

Mathematics Teacher Education



The need for quality teaching in mathematics has never been greater. As our world becomes more and more complex, math is everywhere and it is for everyone. All students need a solid grounding in mathematics—as a foundation for lifelong problem solving and because mathematics is so essential to so many jobs that drive our economy.

At a time when we're seeing critical shortages of math teachers in many areas, the job has gotten more interesting, more demanding, and far more complex. Gone are the days of math being about memorizing formulas and algorithms. Math is now about mathematical literacy—learning how to apply mathematical concepts and skills to solve real problems. The work of a math teacher has become an excitingly creative one, demanding a deep knowledge of mathematics and also the ability to help students make connections between math, their world, and other learning.

It is no surprise that mathematics education has become a national priority. Our world faces complex environmental changes that will require solid math and science to solve and to understand. The national economy hinges on technology and scientific innovation, with math at its foundation.

If you want to take on a career that really matters, become a mathematics teacher. And if you want to become a remarkable teacher, consider the Warner School of Education. Warner is a place for people who want and expect a more rigorous, thoughtful, and experience-based professional education. You will do far more than simply learn to teach. You will be challenged by professors who themselves are nationally recognized in their fields. You will be introduced to research that enlightens you on the best approaches to teaching. And you will have exciting, unique opportunities to test your learning in classrooms and alternative learning environments.

For mathematics teachers, Warner also presents a unique and beneficial setting. We are part of the University of Rochester, a leading center of mathematics and mathematics education research that was recently named one of the “New Ivies” by *Newsweek*. Here, you will be steeped in an environment that brings great mathematics and great teaching together, to provide you the very best path to making a positive difference in the world.



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For more information, please contact the Warner School at (585) 275-3950 or visit warner.rochester.edu.



Mathematics Education

The Warner School's teacher preparation program in mathematics is designed to engage students and support them in deepening their understanding of mathematics while learning about innovative and effective methods to teach mathematics. The program can be completed in 15 months of full-time study, when started in summer (mid-May).

The program builds from long-term empirical and theoretical developments in mathematics education and the learning sciences. Core learning principles that guide the design of the program include the need for learners to make sense of mathematics and to interact with others while engaging with rich mathematical tasks. Core teaching principles include the need to inquire into and reflect on student thinking so that students' informal and intuitive strategies can be transformed into more formal and conventional mathematical concepts. Furthermore, the mathematics education courses highlight the social and cultural dimensions of mathematics education, with a consistent and integrated focus on equity and diversity not just as principles for social justice but as key elements of effective learning communities.

Throughout the program, students engage in collaborative problem-solving activities around a range of mathematical topics using appropriate technology. These intensive experiences are intended to challenge conventional conceptions of mathematics and how people learn mathematics. Ultimately, the goal is to begin the long-term process of building durable perspectives and skills that will help teachers to design engaging, equitable, and rigorous math learning experiences for K-12 students.

On a more practical level, there are multiple opportunities in the program to analyze curricula that are designed to be coherent and comprehensive, which stands in contrast to conventional curricula that suffer from the 'mile-wide, inch-deep' phenomenon. These 'reform' curricula emphasize a developmental approach to learning mathematics concepts by sequencing activities in a way that builds from students' intuitive understandings to more conventional and formal representations. The curricula consistently emphasize the connections between mathematical representations, between procedures and concepts, and between instructional units so that key mathematical ideas are developed over the course of weeks, months, and even years. Furthermore, the curricula situate problems in context so that students use everyday situations to develop mathematical forms of thinking. There are several opportunities throughout the program to observe teachers using these curricula.

Mathematics Education Projects

The Warner School has a long history of leadership in mathematics education research, teacher preparation, and professional development. In fact, our work in mathematics education over the last 20 years is a point of pride and a great example of Warner's approach to bridging research and practice. Recent highlights include:

Warner Center Mathematics Outreach

The Warner School's mathematics reform and professional development work has been funded by grants from the National Science Foundation (NSF) and the New York State Department of Education, as well as from contracts with more than 20 school districts in western New York. In a recent four-year period, the Warner Center provided extensive mathematics professional development to more than 2,000 teachers.

