

MATHEMATICS (MT)

MT-123 College Algebra (3 credits)

The student develops conceptual understanding of algebra as a language to model real-world problems together with algebraic skills to solve those problems. She develops competence in algebra skills related to solving equations and graphing in the Cartesian plane. She studies elementary functions and their graphs (including polynomial, rational, exponential, and logarithmic functions). She develops her analytic and problem-solving abilities while working to formulate and solve problems, applying skills to solve standard and novel mathematical problems.

Prerequisite(s): MP Level 1 or higher or QL-122 completed.

MT-124 Trigonometry (2 credits)

The student learns to use the right triangle and unit circle definitions of trigonometric functions, together with their graphs, to reason about the behavior of the functions and solve applied problems. She develops her analytic and problem-solving abilities using trigonometric functions to model realistic periodic phenomena.

Prerequisite(s): MP level 1 or higher or QL 051 or QL-120 completed.

MT-148 Functions & Modeling (3 credits)

Offered Spring Term & Summers only. The student builds on her previous algebra knowledge (solving equations, elementary functions and their graphs) to develop deeper knowledge of mathematical functions and to use them to create quantitative models of phenomena in science, business, and everyday life. Emphasis is placed on the use of technology tools to understand, use, and apply the function concept. Problem-solving and analytical abilities are developed throughout the work of the course. This course prepares the science or mathematics major for calculus. For the elementary education student pursuing a mathematics support, this course helps her to integrate her algebra knowledge and serves as the bridge to further mathematics courses.

Prerequisite(s): MT-123 completed or Math placement level 2 or higher.

Offered Spring Term only.

MT-152 Calculus 1 (4 credits)

Course Offered Fall Term only. The student studies functions and their rates of change in the context of applied problems, using the ideas and techniques of differential calculus. Topics include derivatives of elementary functions (polynomial, exponential, rational, logarithmic, trigonometric) and their compositions in a variety of representations (graphical, numeric, and symbolic); limits; differential equations as mathematical models for changing phenomena; and antidifferentiation. The student develops her problem-solving, analytic, and communication skills by working both independently and collaboratively to understand, formulate, and solve problems from a variety of disciplines such as physics, chemistry, biology, social science, and management. Computers and calculators are used as tools to computation, communication, and exploration of mathematical ideas.

Prerequisite(s): MT-148 completed or MP Level 3 or higher.

MT-197 Independent Study (0 credits)

Under the approval and direction of a faculty member, independent study is available to students.

MT-221 Discrete Structures & Algorithms (3 credits)

Course Offered Fall Term only. The student explores the mathematics of discrete finite systems, employing algorithms for problem solving in these systems. Topics include set theory, equivalence relations, congruence relations, graph and tree theory, combinatorics, logic, and recurrence relations. Coursework integrates an introduction to a variety of mathematical proof techniques, including proof by mathematical induction.

Prerequisite(s): MT-123 completed or Math Placement Level 2 or higher.

MT-243 Fundamental Concepts/Mathematics 1 (3 credits)

This course, which integrates the learning of mathematics with methods of teaching, is designed for the student preparing to teach at the elementary school level. The student studies the mathematical structures and operations related to sets, whole numbers, integers, rational numbers, and real numbers. She uses the properties of these systems to develop algorithms for the operations defined in each of the systems. She explores the use of manipulatives and technology in building understanding of concepts. Through the study of national, state, and local standards, and contemporary mathematics curriculum projects, she learns teaching strategies. She also gains experience with professional practices such as the development of lesson plans, unit plans, and assessment instruments designed for a variety of learning styles. Throughout the course, she evaluates herself on her ability to analyze and solve problems as well as on her ability to communicate mathematics effectively.

Prerequisite(s): QL-156 completed.

MT-243A Fundamental Concepts/Mathematics 1 (4 credits)

This course, which integrates the learning of mathematics with methods of teaching, is designed for the student preparing to teach at the elementary school level. The student studies the mathematical structures and operations related to sets, whole numbers, integers, rational numbers, and real numbers. She uses the properties of these systems to develop algorithms for the operations defined in each of the systems. She explores the use of manipulatives and technology in building understanding of concepts. Through the study of national, state, and local standards, and contemporary mathematics curriculum projects, she learns teaching strategies. She also gains experience with professional practices such as the development of lesson plans, unit plans, and assessment instruments designed for a variety of learning styles. Throughout the course, she evaluates herself on her ability to analyze and solve problems as well as on her ability to communicate mathematics effectively.

Prerequisite(s): For Educational Licensure & LTM Students only.

Other information Fall 2018: This is a hybrid course with significant independent work. Some online work is expected. See Moodle for preliminary assignment.

