Curriculum and Instruction
Teacher Leadership	Math Education Elementary Education
	Secondary Education

Other: _____

Which certification/endorsement did you complete?

Superintendent Program Administrator School Counseling Teacher Principal

Add on Endorsement (e.g. Special Education):

How many years did it take you to complete your specialization or certification/endorsement?

< 1 2 3 4 5 6 7 8 9 10 >

Were you primarily: Part Time Student Full Time Student

On which campus did you complete your specialization or certification/endorsement?

	Pullman	Spokane	TriCities	Vancouver	Online		
					Not at All	Somewhat	Very Much
1. How satisfied were you with the availability of faculty for	1	2	3	4	5	N/A	
2. To what degree did the specialization meet your individual	1	2	3	4	5	N/A	
3. To what degree have you been satisfied with the overall quality of courses/ instruction of courses?	1	2	3	4	5	N/A	
4. To what degree were you satisfied with your ability to interact with other students and faculty in your program?	1	2	3	4	5	N/A	
5. How satisfied were you with opportunities provided you to research/ disseminate research?	1	2	3	4	5	N/A	
6. To what degree were you given opportunities to make connections between theory and practice?	1	2	3	4	5	N/A	
7. How well prepared do you feel to enter a new career?	1	2	3	4	5	N/A	
8. How satisfied were you with the support provided by the College of Education Office of Graduate Education (Pullman campus) or similar support received at the regional campus in which you are a student?	1	2	3	4	5	N/A	

- Please describe the most positive aspects of your time in one of our graduate programs.
- Please describe the most important ways we can improve our programs for incoming graduate students.
- What is your career goal?

Appendix E

MATHEMATICS AND SCIENCE EDUCATION PHD PROGRAM RUBRIC PRELIMINARY EXAMINATION

Student:

Faculty Committee Member:

1. WRITING QUALITY

The writing is appropriate for academic, scholarly outlets and conforms to standard writing formats.

Criteria include:

- The student's writing is clear, focused, and organized
- The student's writing is scholarly in nature and utilizes appropriate theoretical and empirical research as appropriate
- The student's writing makes use of effective examples as appropriate
- The student's writing is void of significant errors of fact, logic, citation

Check one of the following:

___ **Unsatisfactory** ___ **Acceptable** ___ **Good** ___ **Excellent**

Reasons:

2. SCHOLARLY QUALITY

Evidence of the student's ability to synthesize relevant research in order to demonstrate a working knowledge of the following three areas:

A. Important area(s) of science and/or mathematics education

Criteria include:

- The student shows deep, nuanced knowledge of at least one particular area of study
- The student shows awareness of major findings and academic leaders in a particular area of study
- The student, where appropriate, situates specifics in a larger context
- The student coherently makes connections across multiple areas of mathematics and/or science education

Check one of the following:

___ **Unsatisfactory** ___ **Acceptable** ___ **Good** ___ **Excellent**

Reasons:

B. Tensions (problems, unresolved issues) that exist in a given field and the various stances towards them

Criteria include:

- The student discusses the underlying reasons that different stances are taken
- The student identifies, articulates, and discusses relevant problems that exist in an area(s) of mathematics and science education
- The student identifies, articulates, and discusses significant gaps in the literature in an area(s) of mathematics and science education

Check one of the following:

Unsatisfactory **Acceptable** **Good** **Excellent**

Reasons:

C. Various research methodologies and the implications of choosing one over another

Criteria include:

- The student demonstrates satisfactory knowledge of quantitative, qualitative, and mixed methodologies
- The student discusses the implications of and rationale for selecting one methodology over another
- The student connects particular research methods to investigations of a current problem in an area of mathematics and science education

Check one of the following:

Unsatisfactory **Acceptable** **Good** **Excellent**

Reasons:

Appendix F

Mathematics and Science Education Ph.D. Program Bylaws

Washington State University

Administrative Home: Department of Teaching and Learning

Last Revised – by Faculty April 21, 2014, November 2014, March 2016

Faculty Senate Approval Date: GSC Approved 2.17.2015

I. Objectives

- A. Degree offered: Ph.D.
- B. Discipline: Mathematics and Science Education is a general reference to the fields of teaching and learning in the subject areas of mathematics and science from pre-kindergarten to graduate school.
- C. Mission of the Program: The Ph.D. in Mathematics and Science Education develops scholars capable of making important contributions to the research base, professional context, and learning environments related to mathematics and science education.

