MATHEMATICS

The major in mathematics prepares students for a variety of careers through a balance of theoretical and practical coursework. Theoretical study begins with discrete mathematics and continues through linear algebra, algebraic structures, real analysis, topics in mathematics, and foundations of mathematics. Problem-solving and mathematical modeling skills are honed through the calculus sequence of courses, differential equations, probability and statistics, numerical methods, and operations research. Practical computing skills are developed by using advanced software in many courses and through introductory programming courses. Students who wish to teach mathematics in grades 5-12 may also include coursework designed specifically to satisfy state licensure requirements. Electives and advising are available for students preparing for graduate school or for math-oriented careers such as the actuarial sciences.

Advanced Placement: The math department requires a score of 4 or better on the AP exam in order for the exam to be used to fulfill course requirements in the majors and minors it offers. Students with a score of 3 will receive elective credit or receive credit toward General Education requirements. Students should consult the department chair with questions on AP exams and requirements for majors.

Majors in Mathematics
- B.A. in Mathematics (http://catalog.bethel.edu/academics/catalog/2015-2016/arts-sciences/academic-programs-departments/mathematics/mathematics-ba)
- B.A. in Mathematics with Education 5-12 Licensure (http://catalog.bethel.edu/academics/catalog/2015-2016/arts-sciences/academic-programs-departments/mathematics/mathematics-ba-education-5-12-licensure)

Minor in Mathematics

MAT101M • Mathematics for the 21st Century. 3 Credits.
Mathematical ideas that a liberally educated person should be familiar with in order to function well in a technological society.
Prerequisites: Two years of high school algebra, including logarithms and exponential functions. Offered: Fall, spring.

MAT102M • Creative Problem Solving. 3 Credits.
An opportunity to learn to use creative thinking and intuition to gain confidence in understanding and solving some intriguing problems in mathematics.
Prerequisites: High school algebra and geometry. Offered: Interim.

MAT123M • Precalculus. 3 Credits.
Mathematics topics required for MAT124M or for further study in the natural sciences. Equations and inequalities; graphs of functions and relations; polynomial, rational, exponential, logarithmic functions; trigonometric functions, identities, equations, and applications.
Prerequisites: Two years of high school algebra; satisfy math department placement requirements. Offered: Fall, spring.

MAT124M • Calculus 1. 4 Credits.
A mathematical foundation for future college courses and beyond. An introduction to the concepts and methods of the derivative and the integral, and a demonstration of how they are applied in real-world modeling situations. Topics are examined graphically, numerically, and algebraically, including using a symbolic computer algebra system to aid with understanding.
Prerequisites: MAT123M or equivalent high school or college course(s); satisfy math department placement requirements. Offered: Fall, spring.

MAT125 • Calculus 2. 4 Credits.
A continuation of the equipping of students with tools for effective problem solving. Study of integration, sequences and series, and introduction to differential equations and approximation techniques. Each topic is approached from several viewpoints (graphical, numerical, algebraic) to involve students with different learning styles.
Prerequisites: MAT124M. Offered: Fall, spring.

MAT201M • Mathematics for Elementary Education 1. 3 Credits.
Introduction to problem solving; patterns and sequences; systems of numeration; sets and logic; concepts, operations, and algorithms for each subset of the real numbers; elementary number theory; concepts and applications of ratios, proportions, and percents.
Prerequisites: Major in elementary education; passing score on the MAT201M pre-test, a score of at least 23 on the math portion of the ACT, or a score of at least 519 on the math portion of the SAT. Offered: Fall, spring. Special Notes: MAT201M may not be used to fulfill the requirements for a major or minor in mathematics.

MAT202 • Mathematics for Elementary Education 2. 3 Credits.
Problem-solving and reasoning strategies; algebraic expressions, equations, and functions; data analysis, statistics, combinations/permutations, and probability; concepts and applications of two- and three-dimensional geometry and measurement.
Prerequisites: Grade of C or higher in MAT201M. MAT202 may not be used to fulfill the requirements for a major or minor in mathematics. Offered: Fall, spring.
MAT207M • Statistical Analysis. 3 Credits.
Offered: Fall, interim, spring. Special Notes: Students may not receive credit for both MAT207M and PSY230M.

