

Mathematics (MATH)

Courses

MATH A054 Prealgebra 3 Credits

Covers operations and applications of whole numbers, integers, fractions, decimals, ratios and proportions, percents, geometry and measures, evaluation of algebraic expressions and applications.

Special Note: MATH A054A, MATH A054B, and MATH A054C combined are equivalent to MATH A054.

Registration Restrictions: An approved UAA placement test is required.

Prerequisites: ALEKS Overall Test 1 with a score of 0 or ALEKS Overall Test 2 with a score of 0 or ALEKS Overall Test 3 with a score of 0 or ALEKS Overall Test 4 with a score of 0 or ALEKS Overall Test 5 with a score of 0.

MATH A054A Prealgebra A 1 Credit

Includes operations and applications of whole numbers, integers, fractions, and decimals.

Special Note: MATH A054A, MATH A054B, MATH A054C combined are equivalent to MATH A054.

Registration Restrictions: An approved UAA placement test is required.

MATH A054B Prealgebra B 1 Credit

Includes ratios and proportions, percentages, exponents, and radicals.

Special Note: MATH A054A, MATH A054B, MATH A054C combined are equivalent to MATH A054.

Registration Restrictions: If the prerequisite is not satisfied, an approved UAA placement test is required.

Prerequisites: MATH A054A with a minimum grade of C or concurrent enrollment or ALEKS Overall Test 1 with a score of 06 or ALEKS Overall Test 2 with a score of 06 or ALEKS Overall Test 3 with a score of 06 or ALEKS Overall Test 4 with a score of 06 or ALEKS Overall Test 5 with a score of 06.

MATH A054C Prealgebra C 1 Credit

Includes evaluation of algebraic expressions with applications, geometry and measures.

Special Note: MATH A054A, MATH A054B, MATH A054C combined are equivalent to MATH A054.

Registration Restrictions: If the prerequisite is not satisfied, an approved UAA placement test is required.

Prerequisites: MATH A054B with a minimum grade of C or concurrent enrollment or ALEKS Overall Test 1 with a score of 12 or ALEKS Overall Test 2 with a score of 12 or ALEKS Overall Test 3 with a score of 12 or ALEKS Overall Test 4 with a score of 12 or ALEKS Overall Test 5 with a score of 12.

MATH A055 Elementary Algebra 3 Credits

Covers evaluating and simplifying algebraic expressions, polynomials, factoring, integer exponents, rational expressions, solutions of linear equations and inequalities, quadratic equations, and graphs of lines.

Special Note: MATH A055A, MATH A055B, and MATH A055C combined are equivalent to MATH A055.

Prerequisites: MATH A054 with a minimum grade of C or ALEKS Overall Test 1 with a score of 017 or ALEKS Overall Test 2 with a score of 017 or ALEKS Overall Test 3 with a score of 017 or ALEKS Overall Test 4 with a score of 017 or ALEKS Overall Test 5 with a score of 017.

MATH A055A Elementary Algebra A 1 Credit

Includes operations with real numbers and their basic properties, algebraic expressions, equations, and inequalities.

Special Note: MATH A055A, MATH A055B, MATH A055C combined are equivalent to MATH A055.

Registration Restrictions: If the prerequisite is not satisfied, an approved UAA placement test is required.

Prerequisites: MATH A054 with a minimum grade of C or concurrent enrollment or ALEKS Overall Test 1 with a score of 17 or ALEKS Overall Test 2 with a score of 17 or ALEKS Overall Test 3 with a score of 17 or ALEKS Overall Test 4 with a score of 17 or ALEKS Overall Test 5 with a score of 17.

MATH A055B Elementary Algebra B 1 Credit

Topics include graphing and interpreting graphs of linear equations, solving simple systems of equations, and operations with polynomials.

Special Note: MATH A055A, MATH A055B, MATH A055C combined are equivalent to MATH A055.

Registration Restrictions: If the prerequisite is not satisfied, an approved UAA placement test is required.

Prerequisites: MATH A055A with a minimum grade of C or concurrent enrollment or ALEKS Overall Test 1 with a score of 21 or ALEKS Overall Test 2 with a score of 21 or ALEKS Overall Test 3 with a score of 21 or ALEKS Overall Test 4 with a score of 21 or ALEKS Overall Test 5 with a score of 21.

MATH A055C Elementary Algebra C 1 Credit

Topics include factoring, rational expressions, and quadratic equations.

Special Note: MATH A055A, MATH A055B, MATH A055C combined are equivalent to MATH A055.