II. Membership

- A. Graduate Faculty within the Mathematics and Science Education Ph.D. program may be WSU tenured and tenure track faculty, WSU non-tenure track faculty, or WSU adjunct faculty, subject to the limitations and definitions in this document. All Graduate Faculty must be “Initial Program Faculty” (listed in Section XI of this document) or subsequently approved as Graduate Faculty through the process outlined in section B below.
 1. WSU Campus Participation
 - a. The doctoral degree in Mathematics and Science Education is offered through the Pullman campus of Washington State University. The faculty and campuses at Vancouver, Spokane, and Tri-Cities contribute to and support this program; they are integral to the functioning of the program.
 - b. Approved tenured and tenure track Mathematics and Science Education Graduate Faculty at all regional campuses may participate equally in the Mathematics and Science Education program as supporting site faculty with full program rights and responsibilities. As such they are entitled to act as chair, co-chair, or member of graduate student committees; teach graduate courses; supervise research; and act as a program director or committee member.
 2. Graduate Faculty Participation

- a. Graduate Faculty participation in the Mathematics and Science Education Ph.D. Program is independent and separate from academic department, school, or college affiliations.
- b. All active members of the Graduate Faculty of the Mathematics and Science Education Ph.D. Program are eligible to vote on program issues.

3. Disciplinary Expertise

Graduate Faculty within the Mathematics and Science Education Ph.D. Program are expected to have a PhD or equivalent doctoral-level degree in a field related to mathematics and/or science education. In addition, they must have demonstrated disciplinary expertise in a field related to mathematics and/or science education, interest and experience in mentoring and teaching of graduate students in this field, and relevant professional accomplishments.

4. Active Research Appropriate to the Mathematics and Science Education Ph.D. Program

Mathematics and Science Education Ph.D. Program Graduate Faculty must be actively involved in research and graduate level teaching related to mathematics and/or science education as evidenced by continuing scholarly or creative work and evidence of substantial involvement in graduate education, including recent external grant or contract support, related peer-reviewed publications within the last 5 years, graduate student mentoring within the last 5 years, teaching of relevant graduate level courses, or other relevant professional accomplishments. New faculty without previous involvement in graduate student advising can satisfy this requirement by having a named mentor whose role is to help the faculty member advise and direct graduate students.

5. Non-Tenure Track Graduate Faculty

a. Internal to WSU

Non-tenure track Graduate Faculty internal to WSU include research, clinical, and affiliate faculty. If these non-tenure track faculty internal to WSU have a **history of active** Mathematics and Science Education Ph.D. Program Graduate Faculty participation and hold a Ph.D. or equivalent doctoral degree, they may be entitled to teach graduate courses in the program and act as members of graduate student committees, including chair or co-chair. On a case-by-case basis, the tenure-track Mathematics and Science Education Ph.D. Program Faculty will consider whether a non-tenure track Graduate Faculty member internal to WSU, with a history of active participation in the Mathematics and Science Education Ph.D. Program, is eligible to undertake any or all of the above duties. Approval is subject to review of a signed petition and review of the faculty's curriculum vita at a Mathematics and Science Education Ph.D. program meeting, and is subject to subsequent majority vote.

b. External to WSU

Professionals who are not WSU faculty may be granted Graduate Faculty participation within the Mathematics and Science Education Ph.D. Program if they hold a Ph.D. or equivalent doctoral degree and are first officially approved as adjunct faculty for WSU. Adjunct faculty who are approved as active Mathematics and Science Education Ph.D. Program Graduate Faculty

are entitled to act as a member of graduate student committees; teach graduate courses; and supervise research. They may not serve as student committee chair or co-chair, or as a Mathematics and Science Education Ph.D. Program Committee member.

6. External Individual Committee Members

- a. ***Individual Committee Member Internal to WSU:*** Individuals not officially participating as Graduate Faculty within the Mathematics and Science Education Ph.D. Program (for example, a faculty member from another WSU department or program) may serve on graduate committees as long as they hold a Ph.D. or equivalent doctoral degree and are a member of the Graduate Faculty in their own program or discipline and their committee appointment is approved by the Coordinator of the Mathematics and Science Education Ph.D. Program.
- b. ***Individual Committee Member External to WSU:*** Individuals not officially participating as Graduate Faculty within any graduate program at WSU (for example, a faculty member from another university or research entity who holds a Ph.D. or equivalent doctoral degree) may be approved to serve as a dissertation committee member for an individual student on a case-by-case basis. The committee chair for that student should forward the name and a curriculum vitae of the desired committee member to the Mathematics and Science Education Ph.D. Program Coordinator. With approval of the Program Coordinator, the nomination (with accompanying CV or other documentation of expertise) is forwarded to the Chair of the Department of Teaching and Learning for approval, followed by forwarding to the Dean of the Graduate School for final approval.