Research on Mathematics Instruction

Warner faculty are deeply involved in some of the leading research on mathematics curriculum and instruction. Professor Choppin, who directs the mathematics teacher preparation program at Warner, was recently awarded nearly \$600,000 from NSF for a five-year study designed to increase understanding of teacher usage of innovative curriculum materials and how districts support the use of the materials.

International Conference on Mathematics Education

In 2008, the Warner School hosted a four-day NSF-funded international research conference to discuss and synthesize classroom practices that support more robust and equitable conditions for students to learn and participate meaningfully in mathematics classes.

Mathematics Education Faculty

Jeffrey Choppin, Assistant Professor

(Ph.D., University of Wisconsin - Madison)

Choppin is director of the mathematics teacher education program at the Warner School of Education. His research focuses on how teachers adapt mathematics curricula, the resources they draw on in the process of adaptation, and on the impact of the stability of the instructional context on teachers' effective use of curricula.

Judi Fonzi, Associate Professor (clinical)

(Ph.D., University of Rochester)

Fonzi has extensive experience as a mathematics teacher, teacher educator, and researcher. She directs the Warner Center for Professional Development and Education Reform and occasionally teaches courses in mathematics education. Fonzi's research focuses on systemic reform, professional development, and teacher leadership.

Cindy Callard, Assistant Professor (clinical)

(Ed.D., University of Rochester)

Callard brings 14 years of experience as a middle school mathematics teacher and team leader to her research in school mathematics reform, professional development work, teaching. She serves as the Outreach Coordinator for Mathematics for the Warner Center of Professional Development and Education Reform and occasionally teaches math education courses.



New York State Teaching Certifications

To teach mathematics in secondary schools in New York State, you need to obtain NYS Initial Teaching Certification in Adolescence Education (grades 7-12) as a specialist in mathematics. Professional Certification and a master's degree are also eventually required.

Our Warner mathematics teacher preparation program will provide you with all the coursework needed to apply for both NYS certifications as part of a master's degree. Provided you have the necessary content background (see prerequisites on back), our program also allows you to pursue more than one certification at the same time and with minimal additional credits.

Core Program Components

The core teacher preparation program leading to teaching certification in mathematics in grades 7-12 includes 30 credits of coursework and 9 credits of internships.

Pedagogical Core

These courses address: the context of schooling within which teachers operate; contemporary issues and topics in education, including assessment and evaluation, conflict resolution, law and ethics, and school and community relations; diversity and equity in education; disability and inclusion; and understanding your student populations.

- ED 400: Topics in Teaching & Schooling
- ED 404: Teaching, Curriculum & Change
- ED 415: Adolescent Development and Youth Culture
- EDU 442: Race, Class, Gender & Disability in American Education
- ED 447: Disability & Schools

Literacy Component

Mathematics teacher candidates also receive a grounding in the nature of language practices and literacy learning in classrooms:

- EDU 498: Literacy Learning as Social Practice *Either:*
- EDU 482: Integrating Mathematics and Literacy OR
- EDU 409: Language and Literacy in Education

Mathematics Specialization

It is through the specialized mathematics education courses and internships that you deepen your understanding of mathematics and learn effective methods to teach it.

- EDU 436: Theory & Practice in Teaching & Learning Mathematics
- EDU 444: Implementing Innovation in Mathematics Education
- EDU 483: Integrating Mathematics and Technology

Internships are done concurrently with the coursework as follows:

- Field experiences (minimum of 100 hours; Fall) – taken concurrently with EDU 436
- First and second student teaching experiences (4 and 8 weeks full time, respectively; Spring) – taken concurrently with EDU 444

Program Options/Extensions

In addition to the core program outlined above, students may want to consider supplementing their program to achieve other goals and pursue additional certifications.

Inclusion/DUAL Certification Program

To obtain NYS certification for Teaching Students with Disabilities in addition to your basic certification, four additional inclusion courses (12 credit hours) are needed. Internships need to be conducted in an inclusive setting.

Grades 5-6 Extension

By adding one or two courses, you can extend your certification to teach mathematics in grades 5 and 6.

