Courses

MTH 050 Cr.3
Basic Algebra
A review of beginning algebra. Topics include an elementary treatment of real numbers, polynomials, linear equations, inequalities, rational expressions, systems of linear equations, radicals, and quadratic equations. Letter grade, but only "F" calculated in GPA. Transcript credit only. Offered Fall, Spring.

MTH 051 Cr.2
Topics in Intermediate Algebra
A course to enhance the student's skills in selected areas of intermediate algebra; areas covered include polynomials, rational expressions, exponents, equations, and inequalities. Letter grade, but only "F" calculated in GPA. Transcript credit only. Prerequisite: MTH 050 or an appropriate placement test score. Offered Fall, Spring.

MTH 123 Cr.4
Mathematics for Decision Making
This course is designed to teach students the mathematical skills needed for decision making in the 21st century. Topics for this course include set theory, syllogisms and fallacies, counting and probability, financial mathematics, and statistical concepts. Prerequisite: STAT 045 or MTH 050 or an appropriate placement test score. Offered Fall, Spring.

MTH 135 Cr.4
Mathematics for Elementary Teachers I
This course is designed for prospective elementary teachers. Content strands include number and operations and algebra and functions. Number and operations topics include set theory and pre-number concepts, place-value and numeracy, multiple representations and algorithms for arithmetic, number theory (e.g. divisors, multiples), and proportional reasoning. Algebra and functions topics include the concepts of variable and function, algebraic thinking, linear, polynomial, rational, and exponential functions, mathematical models, rates of change, and multiple representations of relations. Aligned with state and national standards, this course will emphasize problem solving, communication, reasoning, and representation in mathematics. Prerequisite: MTH 050 or satisfactory placement test score; EC/MC or MC/EA major. Offered Fall, Spring.

MTH 136 Cr.4
Mathematics for Elementary Teachers II
This course is designed for prospective elementary teachers. Content strands include geometry and measurement, data analysis and statistics, and probability and discrete math. Topics from these strands include: properties of geometric figures, geometric measurement (length, area, volume), congruence and similarity, and transformations; descriptive statistics, sampling design and statistical comparisons, randomness and variability, inferential statistics (including the normal distribution); counting techniques, uniform and nonuniform distributions, and representations and calculations of probabilities for simple and compound events. Aligned with state and national standards, this course will emphasize problem solving, communication, reasoning, and representation in mathematics. Prerequisite: MTH 135 with a grade of "C" or better. Offered Fall, Spring.

MTH 150 Cr.4
College Algebra
A college algebra course on the properties, graphs, and applications of elementary functions. Topics include the real and complex numbers, concepts from analytic geometry, solutions to equations and inequalities, the elementary algebraic functions, and the logarithmic and exponential functions. Prerequisite: MTH 051 or two years of high school algebra and an appropriate placement test score. (Successful completion of MTH 151, MTH 175, or MTH 207 precludes taking MTH 150 for credit.) Offered Fall, Spring, Summer.

MTH 151 Cr.4
Precalculus
A precalculus course on properties, graphs, and applications of elementary transcendental functions. Topics include concepts from analytic geometry; theory of equations; the logarithmic, exponential, trigonometric, and inverse trigonometric functions; and analytic trigonometry. Prerequisite: grade of "C" or better in MTH 150 or two years of high school algebra and appropriate placement test score. (Successful completion of MTH 151 precludes taking MTH 150. Successful completion of MTH 207 precludes taking MTH 151.) Offered Fall, Spring, Summer.

MTH 171 Cr.3
Geometry for Elementary and Middle School Teachers
This course explores the fundamental ideas of measurement and geometry concepts in K-8 mathematics. Content includes the investigation of measurement concepts; the analysis and classification of two- and three-dimensional geometric figures; and the exploration and application of geometric transformations, tessellations, symmetry, congruence, and similarity. Aligned with national and state standards, this course will emphasize intuitive direct and indirect proof and reasoning, the investigation and discovery of geometric structures, and the use of manipulative materials and technology. Prerequisite: grade of "C" or better in MTH 135 and MTH 136. Offered Fall.

MTH 175 Cr.4
Applied Calculus
Basic concepts and methods from differential and integral calculus. Logarithmic and exponential functions are included, but not trigonometric functions. Emphasis of the course is on models and applications in business and the social, life, and physical sciences. Prerequisite: grade of "C" or better in MTH 150 or two years of high school algebra and appropriate placement test score. (Successful completion of MTH 175 precludes taking MTH 150. Successful completion of MTH 207 precludes taking MTH 175.) Offered Fall, Spring, Summer.