B. Application for Membership

1. Initial Graduate Faculty within the Mathematics and Science Education Ph.D. Program are listed in Section XI of this document and have been approved by the Mathematics and Science Education Ph.D. Program existing faculty, Mathematics and Science Education Ph.D. Program Coordinator, the Chair of the Department of Teaching and Learning, and Dean of the Graduate School.
2. Candidates for Graduate Faculty participation within the Mathematics and Science Education Ph.D. Program should be nominated by an existing Mathematics and Science Education Ph.D. Program Graduate Faculty member or may self-nominate. The nomination should include a letter of nomination, and a curriculum vitae for the nominee. The Program Coordinator will circulate application materials to all active Graduate Faculty prior to voting. Acceptance as Graduate Faculty requires a positive vote from a majority of faculty who respond to the vote.
3. In addition to a commitment to maintain the highest standards of mentoring for graduate students, anticipated contributions or qualifications for all successful Graduate Faculty applicants include history of regular attendance or, in the case of new faculty, participation in Mathematics and Science Education Ph.D. Program faculty meetings plus one or more of the following:

- a. History or reasonable expectation of an active, funded research program that can plausibly be relied upon as the source of continuing support of a Mathematics and Science Education Ph.D. Program graduate student.
- b. History of or willingness to participate as appropriate in administrative, teaching, and other functions of the Mathematics and Science Education Ph.D. graduate program. This may include serving on graduate program administrative committees; serving as a dissertation committee member or chair; or providing graduate level instruction.
- c. History of publication of peer-reviewed manuscripts in a discipline related to Mathematics and Science Education.

C. Continuation of Active Membership

1. Graduate Faculty appointments to the Mathematics and Science Education Ph.D. Program will be reviewed for continuation of active membership by the Program Coordinator every 3 years with one-third of the membership reviewed each year. They will be evaluated for contributions to graduate instruction, research, and teaching. Contributions to the Mathematics and Science Education Ph.D. Program shall be a requirement for continued active membership. Contribution may take the form of:
 - a. Committee chair, co-chair or member for graduate students in the Mathematics and Science Education Ph.D. Program
 - b. Teaching or co-teaching a graduate course in the Mathematics and Science Education Ph.D. Program
 - c. Supervising research for graduate students in the Mathematics and Science Education Ph.D. Program
 - d. Serving in the administrative and committee structure of the Mathematics and Science Education Ph.D. Program, including roles as Coordinator, Co-coordinator, or committee member
2. Faculty who do not make any of the contributions as stated in C.1 above to the Mathematics and Science Education Ph.D. Program for three consecutive years will be designated as inactive Graduate Faculty. Inactive Graduate Faculty do not have voting rights. Initiation of any of these activities described in C.1 above will result in eligibility for restoration of active Graduate Faculty designation, upon approval of the Mathematics and Science Education Ph.D. Program Graduate Faculty, as outlined in Section II.B.2.

D. Discontinuation of Membership

Upon request of an active or inactive Graduate Faculty member, that individual membership will be discontinued. They may reapply for Graduate Faculty participation at any time.

E. Membership Appeal Process

Faculty appeal of any membership decision in the Mathematics and Science Education Ph.D. Program must be made in writing to the Coordinator of the Mathematics and Science Education Ph.D. Program within 30 calendar days of the decision. The appeal is determined by a majority vote of all Mathematics and Science Education Ph.D. Program

Graduate Faculty (see Section IX for definition of quorum). Final written appeal may be made to the Chair of the Department of Teaching and Learning and the Dean of the Graduate School within 30 calendar days of the Mathematics and Science Education Ph.D. Program Graduate Faculty vote.

III. Administration

Administration of the program and its activities is vested in the Coordinator with advice from members of the Mathematics and Science Education Ph.D. Program Committee.