Registration Restrictions: If the prerequisite is not satisfied, an approved UAA placement test is required.

Prerequisites: MATH A055B with a minimum grade of C or concurrent enrollment or ALEKS Overall Test 1 with a score of 21 or ALEKS Overall Test 2 with a score of 21 or ALEKS Overall Test 3 with a score of 21 or ALEKS Overall Test 4 with a score of 21 or ALEKS Overall Test 5 with a score of 21.

MATH A060 Essential Mathematics 4 Credits

Teaches the concepts of basic arithmetic and introductory algebra. Topics include: operations and properties of real numbers, solving proportions and percentage problems, scientific notation, integers as exponents, solving and graphing linear equations and inequalities, operations on polynomials, factoring polynomials, solving quadratic equations by factoring, operations on rational expressions, solving rational equations, and solving elementary systems of two equations.

Special Note: Course content covers content presented in MATH A054 and MATH A055. Credit will not be given for both MATH A055 and MATH A060.

Prerequisites: ALEKS Overall Test 1 with a score of 10 or ALEKS Overall Test 2 with a score of 10 or ALEKS Overall Test 3 with a score of 10 or ALEKS Overall Test 4 with a score of 10 or ALEKS Overall Test 5 with a score of 10.

MATH A066 Math Bootcamp 1 1 Credit

Offers intensive review of entry level mathematics designed for students entering elementary or intermediate algebra, on a shortened timeline and designed to be taken immediately prior to a semester length math class.

Special Note: Student should intend to take a MATH class within a semester of taking this course. This course is meant to potentially place students into a higher level course or to increase the chances of success at the current placement. May be repeated twice for credit.

MATH A104 Technical Mathematics 3 Credits

Uses applications from various professions to explore proportions, reading data, geometric properties, and the use of exponential and trigonometric functions with an emphasis on recognizing mathematical relationships and using mathematical models.

Prerequisites: MATH A055 with a minimum grade of C or MATH A060 with a minimum grade of C or ALEKS Overall Test 1 with a score of 030 or ALEKS Overall Test 2 with a score of 030 or ALEKS Overall Test 3 with a score of 030 or ALEKS Overall Test 4 with a score of 030 or ALEKS Overall Test 5 with a score of 030.

Attributes: UAA Quantitative Skills GER.

MATH A105 Intermediate Algebra 4 Credits

Topics include expressions, equations and applications involving linear, quadratic, rational and radical functions; graphs of linear and quadratic functions; functions and their inverses; introduction to exponential and logarithmic functions; and systems of linear equations.

Prerequisites: MATH A055 with a minimum grade of C or MATH A060 with a minimum grade of C or ALEKS Overall Test 1 with a score of 030 or ALEKS Overall Test 2 with a score of 030 or ALEKS Overall Test 3 with a score of 030 or ALEKS Overall Test 4 with a score of 030 or ALEKS Overall Test 5 with a score of 030.

MATH A113 Numbers and Society 3 Credits

Applications of mathematics in modern society. Topics include but are not limited to the mathematics of elections and voting, modeling, finance, probability and descriptive statistics. Other topics the instructor may choose from include linear programming, logic, geometry, trigonometry and physics.

Prerequisites: MATH A105 with a minimum grade of C or MATH A121 with a minimum grade of C or MATH A151 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A155 with a minimum grade of C or MATH A211 with a minimum grade of C or MATH A212 with a minimum grade of C or MATH A221 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C or MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C or MATH A253 with a minimum grade of C or ALEKS Overall Test 1 with a score of 30 or ALEKS Overall Test 2 with a score of 30 or ALEKS Overall Test 3 with a score of 30 or ALEKS Overall Test 4 with a score of 30 or ALEKS Overall Test 5 with a score of 30.

Attributes: UAA Quantitative Skills GER.

MATH A115 Art of Mathematics 3 Credits

Presents practical mathematics people use, beautiful mathematics people see, and abstract mathematics people dream. Enables students to describe and analyze the world around them.

Special Note: Does not fulfill the prerequisite for any other mathematics course.

Registration Restrictions: Placement into MATH A105 or higher and WRTG A111 or higher

Prerequisites: MATH A055 with a minimum grade of C or MATH A060 with a minimum grade of C or ALEKS Overall Test 1 with a score of 030 or ALEKS Overall Test 2 with a score of 030 or ALEKS Overall Test 3 with a score of 030 or ALEKS Overall Test 4 with a score of 030 or ALEKS Overall Test 5 with a score of 030.

