

# MASTER OF EDUCATION (M.ED.) MAJOR IN MIDDLE SCHOOL MATHEMATICS TEACHING

The focal point of this degree program is to improve mathematics education in the critical 4th - 8th grade levels by providing teachers with peer support and a clear understanding of instructional practices.

**This program discontinued admissions for the Fall 2017 term and beyond.**

## Degree Requirements

The Master of Education (M.Ed.) degree with a major in Middle School Mathematics requires 36 semester credit hours.

## Course Requirements

Code	Title	Hours
<b>Required Courses</b>		
MATH 5303	History of Mathematics	3
MTE 5311		3
MTE 5313	Geometry and Measurement	3
MTE 5315	Algebraic Reasoning	3
MTE 5317		3
MTE 5319		3
MTE 5321	Probability and Statistics	3
MTE 5323	Logic and Foundations of Mathematics	3
<b>Composite Minor</b>		
CI 5306	Evaluative Techniques for the Classroom Teacher	3
CI 5314	Human Growth and Development II	3
CI 5333	The Secondary Curriculum	3
CI 5370	Classroom Management, Discipline, and Legal Issues	3
<b>Total Hours</b>		<b>36</b>

## Comprehensive Examination Requirements

All candidates for graduate degrees must pass one or more comprehensive examinations.

Master's level courses in Mathematics: MATH (p. 1), MTE (p. 4)

## Courses Offered Mathematics (MATH)

### MATH 5111. Graduate Assistant Training.

This course is concerned with techniques used in the teaching of mathematics. This course is required as a condition of employment for graduate teaching and instructional assistants. This course does not earn graduate degree credit. Repeatable with different emphasis.

**1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.**

**Course Attribute(s):** Graduate Assistantship|Exclude from Graduate GPA

**Grade Mode:** Leveling/Assistantships

### MATH 5199B. Thesis.

This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding.

**1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.**

**Grade Mode:** Credit/No Credit

### MATH 5299B. Thesis.

This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding.

**2 Credit Hours. 2 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Credit/No Credit

### MATH 5301. Partial Differential Equations.

Theory and application of partial differential equations; derivation of the differential equation; use of vector and Tensor methods; equations of the first order; wave equations; vibrations and normal functions; Fourier series and integral; Cauchy's methods, initial data; methods of Green; potentials; boundary problems; methods of Riemann-Volterra; characteristics. Prerequisites: MATH 3323 and consent of the instructor.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

### MATH 5303. History of Mathematics.

A study of the development of mathematics and of the accomplishments of men and women who contributed to its progress. Cannot be used on a degree plan for M.S. degree. Prerequisite: MATH 2472 with a grade of "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

### MATH 5304. Topics in Mathematics for the Secondary Teacher.

A study of the current trends and topics found in the secondary school mathematics curriculum with the goal of improving the mathematical background of the secondary teacher. Course content will be flexible and topics will be selected on the basis of student needs and interests. Cannot be used on degree plan for M.S. degree. Prerequisite: MATH 2472 with a grade of "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

### MATH 5305. Advanced Course in Probability and Statistics.

Advanced topics in probability and statistics. May be repeated once with different emphasis for additional credit. Prerequisite: MATH 3305.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5307. Modern Algebra.**

Topics in modern algebra. Material will be adapted to the needs of the class. Prerequisite: MATH 4307 with a grade of "C" or better, or MATH 5384 with a grade of "B" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5311. Foundations of Differential Equations.**

A critical study of the foundations of derivation equations, operator spaces, and such basic topics. Recent developments in this field will be investigated and independent investigation will be encouraged.

Prerequisite: MATH 2393 and [MATH 3380 or MATH 5382] both with grades of "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5312. Functions of a Complex Variable.**

Modern developments in the field of a complex variable. Prerequisite: MATH 2393 and MATH 4315 and [MATH 3380 or MATH 5382] all with grades of "C" or better or departmental approval.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5313. Field Theory.**

Topics in field theory, separable extensions, and Galois Theory.