IV. Program Coordinator

- A. The Coordinator of the Mathematics and Science Education Ph.D. Program will be elected in the Spring semester prior to the academic year of service. Candidates for the Coordinator position can be nominated or self-nominated at a meeting during that time. Only active Mathematics and Science Education Ph.D. Program Graduate Faculty are eligible for the position and to vote. In the case of more than one candidate, the candidate receiving the highest vote total will be named Coordinator. Final approval of the Program Coordinator resides with the Chair of the Department of Teaching & Learning and the Dean of the College of Education.
- B. The Coordinator shall serve a term of 2 years and is eligible for re-election if nominated to continue in this position in accordance within the terms of the initial appointment and with final approval of the Chair of the Department of Teaching & Learning and the Dean of the College of Education as described in IV.A above.
- C. Whenever possible and appropriate, the Coordinator will also serve as the Assistant Coordinator the year before taking the Coordinator position. The Mathematics and Science Education Ph.D. Program will hold elections for the Coordinator on even years, and elections for the Assistant Coordinator on odd years.
- D. The Coordinator or Assistant Coordinator may be removed from office by a majority vote of all active Mathematics and Science Education Ph.D. Program Graduate Faculty and with the approval of the Chair of the Department of Teaching & Learning and the Dean of the College of Education as described in IV.A above.
- E. Duties of the Coordinator
 - 1. Provide overall academic leadership for the Mathematics and Science Education Ph.D. Program.
 - 2. Consult the Assistant Coordinator as needed in regard to decisions about program, students, or faculty, especially in cases when the full program faculty cannot be included in decision-making.
 - 3. Develop and implement policies for the Mathematics and Science Education Ph.D. Program when needed.
 - 4. Represent the interests of the Mathematics and Science Education Ph.D. Program to the campus and University administrators.
 - 5. Call and preside at meetings of the Graduate Faculty of the Mathematics and Science Education Ph.D. Program.
 - 6. Be responsible for coordinating all the Mathematics and Science Education Ph.D. Program administrative matters within the Graduate School.

7. Submit course or curriculum change or approval forms and ensure that faculty are aware of the need, have discussed, and approve of the change.
 8. Submit bylaws changes or approval forms.
 9. Be responsible for the accuracy of all publications related to the Mathematics and Science Education Ph.D. Program including student handbooks, recruitment materials, web pages, and catalog copy.
 10. Coordinate the Mathematics and Science Education Ph.D. Program graduate course teaching assignments and scheduling with relevant department chairs and campus academic directors.
 11. Supervise the activities of the Mathematics and Science Education Ph.D. Program Academic Coordinators as they relate to the program.
- F. The duties of the Assistant Coordinator are to consult with the Coordinator on decisions for which the Coordinator would like a second opinion but for which the full committee does not need to be convened. The Assistant Coordinator may also run Program meetings if requested to do so by the Coordinator.

V. Committees

- A. Faculty Committee
 Advises and assists the Coordinator in administering the Mathematics and Science Education Ph.D. Program, and assists with recruitment, admission, and curriculum. All active Mathematics and Science Education Ph.D. Program Graduate Faculty comprise the Faculty Committee.
1. Areas in which the Faculty Committee shall assist and advise the Coordinator include:
 - a. Review, develop and update long-range goals for the Mathematics and Science Education Ph.D. Program and plans for their attainment. These ideas shall be reviewed annually.
 - b. Serve as a sounding board for new ideas, changes, etc., in academic or administrative issues.
 - c. Provide guidance on administration of the Program.
 - d. Nominate members for service on other committees.
 - e. Assist with the Mathematics and Science Education Ph.D. Program assessment process.
 - f. Develop an annual recruitment plan, set goals, implement and assess the plan.
 - g. Review all student applications and in conjunction with the Coordinator, decide the disposition of applications as to acceptance or rejection in a timely manner.
 - h. Make recommendations to the Coordinator regarding the financial support of graduate students for their first year.
 - i. Review the Mathematics and Science Education Ph.D. Program curriculum.
 - j. Make recommendations for curricular improvements/renewal.
 2. Other Committees
 Other ad hoc committees may be appointed by the Faculty Committee and Coordinator as needed. Addition of new, or changes to the existing, standing committees must be approved by amendment of bylaws.

