

# MASTER OF ARTS IN MATHEMATICS TEACHING

## Overview and Contact Information

The Master of Arts in Mathematics Teaching program (M.A.M.T.), offered through Mount Holyoke College's Mathematics Leadership Programs, is designed for teachers, teacher-leaders, and math coaches of grades K-8 who have a teaching license (initial or professional) and at least a bachelor's degree. The program is designed for educators looking to strengthen their skills as math teachers or develop their professional credentials in order to become qualified as math specialists.

Upon successful completion of the program, students are awarded the Master of Arts in Teaching degree.

### M.A.M.T. Learning Goals

Graduates of the Master of Arts in Mathematics Teaching will:

1. Have a deep conceptual understanding of the mathematical content in each of the following mathematical domains appropriate to K-8 grade levels, including:
  - a. Counting and cardinality
  - b. Number and operations in base 10
  - c. Operations and algebraic thinking
  - d. Measurement and data
  - e. Geometry
  - f. Ratios and proportional relationships
  - g. The number system
  - h. Expressions and equations
  - i. Functions
2. Understand how students make sense of the mathematical ideas in each domain and how these concepts and skills build from kindergarten through eighth grade.
3. Appreciate the power and complexity of students' mathematical thinking.
4. Know what questions to ask of students that will deepen their mathematical understanding.
5. Use and/or adapt curriculum to meet the needs of their students.
6. Connect their experiences in the courses to current research from the field.
7. Develop rich images of teacher leadership at all levels from sharing their classroom work to coaching and mentoring colleagues to leading professional learning opportunities to advocating for the profession.
8. Participate fully in the mathematics education community at the local, state, and national levels.

### Contact Information

Michael Flynn, Director

Janet Paquette, Senior Administrative Assistant

413-538-2063

<http://mathleadership.org/programs/master-of-arts-in-mathematics-teaching/>

Virginia Bastable (<https://www.mtholyoke.edu/people/virginia-bastable>), Ed.D., University of Massachusetts

Sarah Bent, M.A.T., Mount Holyoke College

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Karen Schweitzer, M.A.T., Mount Holyoke College

Janice Szymaszek, M.Ed., Smith College

Kaneka Turner, M.A.T., Mount Holyoke College; M.Ed., University of Phoenix

Elizabeth Van Cleef, M.S., Bank Street College of Education

Polly Wagner, M.Ed., Lesley College

## Curriculum and Requirements

This 32-credit program is built around the latest research and best practices in math education. The core component of the work is the Developing Mathematical Ideas curriculum. The two-and-a-half-year program involves three intensive summer sessions (three weeks each, except the final summer of two weeks) and two academic years of online work.

Each summer will consist of three weeks of courses, two focused on mathematics and one focused on educational leadership. The final summer will consist of one week of mathematics and one week of educational leadership. Students may attend in person on our beautiful campus at Mount Holyoke College or online through our virtual leaning environment during the summer sessions.

Each academic year will include four credits of mathematics work and four credits of educational leadership, all conducted online. The academic year online courses blend asynchronous assignments with live virtual learning sessions. During the virtual learning sessions, participants have the option to attend in person on campus.

### Sample Plan of Study

#### Summer

X.MATH-400	Developing Mathematical Ideas: Building a System of Tens	2
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X.MATH-401	Developing Mathematical Ideas: Making Meaning for Operations	2
X.MTHED-422	Research on Learning: Implementing the Common Core Math Practice Standards	2
<b>Fall</b>		
X.MATH-460	Connecting Arithmetic to Algebra	4
<b>Spring</b>		
	Routines to Support the Development of Algebraic Reasoning	4
<b>Summer</b>		
X.MATH-405	Developing Mathematical Ideas: Measuring Space in One, Two, and Three Dimensions	2
X.MTHED-408	Professional Development for Coaching Mathematics	2
X.MATH-402	Developing Mathematical Ideas: Examining Features of Shape	2
<b>Fall</b>		
X.MTHED-465	Action Research on Learning and Teaching	4
<b>Spring</b>		
X.MTHED-466	Action Research on Math Teacher Leadership	4
<b>Summer</b>		
X.MATH-406	Developing Mathematical Ideas: Patterns, Functions, and Change	2
X.MTHED-410	Educational Leadership II: Facilitating Professional Learning	2
Total Credits		32

## Admission

The M.A.T. in Mathematics Teaching is designed for teachers, math coaches, math specialists, and math interventionists in grades K-8 who have a teaching license (initial or professional) and at least a bachelor's degree. The program is ideal for educators looking to strengthen their skills and expertise as math teachers and those who wish to enhance their professional credentials in order to become teacher leaders in mathematics education. Apply for the program online (<http://mathleadership.org/programs/master-of-arts-in-mathematics-teaching>).

