The Department of Mathematics offers a broadly based curriculum that includes a variety of mathematical areas, both traditional and contemporary. With a strong commitment to quality undergraduate education and research, we seek to develop individuals who can enjoy productive careers in business, government, industry, research and education at all levels.

A student may not take a course required for a mathematics major unless a grade of "C" or above has been earned in prerequisite courses.

It is recommended that majors complete MTH 1321 Calculus I, MTH 1322 Calculus II, MTH 2311 Linear Algebra, MTH 2321 Calculus III, and MTH 3300 Foundations of Mathematics within their first two years.

Students planning to go to graduate school in mathematics should include MTH 4326 Advanced Calculus I, MTH 4327 Advanced Calculus II, MTH 4314 Abstract Algebra, and MTH 4316 Linear Algebra and Matrix Theory in their course of study.


Mathematics (MTH)

MTH 1220 Algebra Review (2)
Algebra review for students who need to take MTH 1320 (pre-calculus) but are not ready for MTH 1320. Topics include solving equations and inequalities, polynomials, rational functions, exponential functions, and logarithms. Begins 5 weeks into the semester. Does not apply on major. Does not satisfy the mathematics requirement for any degree.

MTH 1301 Ideas in Mathematics (3)
Significant ideas of mathematics. Topics will be chosen from: voting theory, apportionment, financial analysis, linear and exponential growth, statistics and opinion polls. Designed primarily for liberal arts students. Does not apply toward the major.

MTH 1308 Precalculus for Business Students (3)
A study of the types of function that arise in business calculus, including linear, quadratic, and other polynomial functions, rational functions, and exponential and logarithmic functions. Does not apply on the Arts and Sciences mathematics requirement nor on a mathematics major. Credit may not be received after receiving credit in MTH 1320.

MTH 1309 Calculus for Business Students (3)
Prerequisite(s): A grade of C or better in MTH 1320 or MTH 1308 or a satisfactory performance on the SAT or RSAT or the ACT or the ALEKS. Differentiation of rational, exponential, and logarithmic functions of one and several variables, integration of functions of one variable, applications to business problems. Does not apply on the major. Credit may not be received after receiving credit in MTH 1321.

MTH 1315 Patterns, Relationships, and Number Concepts (3)
Pre-requisite(s): School of Education Curriculum and Instruction majors only
Advanced perspectives on topics taught in grades EC-8 including number concepts, patterns, and functions. Does not satisfy the liberal arts mathematics requirement and does not apply toward the mathematics major.

MTH 1316 Geometry and Measurement (3)
Pre-requisite(s): A grade of C or above in MTH 1315
A continuation of MTH 1315. Topics in MTH 1316 will be geometric figures, motions of geometry, and measurement. Does not apply toward the mathematics major.

MTH 1320 Precalculus Mathematics (3)
Pre-requisite(s): Either a score of 61 or better on the ALEKS; or a satisfactory score on either the RSAT Math, SAT Math, or ACT Math Basic concepts of college algebra, trigonometry, and elementary functions and an introduction to limits. Satisfactory performance on a department examination. Designed as preparation for MTH 1321; does not apply on the major.

MTH 1321 Calculus I (3)
Pre-requisite(s): Either MTH 1320 with a grade of B- or better; or a score of 80 or better on the ALEKS; or a satisfactory score on either the RSAT Math, SAT Math, or ACT Math
Differential calculus of a single variable. Introduction to the definite integral and the Fundamental Theorem of Calculus.