Prerequisite: MATH 4307 with a grade of "C" or better, or MATH 5384 with a grade of "B" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5314. Number Theory.**

Topics in algebra selected from quadratic forms, elementary number theory, algebraic or analytic number theory, with material adapted to the needs of the class. Prerequisite: MATH 4307 with a grade of "C" or better, or MATH 5384 with a grade of "B" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5315. Mathematical Statistics.**

This course discusses theoretical aspects of estimation theory and hypothesis testing procedures, with some of their important applications. The main topics include convergence of random variables, parameter estimation, properties of estimators, interval estimation, sufficiency and applications to the exponential family, hypothesis testing, decision theory, and Bayesian inference. Prerequisite: Instructor approval.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5317. Problems in Advanced Mathematics.**

Open to graduate students on an individual basis by arrangement with the mathematics department. A considerable degree of mathematical maturity is required. May be repeated with different emphasis. This course does not earn graduate degree credit.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from Graduate GPA|Leveling

**Grade Mode:** Leveling/Assistantships

**MATH 5319. The Theory of Integration.**

A course in the theory of integration with special emphasis on the Lebesgue integrals. A course in the theory of real variables, with a knowledge of point set theory, is desirable as a background for this course. A considerable amount of mathematical maturity is required. Prerequisite: MATH 4315 with a grade of "C" or better, or departmental approval.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5329. General Topology.**

Point-set topology with an emphasis on general topological spaces; separation axioms, connectivity, the metrization theorem, and the C-W complexes. Prerequisite: MATH 4330 with a grade of "C" or better, or departmental approval.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5331. Metric Spaces.**

Point-set topology with an emphasis on metric spaces and compactness but including a brief introduction to general topological spaces.

Prerequisite: MATH 4330 with a grade of "C" or better, or departmental approval.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5335. Survival Analysis.**

This course introduces concepts and methods in the analysis of survival data. Topics include characteristics of survival data; basic functions; parametric models for survival time; maximum likelihood estimation of survival functions; two-sample test techniques; regression analysis with parametric and semi-parametric models; and mathematical and graphical methods for model checking. Prerequisite: Math 5305 with a grade of "B" or better or instructor approval.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5336. Studies in Applied Mathematics.**

Topics selected from optimization and control theory, numerical analysis, calculus of variations, boundary value problems, special functions, or tensor analysis. May be repeated with different emphasis for additional credit. Prerequisites: Six hours of advanced mathematics pertinent to topic and consent of the instructor.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5340. Scientific Computation.**

This course will involve the analysis of algorithms from science and mathematics, and the implementation of these algorithms using a computer algebra system. Symbolic numerical and graphical techniques will be studied. Applications will be drawn from science, engineering, and mathematics. A knowledge of differential equations is expected. Prerequisite: Consent of instructor.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Lab Required

**Grade Mode:** Standard Letter

**MATH 5345. Regression Analysis.**

This course introduces formulation and statistical methodologies for simple and multiple regression, assessment of model fit, model design, and criteria for selection of optimal regression models. Students will develop skills with the use of statistical packages and the writing of reports analyzing a variety of real-world data. Prerequisite: MATH 2472.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5350. Combinatorics.**

This course, covers permutations, combinations, Stirling numbers, chromatic numbers, Ramsey numbers, generating functions, Polya theory, Latin squares and random block design. Prerequisite: MATH 3398 or consent of instructor.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5355. Applied and Algorithmic Graph Theory.**

This course is designed to emphasize the close tie between the theoretical and algorithmic aspects. The topics may include basic concepts such as connectivity, trees, planarity, coloring of graphs, matchings, and networks. It also covers many algorithms such as Max-flow Min-cut algorithm, maximum matching algorithm, and optimization algorithms for facility location problems in networks. Prerequisite: MATH 5388 or MATH 3398.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5358. Applied Discrete Mathematics.**

Boolean algebra, counting techniques, discrete probability, graph theory, and related discrete mathematical structures that are commonly encountered in computer science. Prerequisite: MATH 2472 with a grade of "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5360. Mathematical Modeling.**