MT-243C Fundamental Concepts/Mathematics 1 (4 credits)

This course, which integrates the learning of mathematics with methods of teaching, is designed for the student preparing to teach at the elementary school level. The student studies the mathematical structures and operations related to sets, whole numbers, integers, rational numbers, and real numbers. She uses the properties of these systems to develop algorithms for the operations defined in each of the systems. She explores the use of manipulatives and technology in building understanding of concepts. Through the study of national, state, and local standards, and contemporary mathematics curriculum projects, she learns teaching strategies. She also gains experience with professional practices such as the development of lesson plans, unit plans, and assessment instruments designed for a variety of learning styles. Throughout the course, she evaluates herself on her ability to analyze and solve problems as well as on her ability to communicate mathematics effectively.

MT-244 Fundamental Concepts/Mathematics 2 (3 credits)

This course builds on the mathematical knowledge and skills that the student developed in MT-243. She studies geometry and probability and statistics, and works to strengthen her mathematical problem-solving, analytic, and communication skills. She works further to explore a variety of mathematics teaching approaches at the elementary school level.
Prerequisite(s): QL-156 & MT-243 completed.

MT-244A Fundamental Concepts/Mathematics 2 (4 credits)

This course builds on the mathematical knowledge and skills that the student developed in MT-243. She studies geometry and probability and statistics, and works to strengthen her mathematical problem-solving, analytic, and communication skills. She works further to explore a variety of mathematics teaching approaches at the elementary school level.
Prerequisite(s): MT-243A completed. Limited to licensure or LTM students only.

MT-244C Fundamental Concepts/Mathematics 2 (4 credits)

This course builds on the mathematical knowledge and skills that the student developed in MT-243. She studies geometry and probability and statistics, and works to strengthen her mathematical problem-solving, analytic, and communication skills. She works further to explore a variety of mathematics teaching approaches at the elementary school level.

MT-253 Calculus 2 (4 credits)

Offered Spring Term only. The student extends her knowledge of calculus by exploring the ideas and techniques of integral calculus. Topics include differential equations as mathematical models of changing phenomena, the definite integral and its standard applications, techniques of antidifferentiation, Taylor polynomial approximations, improper integrals, and representations of functions by infinite series. The student builds knowledge and skill using technology tools to solve problems.
Prerequisite(s): MT-152 completed. Offered Spring Term only.

MT-254 Calculus 3 (4 credits)

Offered Fall Term only. The student studies the calculus of multivariate functions with emphasis on functions of two independent variables and their three-dimensional graphs. Further topics include parametric equations; conic sections; polar, cylindrical, and spherical coordinate systems; the calculus of vectors and vector-valued functions; multiple integrals; and line integrals. She continues to develop her analytic and problem-solving abilities, working purposefully on generalization skills, algorithm and formula development, and understanding and applying theorems. In individual and group work, she solved applied problems that arise from the areas of physics, chemistry, biology, management, and mathematics itself.

Prerequisite(s): MT-253 completed or Math Placement Level 4.

MT-254L Calculus 3 Lab (0 credits)

Calculus 3 lab

MT-255 Linear Algebra (4 credits)

The student studies the mathematics of matrix algebra; the structure and operations of vector spaces, including use of determinants, eigenvalues, and eigenvectors; and linear transformations. She learns the basic concepts and computational procedures associated with these structures, including the use of computer and calculator technology. Linear algebra is applied to problems in areas including linear programming, graph theory, theory of games, least squares regression, linear economic models, traffic flow, and scheduling.

Prerequisite(s): MT-148 or MT-152 or MP 3 completed.

MT-256 Probability and Statistics (4 credits)

The student engages in the systematic collection, presentation, and characterization of statistical information for the purpose of decision making. She develops the mathematical skills and knowledge necessary for problem solving in statistical contexts. Both descriptive and inferential statistics are studied. Knowledge of the mathematics of probability support conceptual understanding of statistical methods. Data analysis, graphical representation, correlation, regression, and reliability and validity issues are considered. Technology tools are used.

Prerequisite(s): QL-156 completed.

MT-260 Introduction/Mathematical Problem Solving (2 credits)

Students will work together to solve various open ended problems. Through this problem solving process, they will develop sophisticated ways to solve challenging problems.

Prerequisite(s): QL-156 or MP-1 completed.

MT-267 Introduction to Programming:java (4 credits)

This introductory course in programming introduces the student to an object-oriented program design paradigm. With Java a student can create World Wide Web and stand-alone applications. She develops a number of projects that lead to an independent final project. This course assumes no previous experience with programming.

Prerequisite(s): CM 156Q/QL-156 completed

MT-268 Introduction to Programming: Python (4 credits)

This course teaches the programming language Python. It was created to solve real world problems, but, at the same time, be easy to learn and use. Python is designed to process large amounts of data where critical understanding of the latest research can be found, whether it be in Chemistry, Biology, or Business Analytics. It is considered the best programming language choice for computational chemistry, an essential part of the tool kit for biologists of all types, and as the language with the flexibility and speed needed for business analytics to make sense of big data and answer business' most important questions. Prerequisite: QL-156

Prerequisite(s): QL-156 completed.

MT-269 Introduction to Programming: C++ (4 credits)

This introductory course in programming introduces the student to an object-oriented program design paradigm. With Java a student can create World Wide Web and stand-alone applications. She develops a number of projects that lead to an independent final project. This course assumes no previous experience with programming.

