MATHEMATICS (MATH)

MATH 102 - Fundamental Concepts of Modern Mathematics, 4 credits.
Numeration, number systems, geometry and other topics addressed in the elementary school curriculum. Required for students majoring in elementary education.
Frequency: *Every Year - Second Semester*

MATH 105 - Exploring Mathematics, 4 credits.
This course uses real-world problems and situations to improve students' problem-solving skills, to improve their ability to apply mathematics, and to enhance their appreciation of the importance of mathematics in our modern world. Topics will be chosen from voting theory, number theory, taxicab geometry, graph theory, probability, statistics, and financial mathematics. This course can be used to fulfill the math exploration requirement.
Frequency: *Every Semester*
Core designations: Mathematics K

MATH 110 - Precalculus, 4 credits.
A study of the function concept and properties of the polynomial, exponential, logarithmic and trigonometric functions. Prerequisites: high school geometry and higher algebra
Frequency: *Every Semester*
Core designations: Mathematics K

MATH 121 - Calculus I, 4 credits.
An introduction to the concepts of limits, continuity, derivatives and antiderivatives and their applications, and an introduction to the Riemann integral and integration techniques, including by substitution. Some review of trigonometry and analytic geometry is included.
Frequency: *Every Semester*
Core designations: Mathematics K

MATH 122 - Calculus II, 4 credits.
Applications of the definite integral, techniques of integration, parametric equations, introduction to differential equations, sequences, series and Taylor and Maclaurin Series.
Frequency: *Every Semester*
Prerequisites: MATH 121
Core designations: Mathematics K

MATH 203 - Finite Mathematics, 4 credits.
The course examines combinatorics, probability, descriptive and inferential statistics, linear programming, and mathematics of finance. Prerequisite: high school higher algebra
Frequency: *Every Semester*
Core designations: Mathematics K

MATH 205 - Introduction to Statistics, 4 credits.
This is an introductory course in statistical methods for science and mathematics students. The object of this course is to provide students with a conceptual introduction to the field of statistics, including the determination of the appropriate procedures for data analysis and the proper interpretation of results. Statistical significance and confidence intervals will be explored, along with statistical modeling through regression, ANOVA, and chi-squared techniques. The theory will be illustrated by examples from the life, health, and social sciences. Prerequisite: high school higher algebra. This course can also count toward the environmental and sustainability studies program.
Frequency: *Every Semester*
Core designations: Mathematics K

MATH 207 - Discrete Mathematics, 4 credits.
Logic, sets, functions, sequences and series, matrices, algorithms, methods of proof, combinatorics, recurrence relations, linear programming, graphs and trees.
Frequency: *Every Year - Second Semester*
Prerequisites: MATH 121
Core designations: Mathematics K

MATH 215 - Introduction to Probability and Statistics, 2 credits.
Basic concepts of data analysis, randomness and uncertainty required for elementary mathematics specialization. Topics include: data collection, exploratory data analysis, measures of central tendency and spread, theoretical probabilities in simple and compound events, basics of experimental design, and evaluating predictions and arguments from data.
Frequency: *Alternate Years - 2nd Semester*
Prerequisites: MATH 102 or MATH 105

MATH 220 - Introduction to Geometry Concepts, 2 credits.
Basic geometry content for students seeking elementary mathematics specialization. Topics will include: deriving and describing shapes, characteristics of geometric objects, spatial reasoning with geometric models, elementary geometric transformations, analysis and presentation of geometric arguments, and measurement and estimation.
Frequency: *Alternate Years - 2nd Semester*
Prerequisites: MATH 102

MATH 223 - Calculus III, 4 credits.
Multivariable calculus and applications, line integrals, surface integrals. Green's Theorem, Stoke's Theorem and the Divergence Theorem.
Frequency: *Every Semester*
Prerequisites: MATH 122
Core designations: Mathematics K

MATH 250 - Pre-May Seminar, 2,4 credits.
An introduction to the art and science of mathematics, the axiomatic system that forms its foundation, the historical factors that have influenced its development, its close ties to astronomy, the sciences, art and religion; and its role in the development of Western culture.