Attributes: UAA Quantitative Skills GER.

MATH A120 Math Bootcamp 2 1 Credit

Offers intensive review of entry level mathematics designed for students entering college algebra or trigonometry, on a shortened timeline and designed to be taken immediately prior to a semester length math class.

Special Note: Student should intend to take a 100-level MATH class within a semester of taking this course. This course is meant to potentially place students into a higher level course or to increase the chances of success at the current placement. May be repeated once for credit.

Prerequisites: MATH A105 with a minimum grade of C or MATH A121 with a minimum grade of C or MATH A151 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A155 with a minimum grade of C or MATH A211 with a minimum grade of C or MATH A212 with a minimum grade of C or MATH A221 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C or MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C or MATH A253 with a minimum grade of C or ALEKS Overall Test 1 with a score of 55 or ALEKS Overall Test 2 with a score of 55 or ALEKS Overall Test 3 with a score of 55 or ALEKS Overall Test 4 with a score of 55 or ALEKS Overall Test 5 with a score of 55.

MATH A121 Applied College Algebra 3 Credits

Emphasizes quantitative decision-making in the managerial, life, and social sciences. Covers linear and quadratic equations and inequalities, algebra of matrices, introductory linear programming, simple linear regression, exponential and logarithmic functions.

Prerequisites: MATH A105 with a minimum grade of C or MATH A151 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A155 with a minimum grade of C or MATH A211 with a minimum grade of C or MATH A212 with a minimum grade of C or MATH A221 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C or MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C or MATH A253 with a minimum grade of C or ALEKS Overall Test 1 with a score of 055 or ALEKS Overall Test 2 with a score of 055 or ALEKS Overall Test 3 with a score of 055 or ALEKS Overall Test 4 with a score of 055 or ALEKS Overall Test 5 with a score of 055.

Attributes: UAA Quantitative Skills GER.

MATH A151 College Algebra for Calculus 4 Credits

Study of algebraic, logarithmic, and exponential functions; systems of equations; and applications.

Registration Restrictions: If the prerequisite is not satisfied, an approved UAA placement test is required.

Prerequisites: MATH A105 with a minimum grade of C or MATH A121 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A155 with a minimum grade of C or MATH A211 with a minimum grade of C or MATH A212 with a minimum grade of C or MATH A221 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C or MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C or MATH A253 with a minimum grade of C or ALEKS Overall Test 1 with a score of 055 or ALEKS Overall Test 2 with a score of 055 or ALEKS Overall Test 3 with a score of 055 or ALEKS Overall Test 4 with a score of 055 or ALEKS Overall Test 5 with a score of 055.

Attributes: UAA Quantitative Skills GER.

MATH A152 Trigonometry 3 Credits

A study of trigonometric functions, including graphing, identities, inverse trigonometric functions, solving equations and polar coordinates, and applications.

Special Note: A student may apply no more than 7 credits from any combination of MATH A151, MATH A152 and MATH A155 toward the graduation requirements for any baccalaureate degree.

Registration Restrictions: If the prerequisite is not satisfied, an approved UAA placement test is required.

Prerequisites: MATH A151 with a minimum grade of C or MATH A155 with a minimum grade of C or MATH A211 with a minimum grade of C or MATH A212 with a minimum grade of C or MATH A221 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C or MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C or MATH A253 with a minimum grade of C or ALEKS Overall Test 1 with a score of 065 or ALEKS Overall Test 2 with a score of 065 or ALEKS Overall Test 3 with a score of 065 or ALEKS Overall Test 4 with a score of 065 or ALEKS Overall Test 5 with a score of 065.

Attributes: UAA Quantitative Skills GER.

MATH A155 Precalculus **5 Credits**

Covers algebra and trigonometry required for calculus. Includes polynomial, rational, exponential, logarithmic and trigonometric functions, and trigonometric identities.

Special Note: A student may apply no more than 7 credits from any combination of MATH A151, MATH A152 and MATH A155 toward the graduation requirements for any baccalaureate degree.

Registration Restrictions: If the prerequisite is not satisfied, an approved UAA placement test is required.

Prerequisites: MATH A105 with a minimum grade of B or MATH A121 with a minimum grade of C or MATH A151 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A211 with a minimum grade of C or MATH A212 with a minimum grade of C or MATH A221 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C or MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C or MATH A253 with a minimum grade of C or ALEKS Overall Test 1 with a score of 055 or ALEKS Overall Test 2 with a score of 055 or ALEKS Overall Test 3 with a score of 055 or ALEKS Overall Test 4 with a score of 055 or ALEKS Overall Test 5 with a score of 055.