MTH 1322 Calculus II (3)
Pre-requisite(s): A grade of C or above in MTH 1321
Integral calculus of a single variable, differential equations, slope fields, and power series.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Pre-requisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTH 2311</td>
<td>Linear Algebra</td>
<td>A grade of C or above in MTH 1322</td>
</tr>
<tr>
<td></td>
<td>Vectors, matrix operations, linear transformations, fundamental properties of vector spaces, systems of linear equations, eigenvalues, and eigenvectors.</td>
<td></td>
</tr>
<tr>
<td>MTH 2316</td>
<td>Algebra and Functions</td>
<td>A grade of C or above in MTH 1316 or concurrent enrollment</td>
</tr>
<tr>
<td></td>
<td>Designed for the prospective teacher seeking mathematics certification for grades 4-8. A study of the algebraic and transcendental functions which play a primary role in calculus. An emphasis will be placed on mathematical models which arise from lab-based activities, on connections to areas within and outside of mathematics, and on developing the ability to communicate mathematical ideas to individuals at various levels. Does not apply toward the mathematics major.</td>
<td></td>
</tr>
<tr>
<td>MTH 2317</td>
<td>Functions and the Mathematics of Change</td>
<td>A grade of C or above in MTH 2316</td>
</tr>
<tr>
<td></td>
<td>Designed for the prospective teacher seeking mathematics certification for grades 4-8. A continuation of MTH 2316. An investigation of the derivative and integral from an algebraic, geometric, and numerical perspective. Credit may not be received after completion of MTH 1321. Does not apply toward the mathematics major.</td>
<td></td>
</tr>
<tr>
<td>MTH 2321</td>
<td>Calculus III</td>
<td>A grade of C or above in MTH 1322</td>
</tr>
<tr>
<td></td>
<td>Differential and integral calculus of several variables, Green's Theorem.</td>
<td></td>
</tr>
<tr>
<td>MTH 2V90</td>
<td>Introduction to Research in Mathematics</td>
<td>Consent of Instructor</td>
</tr>
<tr>
<td></td>
<td>Beginning independent study or research in topics not available in other courses. May be repeated for a maximum of 3 hours.</td>
<td></td>
</tr>
<tr>
<td>MTH 3300</td>
<td>Foundations of Mathematics</td>
<td>A grade of C or above in MTH 1321</td>
</tr>
<tr>
<td></td>
<td>Core concepts of advanced mathematics: proofs, induction, sets, functions, equivalence relations, divisibility, modular arithmetic, real numbers, sequences and limits.</td>
<td></td>
</tr>
<tr>
<td>MTH 3312</td>
<td>Foundations of Combinatorics and Algebra</td>
<td>A grade of C or above in MTH 3300 or departmental consent required</td>
</tr>
<tr>
<td></td>
<td>Elementary counting principles, fundamental properties of the integers, the ring of integers modulo n, rings of polynomials, and an introduction to groups, rings and fields.</td>
<td></td>
</tr>
<tr>
<td>MTH 3318</td>
<td>Data and Chance</td>
<td>A grade of C or above in MTH 1316</td>
</tr>
<tr>
<td></td>
<td>Designed for the prospective teacher seeking an EC-4 mathematics certification. Core ideas from probability and statistics, including collection of data, patterns in data, and inference from data, in an active lab-like environment. Credit may not be received after completion of MTH 2381 or MTH 3381. Does not apply toward the mathematics major.</td>
<td></td>
</tr>
<tr>
<td>MTH 3323</td>
<td>Introduction to Analysis</td>
<td>A grade of C or above in MTH 2321 and MTH 3300</td>
</tr>
<tr>
<td></td>
<td>A rigorous treatment of the real number system, sequences of real numbers, limits, continuous functions, and elements of differentiation and integration.</td>
<td></td>
</tr>
<tr>
<td>MTH 3324</td>
<td>Numerical Methods</td>
<td>Cross-listed as CSI 3324</td>
</tr>
<tr>
<td></td>
<td>See CSI 3324 for course information.</td>
<td></td>
</tr>
</tbody>
</table>
MTH 3374  Introduction to Mathematical Modeling  (3)
Pre-requisite(s): A grade of C or above in MTH 1322 or in both MTH 2317 and 3318
An introduction to the process of mathematical modeling, including problem identification, model construction, model selection, simulation, and model verification. Individual and team projects.

MTH 3V90  Advanced Undergraduate Research in Mathematics  (1-3)
Pre-requisite(s): Consent of instructor
Advanced independent study or research in topics not available in other courses. May be repeated for a maximum of 3 hours.

MTH 3V9R  Research  (3)
Pre-requisite(s): Consent of the instructor
Undergraduate research undertaken with the supervision of a faculty member. May be taken for a maximum of 6 hours.