MTH 207 Cr.5
Calculus I
A rigorous introduction to calculus. Topics include limits, rules for differentiation, derivatives of trigonometric, logarithmic and exponential functions, the Mean Value Theorem, integration, and the Fundamental Theorem of Calculus. In the area of applications, the course covers problems on related rates, extrema, areas, volumes, and Newton's Second Law. Prerequisite: grade of "C" or better in MTH 151 or four years of high school mathematics, including trigonometry, and appropriate placement score. (Successful completion of MTH 207 precludes taking MTH 150, MTH 151, or MTH 175 for credit.) Offered Fall, Spring, Summer.
+MTH 208 Cr.4  
**Calculus II**  
A continuation of Calculus I with a rigorous introduction to sequences and series. Topics include techniques of integration and indeterminate forms, improper integrals, applications of integrals to the physical sciences, tests for the convergence of series, absolute convergence, power series, and Taylor's Theorem with Remainder. First order linear differential equations are explored, as well as the geometry of space. Prerequisite: grade of "C" or better in MTH 207. Offered Fall, Spring.

MTH 225 Cr.4  
**Foundations of Advanced Mathematics**  
An introduction to mathematical reasoning. Mathematical logic, including quantification and the predicate calculus is introduced and used to discuss set theory, relations, functions, counting, graphs, and algorithms. Elementary proofs, including proofs by induction are stressed. Prerequisite: grade of "C" or better in MTH 175 or MTH 207. Course not open to those who have credit in CS 225. Offered Fall, Spring.

+MTH 265 Cr.4  
**Mathematical Models in Biology**  
An introduction to the use of calculus and stochastic based models to the biological sciences. Mathematical tools such as discrete and continuous differential equations, linear algebra, phase portraits, probability theory and descriptive and inferential statistics that are necessary to analyze and interpret biological models will be covered. Biological topics may include single species and interacting population dynamics, modeling infectious diseases, enzyme kinetics, and quantitative genetics. Prerequisite: grade of "C" or better in MTH 175 or MTH 207. Offered Spring.

MTH 280 Cr.3  
**Algebraic Reasoning and Problem Solving**  
A study of the mathematical processes and techniques that are used to solve a variety of routine and non-routine problems encountered in school mathematics. Emphasis is on communicating logical arguments, applying a variety of problem solving strategies, and developing mathematical models. Topics include investigations in number and algebraic relationships appropriate to the elementary and middle school classroom. Prerequisite: grade of "C" or better in MTH 135 and MTH 136. Offered Spring.

MTH 299 Cr.1  
**Mathematics and Statistics Tutor Training Practicum**  
This course is designed to offer training and supervision for tutors in the Murphy Learning Center. The course will include an overview of peer tutoring and learning theory, an overview of the general tutoring process, and an examination of best practices for tutoring various client populations. Students will develop a reflective tutoring practice based on readings and course discussions. The course must be taken during the student's first year of employment in the Learning Center. Failure to complete the course will result in termination from the Learning Center. Students who repeat the course will engage more deeply with the content and provide meaningful insights for their peers. Repeatable for credit - maximum three. Consent of instructor. Pass/Fail grading. Offered Fall, Spring.

MTH 309 Cr.4  
**Linear Algebra with Differential Equations**  
A systematic study of linear algebra, and its interactions with differential equations. Topics include: vectors, matrices, systems of linear equations, determinants, vector spaces, subspaces, basis and dimension, linear transformations and their matrix representations, similar matrices and diagonalization, systems of first order linear differential equations, and higher order linear differential equations. Prerequisite: grade of "C" or better in MTH 208. Offered Fall, Spring.
MTH 353 Cr.3

Differential Equations
A first course on the modern study of differential equations including mathematical modeling and numerical solutions. Topics include the formulation of differential equations and interpretation of solutions, fundamental existence and uniqueness theory, first-order linear and separable equations, a dynamical systems approach to linear and nonlinear first order systems, numerical methods and qualitative analysis, and Laplace transforms. Applications and modeling of real world phenomena will be integrated throughout. Prerequisite: grade of "C" or better in MTH 309 and MTH 310. Offered Fall, Spring.

MTH 362 Cr.3

Complex Variables
Introduction to complex numbers and functions of one complex variable. Topics include Cauchy–Riemann equations, Cauchy integral formula, power series, contour integrals, the residue calculus, conformal maps and applications. Prerequisite: grade of "C" or better in MTH 309 and MTH 310. Offered Spring - Even Numbered Years.

MTH 371 Cr.3

Numerical Methods
This course introduces students to the formulation, methodology, and programming techniques for numerical solution of problems in science and engineering. Topics covered include: fundamental principles of digital computing, idea of approximation, algorithm accuracy and stability, the numerical solution of linear and nonlinear equations, numerical interpolation, differentiation and integration, spline functions, fundamentals of finite-difference solutions to ordinary differential equations, and error and convergence analysis. Optional topics include least-square method, Fourier series, Monte Carlo methods and linear programming. Prerequisite: CS 120; grade of "C" or better in MTH 309. Offered Spring.