VI. Graduate Student Committees

- A. The initial selection, or subsequent changes, of a graduate student's committee shall be determined jointly by the student and the student's advisor. In accordance with the Policies and Procedures of the Graduate School at WSU, graduate students are not permitted to serve on the committees of other graduate students.
- B. The graduate committee of each student shall have a minimum of three members for all College of Education graduate degrees.
 - 1. The committee chair requires tenure track and Mathematics and Science Education Ph.D. Program Graduate Contributing Faculty, with the exception that the Graduate Faculty can approve a clinical faculty member as chair on a case by case basis, as described in Section II.A.5. In all cases, at least two of the committee members must be active Mathematics and Science Education Ph.D. Program Graduate Faculty members and at least two of these members must hold permanent WSU tenure-track status. All committee members must hold a graduate doctoral degree comparable to the degree sought by the candidate.
 - 2. Fourth committee member: For any non-WSU member, or for any non-tenured/non-tenure track WSU faculty outside the Graduate Program, please attach a vitae and include a rationale in the Program of Study to be reviewed for approval by the Dean of the Graduate School.
 - 3. The Chair of the Department of Teaching and Learning must approve the committee composition.
- C. As specified in the Graduate School's Policies and Procedures, the performance of each graduate student shall be reviewed annually.

VII. Student Representatives

At the discretion of the Mathematics and Science Education Ph.D. Program Coordinator and Faculty, student representation may be added or deleted from any committee structure. In accordance with the Policies and Procedures of the Graduate School at WSU, graduate students are not permitted to serve on the committees of other graduate students.

VIII. Graduate Faculty Meetings

- A. The Mathematics and Science Education Ph.D. Program Coordinator shall call Mathematics and Science Education Ph.D. Program Graduate Faculty meetings as needed but at least once per academic year. All attempts will be made to provide a written agenda in advance.
- B. Other meetings may be called at the discretion of the Coordinator or the Faculty Committee.
- C. A special meeting of the Mathematics and Science Education Ph.D. Program Graduate Faculty may be called by petition of 3 or more Graduate Faculty members.
- D. Efforts will be made to communicate items of interest, including notification of a faculty meeting, to the faculty via e-mail. Mathematics and Science Education Ph.D. Program Graduate Faculty Meetings shall be called with a minimum of 1 week's notice.

IX. Quorum

- A. For all general graduate faculty meetings and votes unless otherwise indicated, a quorum shall be defined as a minimum of 50 percent of the Program membership.
- B. For programmatic committees to conduct a business meeting, a quorum shall be defined as a minimum of 50 percent of the committee membership.
- C. Unless otherwise indicated, a simple majority of the total number of ballots cast are required to pass a motion.
- D. In the event of a tie vote in which the entire graduate faculty is eligible to vote, the Program Director will decide the outcome of the vote. For tie votes that occur within programmatic committees, the committee chair will decide the outcome of the vote.

X. Amendments to Program Bylaws

- A. The Program Bylaws document shall be reviewed every fifth year by the Faculty Committee and annually by the Coordinator.
- B. Amendments to the Bylaws may originate from any eligible Mathematics and Science Education Ph.D. Program Graduate Faculty member. Proposed amendments must be forwarded to the Mathematics and Science Education Ph.D. Program Faculty Committee and Program Coordinator. After discussion, amendments shall be forwarded to the Mathematics and Science Education Ph.D. Program Graduate Faculty electronically at least 2 weeks prior to the faculty meeting at which the amendments will be discussed. After discussion, a minimum 2-week period will follow the faculty meeting prior to vote. Votes on amendments may occur at a faculty meeting or electronically. Amendments to the Mathematics and Science Education Ph.D. Program Bylaws require a positive vote from the majority of all active Mathematics and Science Education Ph.D. Program Graduate Faculty.
- C. All amendments and revisions must be submitted to the Department of Teaching and Learning, the Graduate Studies Committee and Faculty Senate for review and final approval.

XI. List of Initial Graduate Faculty Participants

- A. List of Mathematics and Science Education Ph.D. Program Contributing Faculty Participants:
 - Andy Cavagnetto
 - Jonah Firestone
 - Janet Hart Frost
 - Richard Lamb
 - Kristin Lesseig
 - Amy Roth McDuffie
 - Judy Morrison
 - Tamara Holmlund Nelson
 - David Slavitt
- B. The Coordinator of the Mathematics and Science Education Ph.D. Program is responsible for submitting an updated list of active and inactive Mathematics and Science Education Ph.D. Program Graduate Faculty participants to the Chair of the Department of Teaching and Learning and the Dean of the Graduate School for approval annually.