This course introduces the process and techniques of mathematical modeling. It covers a variety of application areas from the natural sciences. Emphasis is placed on deterministic systems, stochastic models, and diffusion. Prerequisite: [MATH 2393 and MATH 3323 both with grades of "D" or better and MATH 5301 with a grade of "C" or better] or instructor approval.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5373. Theory of Functions of Real Variables.**

This course will discuss those topics that will enable the student to obtain a better grasp of the fundamental concepts of the calculus of real variables and the more recent developments of this analysis. Prerequisite: MATH 4315 with a grade of "C" or better, or departmental approval.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5374. Numerical Linear Algebra.**

This course introduces tools that mathematical scientists use with vectors and matrices. Applications include least squares and eigenvalue problems, and systems of equations from applied mathematics. The stability of algorithms to perturbations are considered. Theory is balanced with numerically implementing algorithms, in particular for iterative methods for large, sparse systems. Prerequisite: MATH 3377 with a "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5376A. Design and Analysis of Experiments.**

This course introduces fundamental concepts in the design of experiments, justification of linear models, randomization and principles of blocking. It also discusses the construction and analysis of basic designs including fractional replication, composite designs, factorial designs, and incomplete block designs. Prerequisite: Approval of instructor.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Topics

**Grade Mode:** Standard Letter

**MATH 5376B. Analysis of Variance.**

This course introduces basic methods, one-way, two-way ANOVA procedures, and multifactor ANOVA designs. Prerequisite: Approval of instructor.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Topics

**Grade Mode:** Standard Letter

**MATH 5376D. Statistical Applications in Genetics and Bioinformatics.**

The statistical concepts and methods to be covered include important probability distributions, analysis of variance, regression analysis, hidden Markov model, and Markov Chain Monte Carlo methods. These methods will be used to address important and challenging questions arising in the analysis of large genetic and bioinformatic datasets. Prerequisite: Math4305 or equivalent.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing|Topics

**Grade Mode:** Standard Letter

**MATH 5376E. Introduction to Data Science.**

This course introduces basic concepts and methods in the field of data science. Topics include data wrangling, data exploration and visualization, optimization, deep learning, supervised learning subjects such as nearest-neighbor techniques, regression, Lasso, linear discriminant analysis, logistic regression, tree-based models, neural networks, as well as unsupervised learning subjects such as market basket analysis and cluster analysis, and random forests. The material will be approached with a blend of theory and application, and will include programming in Python, R, or another modern, popular language of the instructor's choice.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing|Topics

**Grade Mode:** Standard Letter

**MATH 5376F. Introduction to Probability Theory and Models.**

This course covers the definitions, constructions, theorems, and techniques to build and analyze probability models. The emphasis of this class is the active construction and analysis of probability models. However, we will develop a rigorous treatment of the requisite abstract theory in service of this goal. Topics include conditional expectation, the convergence of random variables, weak and strong law of large numbers, central limit theorem, random walk, Martingales, and Brownian motion.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing|Topics

**Grade Mode:** Standard Letter

**MATH 5381. Foundations of Set Theory.**

A formal study of the theory of sets, relations, functions, finite and infinite sets, set operations and other selected topics. This course will also train the student in the understanding of mathematical logic and the writing of proofs. Prerequisite: MATH 2472 with a grade of "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5382. Foundation of Real Analysis.**

A course covering the foundations of mathematical analysis. Topics include: real numbers, sequences, series, and limits and continuity of functions. Prerequisite: MATH 5381.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5384. Geometric Approach to Abstract Algebra.**

Definitions and elementary properties of groups, rings, integral domains, fields and vector spaces with great emphasis on the rings of integers, rational numbers, complex numbers, polynomials, and the interplay between algebra and geometry. Prerequisite: MATH 5381.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5386. Knots and Surfaces, An Introduction to Low-Dimensional Topology.**

Knot polynomials and other knot invariants. The topological classification of surfaces and topological invariants of surfaces. Prerequisite: MATH 2472 with a grade of "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5388. Discrete Mathematics.**

This course covers topics from: basic and advanced techniques of counting, recurrence relations, discrete probability and statistics, and applications of graph theory. Prerequisites: MATH 2472 with a grade of "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5390. Statistics.**