## Financing

Please see Graduate Tuition, Fees, and Financial Aid (<http://catalog.mtholyoke.edu/PaGE/financial-policies>) for further information.

## Scholarships

Mount Holyoke College offers Emerging Teacher Leader Scholarships for K-8 teachers and coaches that are invested in the learning and teaching of mathematics and are interested in developing their leadership potential, and Distinguished Teacher Leaders Scholarships for State Teachers of the Year and recipients of the Presidential Award for Excellence in Mathematics and Science Teaching.

See the M.A.M.T. application (<http://mathleadership.org/programs/master-of-arts-in-mathematics-teaching>) for more information on applying for the scholarships. Scholarships are issued on a rolling basis at the end of each month until all funds are awarded. Interested applicants are strongly encouraged to apply early to ensure the availability of scholarship funds.

## National Council of Teachers of Mathematics Education Trust

The Mathematics Education Trust (MET) was established in 1976 to channel the generosity of contributors through the creation and funding of grants, awards, honors, and other projects that support the improvement of mathematics teaching and learning. For more information, visit the MET website (<http://www.nctm.org/MET>).

## Course Offerings

### Mathematics

**X.MATH-400 Developing Mathematical Ideas: Building a System of Tens**  
*Credits: 2*

Participants will explore the base-ten structure of the number system, consider how that structure is exploited in multi-digit computational procedures, and examine how basic concepts of whole numbers reappear when working with decimals. They will study the various ways children naturally tend to think about separating and combining numbers and what children must understand in order to work with numbers in these ways.

*Applies to requirement(s): Meets No Distribution Requirement*

*V. Bastable, S. Bent, M. Flynn, L. Lamb*

*Restrictions: This course is limited to Mount Holyoke MAT, MAMT, and MATL students only*

**X.MATH-401 Developing Mathematical Ideas: Making Meaning for Operations**

*Spring. Credits: 2*

This course provides opportunities for participants to examine the actions and situations modeled by the four basic operations. The course will begin with a view of young children's counting strategies as they encounter word problems, moves to an examination of the four basic operations on whole numbers, and revisits the operations in the context of rational numbers.

*Applies to requirement(s): Meets No Distribution Requirement*

*S. Bent, Y. Chen, M. Flynn, K. Turner*

*Restrictions: This course is limited to Mount Holyoke MAT, MAMT, and MATL students only*

**X.MATH-402 Developing Mathematical Ideas: Examining Features of Shape**

*Credits: 2*

Participants examine aspects of two-dimensional and three-dimensional shapes, develop geometric vocabulary, and explore both definitions and properties of geometric objects. The seminar includes a study of angle, similarity, congruence, and the relationships between three-dimensional objects and their two-dimensional representations. Participants examine how students develop these concepts through analyzing print and video cases as well as reading and discussing research articles.

*Applies to requirement(s): Meets No Distribution Requirement*

*V. Bastable, A. Chang, M. Flynn, E. Van Cleef*

*Restrictions: This course is limited to Mount Holyoke MAMT students only. Instructor permission required.*

*Notes: Section 01 for MAMT students. Section 02 for non-matriculated students. Half semester.*

**X.MATH-404 Developing Mathematical Ideas: Working With Data***Credits: 2*

Students will work with the collection, representation, description, and interpretation of data. They will learn what various graphs and statistical measures show about features of the data, study how to summarize data when comparing groups, and consider whether the data provides insight into the questions that led to data collection.

*Applies to requirement(s): Meets No Distribution Requirement*

*M. Flynn*

*Restrictions: This course is limited to Mount Holyoke MAMT students only*

**X.MATH-405 Developing Mathematical Ideas: Measuring Space in One, Two, and Three Dimensions***Credits: 2*

Participants will examine different aspects of size, develop facility in composing and decomposing shapes, and apply these skills to make sense of formulas for area and volume. They will also explore conceptual issues of length, area, and volume, as well as their complex interrelationships.