Attributes: UAA Quantitative Skills GER.

MATH A211 Mathematics for Elementary School Teachers I **3 Credits**

Studies elementary set theory, numeration systems, algorithms of arithmetic, elementary number theory, integers, rational numbers and problem-solving strategies.

Special Note: MATH A211 and MATH A212 with a minimum grade of C are required to meet State of Alaska teacher certification standards.

Prerequisites: MATH A121 with a minimum grade of C or MATH A151 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A155 with a minimum grade of C or MATH A212 with a minimum grade of C or MATH A221 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C or MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C or MATH A253 with a minimum grade of C or STAT A200 with a minimum grade of C.

MATH A212 Mathematics for Elementary School Teachers II **3 Credits**

Studies functions, informal geometry, measurement, statistics and probability.

Special Note: MATH A211 and MATH A212 with a minimum grade of C are required to meet State of Alaska teacher certification standards.

Prerequisites: MATH A121 with a minimum grade of C or MATH A151 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A155 with a minimum grade of C or MATH A211 with a minimum grade of C or MATH A221 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C or MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C or MATH A253 with a minimum grade of C or STAT A200 with a minimum grade of C.

MATH A221 Applied Calculus for Managerial and Social Sciences **3 Credits**

Covers functions and graphs, differentiation, exponential and logarithmic functions, antidifferentiation and integration, and functions of several variables. Applies these mathematical concepts.

Prerequisites: MATH A121 with a minimum grade of C or MATH A151 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A211 with a minimum grade of C or MATH A212 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C or MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C or MATH A253 with a minimum grade of C or ALEKS Overall Test 1 with a score of 078 or ALEKS Overall Test 2 with a score of 078 or ALEKS Overall Test 3 with a score of 078 or ALEKS Overall Test 4 with a score of 078 or ALEKS Overall Test 5 with a score of 078.

Attributes: UAA Quantitative Skills GER.

MATH A251 Calculus I **4 Credits**

A first course in single-variable calculus. Topics include limits; continuity and differentiation of functions; applications of the derivative to graphing, optimization and rates of change; definite and indefinite integration; and the fundamental theorem of calculus.

Registration Restrictions: If the prerequisite is not satisfied, an approved UAA placement test is required.

Prerequisites: (MATH A151 with a minimum grade of C and MATH A152 with a minimum grade of C) or MATH A155 with a minimum grade of C or MATH A211 with a minimum grade of C or MATH A212 with a minimum grade of C or MATH A221 with a minimum grade of C or MATH A251F with a minimum grade of C or MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C or MATH A253 with a minimum grade of C or ALEKS Overall Test 1 with a score of 078 or ALEKS Overall Test 2 with a score of 078 or ALEKS Overall Test 3 with a score of 078 or ALEKS Overall Test 4 with a score of 078 or ALEKS Overall Test 5 with a score of 078.

Attributes: UAA Quantitative Skills GER.

MATH A251F F.A.T. Calculus I **6 Credits**

Introduces single-variable calculus. Provides Fast introduction to required topics in Algebra and Trigonometry. Introduces limits, continuity, differentiability, and Riemannian integration including the Fundamental Theorem of Calculus. Presents applications of the derivative to graphing, optimization, and rates of change. Presents calculation of derivatives, definite integrals, and indefinite integrals.

Prerequisites: MATH A105 with a minimum grade of A or MATH A121 with a minimum grade of C or MATH A151 with a minimum grade of C or MATH A152 with a minimum grade of C or MATH A155 with a minimum grade of C or MATH A211 with a minimum grade of C or MATH A212 with a minimum grade of C or MATH A221 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C or MATH A253 with a minimum grade of C or ALEKS Overall Test 1 with a score of 60 or ALEKS Overall Test 2 with a score of 60 or ALEKS Overall Test 3 with a score of 60 or ALEKS Overall Test 4 with a score of 60 or ALEKS Overall Test 5 with a score of 60.

Attributes: UAA Quantitative Skills GER.

MATH A252 Calculus II **4 Credits**

Further topics in single-variable calculus, including techniques of integration, applications of integration, convergence of sequences and series, parameterized curves, and polar coordinates.

Prerequisites: MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C.

Attributes: UAA Quantitative Skills GER.