MATH 300 - May Seminar, 4 credits.
Frequency: *Not offered on a Regular Basis*
Prerequisites: MATH 250
Core designations: International-Global Prspct G

MATH 310 - Linear Algebra, 4 credits.
Systems of linear equations, matrix algebra, determinants, abstract vector spaces, linear transformations, eigenvalues and eigenvectors, orthogonality, singular value decomposition.
Frequency: *Every Semester*
Prerequisites: MATH 122

MATH 311 - Differential Equations, 4 credits.
Differential equations and models, analytic and qualitative solutions, nth-order equations, linear systems, harmonic oscillators, Laplace transforms, initial and boundary value problems, bifurcation.
Frequency: *Every Year - Second Semester*
Prerequisites: MATH 122
Core designations: Mathematics K

MATH 312 - Applied Mathematics, 2 credits.
An introduction to Fourier and other methods for solving partial differential equations, including the heat, wave and potential equations and related boundary value problems.
Frequency: *Not offered on a Regular Basis*
Prerequisites: MATH 207 and MATH 223 and MATH 311
Core designations: Mathematics K

MATH 315 - Probability and Mathematical Statistics, 4 credits.
Introduction to the basic concepts in probability theory, including discrete and continuous probability functions, independence, random variables, order statistics, expected value, variance and moment generating functions. Specific attention given to normal, Poisson and geometric distributions, as well as estimation and estimators.
Frequency: *Every Year - First Semester*
Prerequisites: MATH 223
Core designations: Mathematics K

MATH 316 / DATA 316 - Applied Statistical Models, 4 credits.
An introduction to the construction and analysis of least-squares models, including multiple regression, ANOVA, ANCOVA, and mixed models. Generalized linear models will also be presented, with special attention paid to logistic regression and log-linear models. Examples and applications will be drawn from various disciplines, including biology, medicine, economics, engineering, and the social sciences.
Frequency: *Alternate Years - 2nd Semester*
Prerequisites: MATH 315 or MATH 205 or BUSN 320 or PSYC 230 or SOC 228 or DATA 200
Core designations: Mathematics K

MATH 320 - Geometry, 4 credits.
Euclidean, non-Euclidean, projective and other geometries as time permits.
Frequency: *Alternate Years - 2nd Semester*
Prerequisites: MATH 207
Core designations: Mathematics K

MATH 325 - Modern Algebra I, 4 credits.
Introduction to basic algebraic systems: groups, rings, integral domains and fields. Special attention is given to the ring of integers.
Frequency: *Every Year - First Semester*
Prerequisites: MATH 207
Core designations: Mathematics K

MATH 328 - Complex Analysis, 4 credits.
The algebra and geometry of complex numbers, elementary analytic functions, complex functions defined by power series, differentiation and integration of complex functions with selected applications.
Frequency: *Alternate Years - 2nd Semester*
Prerequisites: MATH 223
Core designations: Mathematics K

MATH 330 - Real Analysis I, 4 credits.
A proof-based course that covers-sets, real numbers, sequences and convergence, limits of functions, continuity and differentiability, the Riemann integral, infinite series, and sequences and series of functions.
Frequency: *Alternate Years - 2nd Semester*
Prerequisites: MATH 207 and MATH 223
Core designations: Mathematics K

MATH 335 / CSC 335 / SCM 335 - Operations Management/Research, 4 credits.
An introduction to the theory and practice of quantitative modeling and optimization, with applications to computer simulation and business resource management. Possible topics include linear and nonlinear programming, network analysis, game theory, deterministic and probabilistic models.
Frequency: *Every Year - First Semester*
Corequisites: PEAK 400
Core designations: Mathematics K
This course is PEAK Required

MATH 380 - Special Topics, 0-4 credits.
Courses covering various topics of interest in this particular discipline are offered regularly. Contact department or program chair for more information.
Frequency: *Not offered on a Regular Basis*
Repeatable: Yes

MATH 390 - Academic Internship, 1-8 credits.
Frequency: *Every Semester*
Repeatable: Yes

MATH 402 - Senior Seminar, 1 credits.
Required of all senior Group 2 mathematics majors (mathematics and education double majors seeking reaching licensure). Topics in mathematics history are discussed using the seminar format. With the guidance of faculty members, each student researches a topic and delivers an oral presentation on that topic. Prerequisite: senior standing in both mathematics and education, or permission of instructor.
Frequency: *Every Year - Second Semester*

MATH 425 - Modern Algebra II, 2 credits.
Further study of the basic algebraic systems introduced in MATH 325 - Modern Algebra I.
Frequency: *Not offered on a Regular Basis*
Prerequisites: MATH 325

MATH 430 - Real Analysis II, 2 credits.
Further study of topics listed under MATH 330 - Real Analysis I.
Frequency: *Not offered on a Regular Basis*
Prerequisites: MATH 330

MATH 480 - Independent Study, 1-4 credits.
This course provides an opportunity for individual students to conduct in-depth study of a particular topic under the supervision of a faculty member. A seminar on non-routine problems sometimes is conducted. Prerequisite: Consent of faculty. Contact the department or program chair for more information.
Frequency: *Every Semester*
Repeatable: Yes

MATH 487 - Directed Research, 1-4 credits.
This course provides an opportunity for individual students to conduct research in a specific area of study, completed under the direction of a faculty mentor. Specific expectations of the research experience to be determined by the faculty. Repeatable for credit. Prerequisite: consent of instructor.
Frequency: *Not offered on a Regular Basis*
Repeatable: Yes