M.A.T. (Master of Arts in Teaching) Program

If you are interested in pursuing teaching certification while strengthening your subject area knowledge, you may obtain an M.A.T., which involves an additional 12 credit hours of coursework in your mathematics specialization.

Urban Teaching and Leadership (UTL) Program

Students interested in urban teaching may want to consider the UTL program where students take nine additional credit hours and participate in a series of experiences as part of an Urban Education Concentration.

Core Program at a Glance

Full-time students starting in the summer can complete the core mathematics teacher preparation program in 15 months. Students starting at a different time, doing some of the program on a part-time basis or adding additional certifications, will take longer.

Recommended Sequence

Summer 1 (12 credits):

- Disability & Schools
- Literacy Learning as Social Practice
- Integrating Mathematics & Technology
- Teaching, Curriculum & Change

Fall (12 credits):

- Theory & Practice in Teaching & Learning Mathematics
- Race, Class, Gender & Disability in American Education
- Adolescent Development and Youth Culture
- Topics in Teaching & Schooling (part 1)
- Field experiences

Spring (12 credits):

- Implementing Innovation in Mathematics Education
- Topics in Teaching & Schooling (part 2)
- First & second student teaching experiences

Summer 2 (3 credits):

- Integrating Mathematics & Literacy

MATHEMATICS TEACHER EDUCATION

PREREQUISITES

To enter the mathematics teacher preparation program you need:

- A bachelor's degree with a major in one or more of the liberal arts or sciences.
- At least 30 hours of coursework in mathematics at either the undergraduate or graduate level, including a sequence of Calculus I and II.
- Two courses in a language other than English (or equivalent).

Frequently Asked Questions

What do I do if I do not know if I qualify with the necessary prerequisites?

Sometimes students have applied mathematics backgrounds that make it difficult to evaluate whether you have the required prerequisites. If you have any questions as to whether you have all the prerequisites to enter the program, please contact the Admissions Office.

Can I still apply to the program if I do not have all the necessary prerequisites?

If you are short just a couple of courses, you can still apply and may be admitted into our program, although you will have to complete all your prerequisites in order to graduate. If you need to complete several of the prerequisite courses, we recommend that you take the time to fulfill these requirements before applying, but you are welcome to schedule an appointment with one of our admissions counselors for advice on how to best do this.

Can I do the program part time?

You can start your program as a part-time student; however, you need at the very least to commit to full-time studies for the spring semester when you will be conducting your student teaching experiences.

Can I transfer courses into this program?

If you have taken any of the required courses at the Warner School prior to matriculating into the program, they will automatically count toward your degree. Any other transfer credit questions will be addressed on a one-on-one basis.

Can I start the program in the fall as a full-time student?

While in special circumstances we may allow you to start the program in the fall and complete it by the following summer, we do not recommend this option, as it will involve taking some of the key courses and experiences out of sequence as well as requiring you to take an overload in the fall semester.

Scholarships

The Warner School is committed to assisting qualified students finance their graduate study in education. In 2007-08, the Warner School awarded over \$1 million in scholarships and assistantships in recognition of our students' academic excellence, professional accomplishment, and leadership in their fields, and to ensure a diverse student body.

Over the next two years, through funding from the National Science Foundation, the Warner School has full scholarships available for math and mathematics teacher candidates. Noyce Scholars will be expected to make a commitment to teaching for at least two years in a high-need school, helping to share their passion for mathematics or math and inspiring other students to follow in their footsteps.

University of Rochester seniors interested in teaching mathematics in urban settings may also be eligible for the Fifth Year in Teaching Scholarship as part of the Urban Teaching and Leadership program. Fifth Year Scholarships offer full tuition, room, and board to eligible candidates.

Additional information is available at www.rochester.edu/warner.

For additional information on scholarships and eligibility, please contact the Admissions Office.

Admissions:

Applications are available online at warner.rochester.edu/admissions/WS_app.pdf.

Admission deadlines are October 15, February 1, April 1, and July 1. Cohorts begin every summer.

This information bulletin was prepared on the date indicated below, and the information is subject to change. Please consult warner.rochester.edu for updates on programs, courses, and requirements.

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