MATH A252F F.A.T. Calculus II **6 Credits**

Extends single-variable calculus. Provides Fast coverage of topics from Algebra and Trigonometry required for Calculus II and III. Presents techniques of integration, applications of integration and use of parameterization of curves and polar coordinates. Introduces convergence of sequences and series including power series.

Prerequisites: MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C.

Attributes: UAA Quantitative Skills GER.

MATH A253 Calculus III **4 Credits**

Multivariable calculus. Topics include vectors in two and three dimensions; differential calculus of functions of several variables; multiple integration; vector calculus, including Green's and Stokes' theorem; and applications.

Prerequisites: MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C.

Attributes: UAA Quantitative Skills GER.

MATH A261 Introduction to Discrete Mathematics **3 Credits**

Introduces basic logic, mathematical structures, graph theory and enumeration.

Registration Restrictions: If the prerequisite is not satisfied, an approved UAA placement test is required.

Prerequisites: MATH A151 with a minimum grade of C or MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C or ALEKS Overall Test 1 with a score of 078 or ALEKS Overall Test 2 with a score of 078 or ALEKS Overall Test 3 with a score of 078 or ALEKS Overall Test 4 with a score of 078 or ALEKS Overall Test 5 with a score of 078.

MATH A264 Introduction to the Mathematics Major **1 Credit**

Introduces the major topical areas of mathematics, tools and research methods of mathematicians, and potential career paths in mathematics. Required eportfolio is begun in this course. Opportunities for undergraduates will be presented.

Prerequisites: MATH A221 with a minimum grade of C or MATH A251 with a minimum grade of C or concurrent enrollment or MATH A251F with a minimum grade of C or concurrent enrollment or MATH A261 with a minimum grade of C.

MATH A265 Fundamentals of Mathematics **3 Credits**

Presents logic, sets, relations, functions and cardinality. Introduces mathematical proof techniques.

Prerequisites: MATH A252 with a minimum grade of C.

MATH A302 Ordinary Differential Equations **3 Credits**

Nature and origin of differential equations; analysis of first order, linear scalar, and systems of differential equations using exact, qualitative and geometric methods; forcing and resonance; Laplace transform; and applications.

Prerequisites: MATH A253 with a minimum grade of C.

MATH A305 Introduction to Geometries **3 Credits**

Presents Euclidean, hyperbolic, and some projective geometry using both synthetic and transformational perspectives.

Prerequisites: MATH A253 with a minimum grade of C and MATH A265 with a minimum grade of C.

MATH A306 Discrete Methods **3 Credits**

Introduces enumeration and graph theory with some algorithms.

Prerequisites: (MATH A251 with a minimum grade of C or MATH A251F with a minimum grade of C) and (MATH A261 with a minimum grade of C or MATH A265 with a minimum grade of C).

MATH A309 Introduction to Number Theory **3 Credits**

Examines fundamental concepts of number theory including primes, divisibility, congruences, quadratic reciprocity, number theoretic functions, continued fractions and Diophantine equations.

Prerequisites: MATH A265 with a minimum grade of C.

MATH A314 Linear Algebra **3 Credits**

Studies linear equations, matrices, determinants, finite dimensional vector spaces, linear transformations, characteristic values and inner product spaces.

Prerequisites: MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C.

MATH A401 Introduction to Real Analysis **3 Credits**

Investigates the limit concept with special reference to functions on the real line. Topics include continuous functions and their properties, sequences and series, and differentiation and integration of functions.

Prerequisites: MATH A253 with a minimum grade of C and MATH A265 with a minimum grade of C.

MATH A405 Introduction to Abstract Algebra **3 Credits**

Introduces groups, rings and fields.

Prerequisites: MATH A253 with a minimum grade of C and MATH A265 with a minimum grade of C.

MATH A410 Introduction to Complex Analysis **3 Credits**

Explores analytic functions, Cauchy's theorem, sequences and series, integration, and residues.

Prerequisites: MATH A253 with a minimum grade of C and MATH A265 with a minimum grade of C.

MATH A420 Historical Mathematics **3 Credits**

Presents the historical development of mathematical concepts in algebra, trigonometry, geometry, discrete mathematics, calculus, probability and statistics. Presents factors that influenced the growth of mathematical knowledge across cultures and times.

Registration Restrictions: Completion of Written Communication Skills and Oral Communication Skills GER requirements and junior or senior standing.

Prerequisites: (MATH A252 with a minimum grade of C or MATH A252F with a minimum grade of C) and (MATH A261 with a minimum grade of C or MATH A265 with a minimum grade of C).