MTH 395 Cr.1-3

Special Topics in Mathematics
Special topics in mathematics not covered by regular courses taught in this department. The particular topic is decided mutually by the student and instructor. Repeatable for credit - maximum six. Consent of department. Offered Occasionally.

MTH 407 Cr.3

Real Analysis I
This course covers the basic theory underlying the differential and integral calculus. Convergence of sequences is examined. Theoretical concepts of calculus are examined and particular attention is given to writing proofs. Prerequisite: grade of "C" or better in MTH 225 or CS 225; grade of "C" or better in MTH 309 and MTH 310. Offered Fall.

MTH 408 Cr.3

Real Analysis II
This course covers convergence of series and basic theory of power series. Further study of real analysis via selected topics such as the theory of convergence, Lebesque-Stieltjes integration, Fourier Analysis, probability theory, approximation theory and metric spaces. Prerequisite: grade of "C" or better in MTH 407. Offered Spring - Odd Numbered Years.

MTH 411 Cr.3

Abstract Algebra I
A rigorous approach to algebraic systems including the study of groups, rings, integral domains and fields with application to polynomials. Prerequisite: grade of "C" or better in MTH 225 or CS 225; grade of "C" or better in MTH 309. Offered Fall, Spring.

MTH 412 Cr.3

Abstract Algebra II
Continuation of MTH 411. Further study of rings, integral domains and fields. Prerequisite: grade of "C" or better in MTH 411. Offered Spring - Even Numbered Years.

MTH 415 Cr.3

Topology
An introduction to the study of topological spaces and their structure-preserving (continuous) functions. We develop concepts from point-set topology including methods of construction of topological spaces, continuity, connectedness, compactness, and Hausdorff condition. Prerequisite: grade of "C" or better in MTH 225 or CS 225, MTH 309, and MTH 310. Offered Spring.

MTH 421 Cr.4

Teaching and Learning Mathematics and Computer Science in the Secondary School
This course will be integrated with a field experience. In the context of a real classroom, teacher candidates will learn how to plan for and assess student learning in mathematics and computer science. With a focus on content knowledge, teacher candidates will plan a variety of meaningful learning experiences, assess student learning, and monitor and modify instruction to best support the individual learners in the classroom. The teacher candidate will design, enact, and assess activities that advance student understanding to more complex levels. Teacher candidates will gain experience in monitoring the obstacles and barriers that some students or groups of students face in school and learn how to design learning experiences to support all learners. Prerequisite: EDS 351; grade of "C" or better in MTH 321. Offered Fall, Spring.

MTH/PHY 461 Cr.3

Mathematical Physics
In depth study of topics from vector analysis, Fourier analysis and special functions with emphasis on modeling physical phenomena involving conservative fields, fluid flow, heat conduction, and wave motion. MTH 461 may be counted towards both a MTH and PHY major. Prerequisite: grade of "C" or better in MTH 353. (Cross-listed with MTH/PHY; may only earn credit in one department.) Offered Spring - Odd Numbered Years.

MTH 480 Cr.3

Studies in Applied Mathematics
Advanced studies of applications of mathematics and computation to solve problems and understand processes from a variety of fields (for example, industry, medicine and the physical and life sciences.) Requirements include an application/modeling project with a written report and class presentation. Prerequisite: grade of "C" or better in MTH 353. Offered Spring - Even Numbered Years.

MTH 495/595 Cr.1-3

Special Topics in Mathematics
Special topics in mathematics not covered by regular courses taught in this department, such as topology, set theory and advanced numerical analysis. The particular topic is decided mutually by the students and the instructor. Repeatable for credit - maximum six. Prerequisite: junior standing. Consent of department. Offered Occasionally.

MTH 498 Cr.1-3

Independent Study
Directed readings or presentation of material not available in formal departmental courses under the supervision of a faculty member. Registration by written consent of supervising faculty member and department chair. Repeatable for credit - maximum six. Consent of department. Offered Occasionally.
MTH 499 Cr.1-3

Research Topics
An opportunity to pursue individual research topics under the direction of a faculty member. Depending on the nature of the research project, study is expected to involve substantial computational or theoretical work in addition to literature review and instruction. In addition to a written report to the supervising faculty member, expected outcomes may include: software, papers and presentations to the department and regional meetings. Not applicable to a mathematics major or minor. Registration by written consent of supervising faculty member. Repeatable for credit - maximum six. Consent of department. Offered Occasionally.