*Applies to requirement(s): Meets No Distribution Requirement*

*M. Garcia, K. Schweitzer*

*Restrictions: This course is limited to Mount Holyoke MAMT students only*

**X.MATH-406 Developing Mathematical Ideas: Patterns, Functions, and Change***Credits: 2*

Participants discover how the study of repeating patterns and number sequences can lead to ideas of functions, learn how to read tables and graphs to interpret phenomena of change, and use algebraic notation to write function rules. With a particular emphasis on linear functions, participants also explore quadratic and exponential functions and examine how various features of a function are seen in graphs, tables, or rules. Participants examine how students develop these concepts through analyzing print and video cases as well as reading and discussing research articles.

*Applies to requirement(s): Meets No Distribution Requirement*

*V. Bastable, M. Flynn S. Bent, Z. Champagne*

*Restrictions: This course is limited to Mount Holyoke MAMT students only  
Instructor permission required.*

**X.MATH-407 Reasoning Algebraically About Operations***Fall. Credits: 2*

Participants examine generalizations at the heart of the study of operations in the elementary grades. They express these generalizations in common language and in algebraic notation, develop arguments based on representations of the operations, study what it means to prove a generalization, and extend their generalizations and arguments when the domain under consideration expands from whole numbers to integers.

*Applies to requirement(s): Meets No Distribution Requirement*

*V. Bastable, M. Flynn*

*Restrictions: This course is limited to Mount Holyoke MAMT students only  
Instructor permission required.*

**X.MATH-411 Math for Elementary Teachers***Credits: 2*

This course equips educators planning to teach mathematics at the elementary (K-6) level with the foundations for teaching math and an understanding of the "why" underlying the formulas, procedures, and reasoning. Using an inquiry-based approach, future teachers learn about a range of topics relevant to elementary school (K-6) math pedagogy and curricula. Topics covered include: number sense, operations, data analysis, functional relationships, algebraic thinking, and geometry/measurement. At the end of the course, students are prepared to meet both federal Common Core standards and Massachusetts state standards, and to support their students by using best practices in math education.

*Applies to requirement(s): Meets No Distribution Requirement*

*J. Agron*

*Restrictions: This course is limited to Mount Holyoke MAT students only*

*Advisory: The course is intended for teacher licensure students.*

**X.MATH-424 Developing Mathematical Reasoning***Spring. Credits: 4*

Developing Mathematical Reasoning (DMR) builds on and extends the work of Connecting Arithmetic to Algebra. Participants will work with a five-phase model for instruction in mathematical argument: Noticing, Articulating, Representing Specific Instances, Creating Mathematical Argument, and Comparing and Contrasting Operations. They will examine and implement a set of lessons designed to engage their own students with generalizations about the operations using these phases of instruction. DMR investigates how this approach to mathematics thinking supports a range of mathematics learners including those who have difficulty with grade-level mathematics and those who need additional challenge.

*Applies to requirement(s): Meets No Distribution Requirement*

*V. Bastable, M. Flynn*

*Restrictions: This course is limited to Mount Holyoke MAMT students only  
Advisory: X.MATH-460 Connecting Arithmetic to Algebra.*

**X.MATH-460 Connecting Arithmetic to Algebra***Fall. Credits: 4*

Connecting Arithmetic to Algebra (CAA) is a year-long professional development experience in which teachers consider generalizations that arise from the study of number and operations in grades 1 through 7. They examine cases of students who are engaged in the process of articulating general claims, working to understand those claims, and learning how to prove them. The course also focuses on how this approach to mathematical thinking supports a range of mathematics learners, including those who have difficulty with grade-level mathematics and those who need additional challenge.

*Applies to requirement(s): Meets No Distribution Requirement*

*M. Flynn, The department*

*Restrictions: This course is limited to Mount Holyoke MAMT students only*

**X.MATH-462 Fostering Algebraic Reasoning**

*Not Scheduled for This Year. Credits: 3*

Enrolled students examine generalizations at the heart of the study of operations in the elementary grades. They express these generalizations in common language and in algebraic notation, develop arguments based on representations of the operations, study what it means to prove a generalization, and extend their generalizations and arguments when the domain under consideration expands from whole numbers to integers. In addition, they investigate the thinking of their own students working on similar ideas by recording and analyzing their own lessons and interviews with their students. Examination of the links between Common Core Math Practice Standards is also included.