Attributes: UAA Integrative Capstone GER.

MATH A424 Advanced Engineering Mathematics: Linear Algebra and Numerical Analysis **3 Credits**

Emphasizes mathematics used in engineering. Includes applications of matrices, vector spaces, inner products, and linear transformations; numerical interpolation, approximation, differentiation, and quadrature; finite difference methods for ordinary and partial differential equations; and numerical stability.

Registration Restrictions: Completion of a programming course with a minimum grade of C

Prerequisites: MATH A302 with a minimum grade of C and PHYS A211 with a minimum grade of C.

MATH A425 Advanced Engineering Mathematics: Partial Differential Equations and Complex Variables **3 Credits**

Emphasizes mathematics used in engineering. Includes Fourier series and transforms, Bessel functions, Legendre polynomials, linear partial differential equations, and complex variables. Develops the wave, heat and potential equations via first principles. Introduces the method of characteristics as applied to shock phenomena.

Registration Restrictions: Completion of a programming course with a minimum grade of C

May Be Stacked With: MATH A625

Prerequisites: MATH A302 with a minimum grade of C and PHYS A211 with a minimum grade of C.

MATH A426 Numerical Analysis **3 Credits**

Introduces numerical solutions of linear systems and eigenvalue problems, nonlinear equations and systems, numerical differentiation and integration, and numerical solutions of ordinary and partial differential equations. Introduces approximation theory, homotopy, and error and stability analysis. Provides theoretical framework for convergence analysis.

Prerequisites: MATH A265 with a minimum grade of C.

MATH A430 Concepts of Topology **3 Credits**

Covers axiomatic definition of a topological space, mappings between topological spaces, continuity, homeomorphism, connectivity, completeness and compactness. Also covers examples and applications from analysis and geometry. May include homotopy (the fundamental group with low-dimensional applications) and/or knot theory.

Prerequisites: MATH A401 with a minimum grade of C.

MATH A431 Introduction to Differential Geometry **3 Credits**

Develops the theory of curves and surfaces in Euclidean spaces. Presents major constructions and theorems including the Frenet-Serret apparatus, geodesics, Gauss's Theorema Egregium and the Gauss-Bonnet theorem. Introduces abstract manifolds.

Prerequisites: MATH A265 with a minimum grade of C and MATH A314 with a minimum grade of C.

MATH A432 Partial Differential Equations **3 Credits**

Presents analysis and solution of partial differential equations. Students will classify and solve initial and boundary value problems for elliptic, hyperbolic and parabolic types. Faculty will select additional topics.

Prerequisites: MATH A302 with a minimum grade of C.

MATH A495A Mathematics Practicum **1-3 Credits**

Provides upper-division mathematics majors the experience of teaching mathematics. The student is responsible for 3 hours per week per credit in the mathematics laboratory or classroom.

Special Note: May be repeated up to a maximum of 3 credits.

Registration Restrictions: Faculty permission required.

Prerequisites: MATH A253 with a minimum grade of C.

MATH A495B Mathematics or Statistics Internship **1-3 Credits**

Provides an opportunity to gain experience in the mathematical or statistics field. The position must be approved by a faculty member. Positions will be limited and competitive.

Registration Restrictions: At least two upper-division mathematics or statistics courses that count toward the major.

Prerequisites: MATH A265 with a minimum grade of C.

MATH A496 Advanced Readings in Mathematics **1-3 Credits**

Students, by mutual agreement with involved faculty, engage in reading, discussion and presentation of advanced mathematical topics.

Registration Restrictions: At least one upper-division mathematics or statistics course that counts toward the major.

Prerequisites: MATH A265 with a minimum grade of C.

MATH A498 Individual Research **1-3 Credits**

Independent research projects under the supervision of a faculty member. The result will be a paper or presentation prepared to publication standards.

Special Note: May be repeated up to a maximum of 6 credits.

Registration Restrictions: Minimum of 6 credits of upper division mathematics courses with a minimum grade of B and faculty permission.

MATH A625 Advanced Engineering Mathematics: Partial Differential Equations and Complex Variables **3 Credits**

Emphasizes mathematics used in engineering. Includes Fourier series and transforms, Bessel functions, Legendre polynomials, linear partial differential equations, and complex variables. Develops the wave, heat and potential equations via first principles. Introduces the method of characteristics as applied to shock phenomena. Additional assignments will include modeling, projects and research.

Registration Restrictions: Completion of a programming course with a minimum grade of C

May Be Stacked With: MATH A425