Prerequisite(s): CM 156Q completed

MT-297 Independent Study (1 credit)

Under the approval and direction of a faculty member, independent study is available to students.

MT-340 History of Mathematics (2 credits)

Offered Spring Term only. The student studies the history of mathematics as it is embedded in the development of world cultures. Contemporary mathematical events and trends are placed in historical context. The student spends significant time analyzing problem-solving methods and using them to solve problems from given times and cultures.

Prerequisite(s): Math Placement level 4 or for MT Majors: M 148 completed. Offered Spring Term only.

MT-345 College Geometry (3 credits)

In this course, the student works with Euclidean geometry in two dimensions. She uses visualization, spatial reasoning, and geometric modeling to solve problems. Technology tools are employed to explore ideas and generate conjectures, leading to mathematical proofs.

Prerequisite(s): MT placement Level 3 or higher or MT Majors: MT-152 completed. For MTM or MTE supports: MT-148 & MT-244 completed.

MT-347 Modern Algebra (3 credits)

Course Offered Fall Term alternate years only. The student learns to identify abstract algebraic structures such as groups, rings, and fields and to use their defining axioms. She explores the properties of these systems and examines others, applying the properties. Foundational work involves sets, mappings, and relations. The student gains experience reading and applying theorems, examining proofs for understanding, and constructing her own proofs.

Prerequisite(s): MT-253 completed or Math Placement Level 4 completed.

MT-350 Differential Equations (3 credits)

Offered Spring Term only in alternate years. The student learns about differential equations as descriptions of changing phenomena. She studies solutions from several perspectives, surveying basic analytic methods for solving differential equations, learning to use graphical and qualitative approaches to analyze behavior of solutions, and using the computer to obtain numerical solutions. She works to interpret mathematical results in realistic contexts.

Prerequisite(s): Math Placement level 4 or MT-253 completed.

MT-374 Math Assessment in Effective Citizenship (0 credits)

Mathematics Assessment in Effective Citizenship

Prerequisite(s): MT Major; Effective Citizenship Level 3 completed.

MT-397 Independent Study (0 credits)

Under the approval and direction of a faculty member, independent study is available to students.

MT-399 Formal Introduction to Advanced Work (0 credits)

Course Offered Fall Term only. The Advanced-Level Event marks a significant accomplishment for each student as she proceeds into the work of her major department. When a department determines that a student is ready for advanced work within a discipline, the student is invited to participate in a ceremony that is both a celebration and an explanation of future requirements of the major and support areas. She registers for this experience at a point determined by her major department: for most majors the registration is connected to the taking of a particular course. Students and faculty gather for an afternoon during Mid-semester Assessment Days. Following a general program, students meet in departmental sessions with their faculty to discuss advanced outcomes, department courses, advising procedures, and so on.

Prerequisite(s): MT-253 completed or concurrent

MT-420 Axiomatic Systems (3 credits)

Offered Fall Term in alternate years. The student learns about the structure and scope of mathematical axiom systems in the context of modern geometries. She expands her analytic-thinking and problem-solving abilities as she reads, understands, and writes mathematical theorems and their proofs.

Prerequisite(s): Math Placement Level 4 or MT-221 completed.

MT-445 Advanced Topics-Math Elementary Tchg (3 credits)

Course Offered Fall Term only. The mathematics education student develops an in-depth understanding in the area of algebraic thinking, with emphasis given to proportional reasoning. Other middle-school mathematics topics, such as geometry in two and three dimensions and probability and statistics, may be studied. The historical development of the elementary and middle school curriculum is examined, with emphasis on the teaching, learning, and assessment processes highlighted in local, state, and national standards documents.

Prerequisite(s): Praxis 1/Core, MT-243 & MT-244 completed. MT-148 or Math placement Level 3 or higher completed.

MT-449 Mathematical Portfolio (1 credit)

Students will prepare a portfolio that demonstrates that they have met the outcomes for the mathematics major. Students will meet with the mathematics faculty to discuss their portfolio.

Prerequisite(s): Taken by Mathematic Majors in their second to last semester.

MT-460 Introduction to Real Analysis (3 credits)

Offered Spring Term in alternate years. In this course, the student studies functions of real variables from an advanced viewpoint. She examines the concepts of sequence, limit, continuity, and derivative in a mathematically rigorous setting. She gains experience in mathematical thinking and writing, developing an appreciation of the nature and role of mathematical proof.

Prerequisite(s): Math Placement Level 4 or MT-253 completed.

MT-491 Seminar: Mathematical Thinking (2 credits)

Offered in alternate years. The student, in consultation with the instructor, selects an advanced topic or mathematical problem for in-depth research. She reports her finding in a formal presentation.

Prerequisite(s): MT-123 completed. MT-256 or MGT-250 or BSC-257 completed or Math Placement level 2 completed.

MT-492 Senior Seminar (2 credits)

Senior Seminar in Math

MT-497 Independent Study (4 credits)

Under the approval and direction of a faculty member, independent study is available to students.