This course will cover not only some of the basic statistical ideas and techniques but also the mathematical and probabilistic underpinnings of these techniques with an emphasis on simulations and modeling. The planning, conducting, analysis, and reporting of experimental data will also be covered. Prerequisite: MATH 2472 with a grade of "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5392. Survey of Geometries.**

A study of topics in geometry including geometrical transformations, the geometry fractals, projective geometry, Euclidean geometry, and non-Euclidean geometry. Prerequisite: MATH 2472 with a grade of "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5393. Numerical Optimization.**

This course focuses on optimization methods for a broad range of applications, such as engineering and applied sciences. Subjects are the basic theory of optimization, numerical algorithms to locate points satisfying optimality conditions and to analyze the convergence properties. Prerequisites: MATH 2472 and MATH 3377 and MATH 3383, all with a grade of "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MATH 5399A. Thesis.**

This course represents a student's initial thesis enrollment. No thesis credit is awarded until student has completed the thesis in Mathematics 5399B.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Credit/No Credit

**MATH 5399B. Thesis.**

This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Credit/No Credit

**MATH 5599B. Thesis.**

This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding.

**5 Credit Hours. 5 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Credit/No Credit

**MATH 5999B. Thesis.**

This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding.

**9 Credit Hours. 9 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Credit/No Credit

**Mathematics for Teacher Education (MTE)****MTE 5301E. Visual Models for Middle School Mathematics.**

This course uses visual models to motivate understanding of the fundamental concepts underlying middle school mathematics. Pedagogical techniques to engage middle school students will also be addressed including inquiry-based instructional methods utilizing these visual models.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Topics

**Grade Mode:** Standard Letter

**MTE 5301F. Implementing New Mathematics Curriculum.**

In this course we will investigate the keys to successfully implementing new curriculum. Two main aspects considered are: 1) the mathematical content knowledge required for a new curriculum and 2) how to build a community of practice which provides support during the implementation process.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Topics

**Grade Mode:** Standard Letter

**MTE 5301G. Mathematics for Teaching.**

A study of the current trends and topics found in the secondary school mathematics curriculum taught from an advance perspective. Course context will be flexible and topics will be selected on the basis of student needs and interests.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Topics

**Grade Mode:** Standard Letter

**MTE 5302A. Quantitative Reasoning.**

This course covers current pedagogy, curriculum, and methods related specifically to the teaching of middle school mathematics. Some of the topics explored are curriculum theory, instructional theory, learning theory, problem solving, national and state standards and assessment, discovery learning, assessment methods, manipulative, and technology in the classroom.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Topics

**Grade Mode:** Standard Letter

**MTE 5313. Geometry and Measurement.**

This course will focus on using spatial reasoning to investigate the concepts of direction, orientation, shape and structure; using mathematical reasoning to develop and prove geometric relationships; using logical reasoning and proof in relation to the axiomatic structure of geometry; using measurement of geometry concepts to solve real-world problems. 5315 Algebraic Reasoning. (3-0) This course will focus on using algebraic reasoning to.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MTE 5315. Algebraic Reasoning.**

This course will focus on using algebraic reasoning to investigate patterns, make generalizations, formulate mathematical models, and make predications; using properties, graphs, and applications of relations and function to analyze, model and solve problems; and making connections among geometric, graphic, numeric and symbolic representation of functions and relations.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MTE 5321. Probability and Statistics.**

This course will deal with using graphical and numerical techniques to explore data, characterize patterns, and describe departures from patterns; designing experiments to solve problems; understanding the theory of probability and its relationship to sampling and statistical inference and its use in making and evaluating predication. Prerequisite: MTE 5315 with a grade of "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**MTE 5323. Logic and Foundations of Mathematics.**

This course will consist of an introduction to fundamental mathematical structures and techniques of proof. Topics will include: logic, set theory, number theory, relations, and functions. Emphasis will be placed on communication about mathematics and construction of well-reasoned explanations. Prerequisite: MTE 5313 and MTE 5319 both with grades of "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter