



Math in the Middle

Course Descriptions



Math 800T: Mathematics as a Second Language

This course lays the foundation for developing the “habits of mind of a mathematical thinker,” a theme that is further developed in subsequent M2 courses. The approach is to understand arithmetic (number) and (introductory) algebra as a means of communicating mathematical ideas (i.e. as a language). A careful study of fractions, ratios and rational numbers lays the foundation for a study of algebra. The course stresses a deep understanding of the basic operations of arithmetic, as well as the interconnected nature of arithmetic, algebra and geometry.

Math 802T: Functions, Algebra and Geometry for Middle-Level Teachers

This course builds on Mathematics as a Second-Language. Participants gain a deep understanding of the concept of function and gain a deeper understanding of the algebra and geometry taught in the middle grades. As part of the study of functions, algebra and geometry, participants study measurement with an emphasis on length, area and volume. The course also explores ways to increase students’ visual literacy as a component of learning, understanding, and communicating ideas in mathematics.

TEAC 800 : Inquiry into Teaching and Learning

This course focuses on inquiry into mathematics teaching and learning. Participants are introduced to the field of educational inquiry through a study of various designs and methods of doing educational research. Participants also develop knowledge, skills, and dispositions of educational inquiry through a study of artifacts of mathematics teaching and learning. The course helps participants consider current issues in mathematics education in relationship to their own teaching and learning of mathematics and what it means to transfer the mathematics learned in other M2 courses into one’s practice as a math teacher. The course also lays the foundation for ongoing work in the area of teacher leadership.

STAT 892: Statistics For Middle-Level Teachers

The course offers an introduction to statistics and probability with an emphasis on teaching statistics and probability to middle level students. The course provides the foundation for later study of how data is used in education and for school-based research.

Math 804T: Experimentation, Conjecture and Reasoning

This course emphasizes the cycle of doing mathematics, i.e. experimentation, conjecture and reasoning. Focus is placed on problem solving, reasoning and proof and communicating mathematics. With the support of the American Mathematics Competitions, which is housed in Lincoln, NE, this course utilizes the extensive resources of the AMC to help middle level mathematics teachers develop problem solving skills. This is often an academic year course that is taught using distance learning approaches together with one 2-day, on-site classroom experience.

Math 805T: Discrete Math for Middle-Level Teachers

Discrete mathematics topics introduced in this class includes social decision making, vertex-edge graph theory, counting techniques, matrix models, and the mathematics of iteration. The unifying themes for these topics are mathematical modeling, the use of technology, algorithmic thinking, recursive thinking, decision making, and mathematical induction as a way of knowing.

TEAC 801: Curriculum Inquiry

This pedagogical seminar is taught in partnership with a math class and focuses on gaining a deeper understanding of mathematics curriculum development, including historical and contemporary issues that influence curriculum planning and educational change. Participants consider current curricular issues in relationship to their own mathematics teaching and learning and how the mathematics learned in other M2 courses transfers into the planned and enacted curriculum of one’s own teaching practice.



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Math 806T: Number Theory and Cryptology for Middle-Level Teachers

This course focuses on basic number theory results which are needed to understand the number theoretic RSA cryptography algorithm (an encryption algorithm which is in use today to secure information sent via the internet). As the number theory results are developed, connections to middle level curricula are emphasized and proofs are carefully selected so that those which are included in the course are particularly relevant and accessible to middle level teachers. This portion of the course promotes a deep understanding of the integers and their properties in connection with the operations of multiplication and division. Elementary ciphers (methods for encoding and decoding) are included to introduce the nature of cryptology in preparation for understanding the RSA method. The cryptology related activities are readily adaptable as enrichment activities for middle level students. The connection of number theory to the RSA encryption algorithm allows the participants to see and understand a very relevant, real-world application of mathematics.

Math 807T: Using Mathematics to Understand our World

This academic year course is taught using distance learning approaches together with one 2-day, on-site classroom experience. This course is designed around a series of projects in which students examine the mathematics underlying several socially-relevant questions which arise in a variety of academic disciplines (i.e. real-world problems). Students learn to extract the mathematics out of the problem in order to construct models to describe them. The models are then analyzed using skills developed in this or previous mathematics courses.

Math 808T: Concepts of Calculus for Middle-Level Teachers

In this course, students in develop conceptual knowledge of the processes of differentiation and integration, along with their applications. The course is designed around a series of explorations (worksheets) through which students are led to “discover” the main ideas of calculus. Instructors’ roles are primarily to answer individuals’ questions that arise in completing the worksheets, facilitate class discussions as the explorations are completed, and summarize the main ideas developed in the course as the class progresses through the material.

TEAC 888: Teacher as Scholarly Practitioner

This academic year course is taught using distance learning approaches together with one 2-day, on-site classroom experience. The course introduces participants to the theory and practice of teacher-led inquiry into effective practice. The course prepares teachers to engage in a school-based action research project that will be conducted during the following spring semester.

Capstone Course : Integrating the Learning and Teaching of Mathematics

Depending on the degree pursued, teachers will register for TEAC 889 or Math 896T

This course is the capstone experience of the M2 Institute. Considerable time is devoted to discussing how the mathematics learned in M2 courses can enrich the middle level classroom. This course is an integrated mathematics and pedagogy course whose goal is to enable the teacher to be a better teacher of mathematics because of the mathematics and pedagogy that they have learned. Concurrently with this course, teachers work on satisfying the Master’s exam requirements for their Master’s Degree.



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