*Applies to requirement(s): Meets No Distribution Requirement*

*V. Bastable, M. Flynn*

*Restrictions: This course is offered for graduate students only.*

*Notes: This is a year-long online course. At the conclusion of the 2-semester sequence, final letter grades will be awarded for both segments of the sequence.*

**Mathematics Education****X.MTHED-404 Effective Practices for Advancing the Teaching and Learning of Mathematics**

The National Council of Teachers of Mathematics identified eight practices for effective teaching of mathematics. Teacher leaders from around the country been strategizing and working to develop unique ways to implement these practices in K-12 classrooms. Each live online session will explore a different practice in depth with one of the teacher leaders who designed it. Students will then work to implement the practice in their own classrooms and analyze how it affects student learning.

**X.MTHED-404DV Effective Practices for Advancing the Teaching and Learning of Mathematics: "Developing Students' Mathematical Sense-Making"**

*Spring. Credits: 2*

Recent math reform efforts emphasize the importance of developing students' conceptual understanding over teaching procedures for students to memorize. For many teachers, this is a shift in practice because their own experiences in mathematics have been with the latter. In this course we will draw upon some of the leading experts in the field to explore how we can develop students' understanding in the domains of counting and cardinality, geometry, number and operations in base ten, algebraic reasoning, measurement, and functions. In each class session, we will explore one or more domains in depth as we engage in mathematical tasks and analyze student thinking through video and print cases.

*Applies to requirement(s): Meets No Distribution Requirement*

*S. Bent, M. Flynn*

**X.MTHED-407 Reasoning Algebraically About Operations**

*Not Scheduled for This Year. Credits: 1*

Participants examine generalizations at the heart of the study of operations in the elementary grades. They express these generalizations in common language and in algebraic notation, develop arguments based on representations of the operations, study what it means to prove a generalization, and extend their generalizations and arguments when the domain under consideration expands from whole numbers to integers.

*Applies to requirement(s): Meets No Distribution Requirement*

*V. Bastable, M. Flynn*

*Restrictions: This course is limited to Mount Holyoke MAMT students only  
Instructor permission required.*

**X.MTHED-408 Professional Development for Coaching Mathematics**

*Credits: 2*

This course is designed for elementary math specialists with responsibilities for supporting teachers in the development of strong mathematics education programs. Participants explore issues related to: learning mathematics while in the context of teaching; facilitating the professional development of colleagues; teachers' and students' ideas about mathematics and learning; and fostering a stance of collaborative investigation. By way of a central theme of mathematics learning, the institute will offer coaches opportunities to explore, through the coaching perspective, ideas of number and geometry in the elementary grades.

*Applies to requirement(s): Meets No Distribution Requirement*

*P. Wagner*

*Restrictions: This course is offered for graduate students only.*

**X.MTHED-409 Educational Leadership I: Exploring the Rules of Math Teacher Leadership**

*Credits: 2*

This course will explore the roles of teacher leadership in math education at the local, state, and national level. Topics will include coaching, mentoring, writing (blogs, journals, op-eds, articles), professional learning communities (virtual and face-to-face), and advocacy. Participants will consider current issues and challenges facing students and teachers with regard to math education and will work to develop action plans to address these issues in the coming school year.

*Applies to requirement(s): Meets No Distribution Requirement*

*S. Hedgepeth, B. Meyer*

*Restrictions: This course is limited to Mount Holyoke MAMT students only*

**X.MTHED-410 Educational Leadership II: Facilitating Professional Learning**

*Credits: 2*

This institute focuses on learning to teach one of the Developmental Mathematical Ideas (DMI) modules. Participants will choose a particular DMI module on which to concentrate their facilitation work. The institute will include examination of the central mathematical ideas of the module, identifying key goals for each session, discussion of the process of interacting with participants both in the institute sessions and through written responses, as well as opportunities for practice facilitation.

*Applies to requirement(s): Meets No Distribution Requirement*

*V. Bastable*

*Restrictions: This course is offered for graduate students only.*

*Advisory: Prior experience with a DMI seminar recommended.*

**X.MTHED-411 Educational Leadership II: Facilitating Adult Learning**

*Credits: 2*

This course provides opportunities for participants to develop skills and knowledge to enable them to design and implement professional learning opportunities in mathematics for adults. Activities focus on four aspects: the importance of identifying key ideas and goals for professional learning, strategically using both small and whole group formats, an analysis of the range of professional learning opportunities for teachers, and opportunities to practice facilitating professional learning with an audience of teachers.