MTH 4312  Cryptology  (3)
Pre-requisite(s): A grade of C or above MTH 3300 or CSI 2350; or consent of instructor
Introduction to cryptology, the study of select codes and ciphers. Included is a historical context, a survey of modern crypto systems, and an exposition of the role of mathematical topics such as number theory and elliptic curves in the subject. Mathematical software will be available.

MTH 4313  Number Theory  (3)
Pre-requisite(s): A grade of C or above in MTH 3300 or consent of instructor
Algebraic number theory including linear Diophantine equations, distribution of primes, congruence, number theoretic functions, Euler's and Wilson's theorems, Pythagorean triples, Mersenne and Fermat primes, Fibonacci numbers, and sums of squares. Continued fractions, quadratic reciprocity, Mobius inversion, Bertrand's postulate, prime number theorem, and zeta function may also be included.

MTH 4314  Abstract Algebra  (3)
Pre-requisite(s): A grade of C or above in MTH 2311 and MTH 3312; or consent of instructor
Fundamentals of group, ring, and field theory. Topics include permutation groups, group and ring homomorphisms, direct products of groups and rings, quotient objects, integral domains, field of quotients, polynomial rings, unique factorization domains, extension fields, and finite fields.

MTH 4316  Linear Algebra and Matrix Theory  (3)
Pre-requisite(s): A grade of C or above in MTH 2311 and MTH 3300
Matrix calculus, eigenvalues and eigenvectors, canonical forms, orthogonal and unitary transformation, and quadratic forms. Applications of these concepts.

MTH 4322  Numerical Analysis  (3)
Cross-listed as CSI 4322
Numerical evaluation of derivatives and integrals, solution of algebraic and differential equations, and approximation theory.

MTH 4324  Systems of Ordinary Differential Equations  (3)
Pre-requisite(s): MTH 3325 and MTH 2311
A continuation of MTH 3325 with emphasis on systems of ordinary differential equations. Topics include matrix and first order linear systems of differential equations, eigenvalues and eigenvectors, two-dimensional autonomous systems, critical point analysis, phase plane analysis, Liapunov, stability theory, limit cycles and Poincare-Bendixson theorem, periodic solutions, perturbation methods, and some fixed point theory.

MTH 4326  Advanced Calculus I  (3)
Pre-requisite(s): A grade of C or above in MTH 2321 and MTH 3323 or consent of instructor
The real and complex number systems, basic topology, numerical sequences and series, continuity, differentiation, integration, sequences and series of functions.

MTH 4327  Advanced Calculus II  (3)
Pre-requisite(s): A grade of C or above in MTH 4326
Line and surface integrals, Green, Gauss, Stokes theorems with applications, Fourier series and integrals, functions defined by integrals, introduction to complex functions.

MTH 4328  Numerical Linear Algebra  (3)
Cross-listed as CSI 4328
Pre-requisite(s): A grade of C or above in MTH 2311
Numerical methods for solution of linear equations, eigenvalue problems, and least squares problems, including sparse matrix techniques with applications to partial equations.

MTH 4329  Theory of Functions of a Complex Variable  (3)
Pre-requisite(s): A grade of C or above in MTH 2321
Number systems: the complex plane; fractions, powers, and roots; analytic functions; elementary functions; complex integration; power series; mapping by elementary functions; calculus of residues.

MTH 4343  Topics in Mathematics for Prospective Teachers  (3)
Pre-requisite(s): A grade of C or above in MTH 3312, 3323, or 3350
Prospective middle and secondary school mathematics teachers engage in an in-depth analysis of mathematical topics encountered in the middle and secondary curriculum. Does not apply toward the mathematics major.

MTH 4375  Linear Programming  (3)
Pre-requisite(s): A grade of C or above in MTH 2311 and 3370
An introduction to the theory and applications of linear programming, including the simplex algorithm, duality, sensitivity analysis, parametric linear programming, and integer programming, with applications to transportation, allocation problems, and game theory.

MTH 4V90  Topics in Mathematics  (1-3)
Pre-requisite(s): Consent of instructor
Topics in contemporary mathematics not covered in other courses. May be repeated once for credit if content is different.

MTH 4V9R  Research  (3)
Pre-requisite(s): Consent of the instructor
Undergraduate research undertaken with the supervision of a faculty member. May be taken for a maximum of 6 hours.