MAT211 • Linear Algebra. 3 Credits.
Linear systems, matrices, vectors and vector spaces, linear transformations, inner products, norms, eigenvalues and eigenvectors, orthogonality, and applications. Provides a foundation for many areas of study in mathematics, computer science, engineering, and science. 
Prerequisites: MAT125 or MAT241. Offered: Spring.

MAT222 • Differential Equations. 3 Credits.
Prerequisites: MAT212. MAT223 strongly recommended. Offered: Spring.

MAT223 • Multivariable Calculus. 3 Credits.
Differential calculus of real functions on Rn: limits, continuity, partial and directional derivatives, mean value theorem, implicit functions, Taylor's Theorem, and optimization techniques (including Lagrange multipliers). Multiple integral theory: change of variables, iterated integrals, and line integration (Green's Theorem). 
Prerequisites: MAT125. Offered: Fall, spring.

MAT241 • Discrete Mathematics. 3 Credits.
Covers a collection of topics useful to mathematics and computer science majors. The unifying factor is that the topics deal mainly with finite collections of mathematical objects (graphs, trees, finite state machines, etc.). Also includes examination of sets, logic, Boolean algebras, proof techniques, algorithm analysis, counting, and recursion. 
Prerequisites: MAT124M. Offered: Fall.

MAT310 • Algebraic Structures. 4 Credits.
Study of groups, rings, fields, and applications of these algebraic structures from a firm axiomatic foundation with a strong emphasis on properly written proofs.  
Prerequisites: MAT211. Offered: Spring.

MAT330 • Probability and Statistics. 3 Credits.
Discrete and continuous probability spaces, distribution and density functions, random variables, sampling, expectation, estimation, and hypothesis testing. 
Prerequisites: MAT125. Offered: Fall.

MAT331 • Applied Statistics. 3 Credits.
Linear and multilinear regression. Factor analysis, including analysis of variance and experimental design.  
Prerequisites: MAT330 or consent of instructor. Offered: Spring, even # years.

MAT344 • Numerical Methods. 3 Credits.
Numerical methods for solving systems of linear equations, finding roots and fixed points, approximating data and functions, numerical integration, finding solutions to differential equations. 
Prerequisites: MAT211 or MAT222. Recommended: COS105 or COS205. Offered: Fall. Special Notes: Carries cross-credit in computer science.

MAT351 • Modern Geometry. 3 Credits.
A survey of informal and formal geometric topics. Investigation of concepts, structure, proof, Euclidean, non-Euclidean, and transformational geometry. 
Prerequisites: MAT241 or consent of instructor. Offered: Fall, even # years. Special Notes: Designed for students seeking licensure to teach math in grades 5-12.

MAT376 • Operations Research. 3 Credits.
Mathematical techniques used in systems analysis, including linear programming, simulation techniques, and other topics such as transportation models, integer programming, and network analysis. 
Prerequisites: COS105 or COS205, MAT211. Offered: Fall, odd # years.

MAT422 • Real Analysis. 3 Credits.
Elementary set theory, properties of real numbers, functions of real variables, sequences, series, Riemann and Stieltjes integration, and introduction to normed linear spaces. 
Prerequisites: MAT223; MAT310. Offered: Fall.

MAT425 • Topics in Mathematics. 3 Credits.
A seminar designed to provide an in-depth experience with a specific field of mathematics. Topics vary from semester to semester and include logic, number theory, dynamical systems, chaos and fractals, complex analysis, partial differential equations and Fourier analysis, intermediate probability and statistics, combinations, and topology.  
Corerequisites: MAT310 or consent of instructor.Offered: Spring, odd # years.
MAT499 • Foundations of Mathematics. 3 Credits.
A short history of mathematics’ major transition points, overview of foundations of mathematics, axiomatic structures, and philosophies of mathematics.

Prerequisites: Major in mathematics; senior standing. Offered: Interim.