*Applies to requirement(s): Meets No Distribution Requirement*

*M. Flynn, J. Szymaszek*

*Restrictions: This course is limited to Mount Holyoke MAMT students only*

**X.MTHED-412 Mathematics Coaching: Designing Effective Professional Development**

*Not Scheduled for This Year. Credits: 3*

This course provides opportunities for math specialists/coaches of grades K-8 to design, develop, critique, implement, give, and receive feedback on mathematics professional development experiences that align with the Common Core standards and the particular needs of the school/district's participating staff. Topics include staying focused on mathematics while developing collaborative relationships, communicating with teachers and administrators, developing leadership skills, and continuing to be a learner. Emphasis will be placed on learning how to move a school and/or district toward their mathematics goals by providing both support and press for teachers who teach mathematics.

*Applies to requirement(s): Meets No Distribution Requirement*

*V. Bastable, M. Flynn*

*Restrictions: This course is limited to Mount Holyoke MAMT students only*  
*Advisory: Prior experience with a DMI seminar recommended.*

**X.MTHED-413 Supporting the Range of Learners in Mathematics Classrooms**

*Spring. Credits: 2*

Every teacher wants each student to achieve to the highest levels. And yet knowing how to do this can feel hard, overwhelming, and/or unclear. To make diverse classrooms feel more manageable and productive, this course will provide concrete methods and strategies teachers can use in classrooms to support all students. Students will engage in interesting mathematics every session; leave each session with something concrete to try in your classroom; read and analyze current research on supporting diverse learners; research your own students through case work and discussions with colleagues; and have new thought partners and colleagues who will be invested in your students' success.

*Applies to requirement(s): Meets No Distribution Requirement*

*J. Sunkle, P. Wagner*

*Restrictions: This course is limited to Mount Holyoke MAT, MAMT, and MATL students only*

**X.MTHED-422 Research on Learning: Implementing the Common Core Math Practice Standards**

*Not Scheduled for This Year. Credits: 2*

This course is focused on implementing mathematics instruction to support the development of conceptual understandings of mathematics. Topics include creating a classroom climate for productive mathematics discussion, posing open-ended math tasks, asking probing questions, and exploring teacher moves that both challenge and support individual student learning. Analyzing classroom cases of practice will be a key feature.

*Applies to requirement(s): Meets No Distribution Requirement*

*V. Bastable, M. Flynn*

*Restrictions: This course is limited to Mount Holyoke MAMT students only*  
*Advisory: Prior experience with a DMI seminar recommended.*

**X.MTHED-462 Fostering Algebraic Reasoning**

*Not Scheduled for This Year. Credits: 1*

Enrolled students examine generalizations at the heart of the study of operations in the elementary grades. They express these generalizations in common language and in algebraic notation, develop arguments based on representations of the operations, study what it means to prove a generalization, and extend their generalizations and arguments when the domain under consideration expands from whole numbers to integers. In addition, they investigate the thinking of their own students working on similar ideas by recording and analyzing their own lessons and interviews with their students. Examination of the links between Common Core Math Practice Standards is also included.

*Applies to requirement(s): Meets No Distribution Requirement*

*V. Bastable, M. Flynn*

*Restrictions: This course is offered for graduate students only.*

*Notes: This is a year-long online course. At the conclusion of the 2-semester sequence, final letter grades will be awarded for both segments of the sequence.*

**X.MTHED-465 Action Research on Learning and Teaching**

*Not Scheduled for This Year. Credits: 2*

This course will include action research on the mathematics learning of students and pedagogical moves of teachers. Participants will produce written cases of practice based on audio or videotaped classroom discussions and interviews with their own students. Participants will analyze their own cases and those of their colleagues to examine the learning of students and the impact of teacher moves. Course instructors will also provide individual feedback based on the classroom cases.

*Applies to requirement(s): Meets No Distribution Requirement*

*V. Bastable, M. Flynn*

*Restrictions: This course is limited to Mount Holyoke MAMT students only*

*Notes: Online.*

**X.MTHED-466 Action Research on Math Teacher Leadership**

*Spring. Credits: 4*

The course involves action research on the impact of teacher leadership roles in mathematics education. Students will implement the action plan created during Educational Leadership I, develop a capstone project, and report the results so the group can provide critical feedback and support. The scalable nature of this work allows each student to define a leadership role and project to fit their interests and professional goals.

*Applies to requirement(s): Meets No Distribution Requirement*

*S. Bent*

*Restrictions: This course is limited to Mount Holyoke MAMT students only*

*Advisory: X.MTHED-409 Educational Leadership I.*