Mathematics (MATH)

Courses

MATH A054 Prealgebra 3 Credits
Topics include 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, 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
Topics include operations and applications of whole numbers, integers, fractions, decimals, ratios and proportions, and percents. The topic of math anxiety is dealt with throughout the course.
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
Topics include operations and applications of integers, fractions, decimals, ratios and proportions, and percents. The topic of math anxiety is dealt with throughout the course.
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.

MATH A054C Prealgebra C 1 Credit
Topics include 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.

MATH A055 Elementary Algebra A 1 Credit
Topics include solutions of linear equations and graphs of lines.
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 A054A with a minimum grade of C.

MATH A055B Elementary Algebra B 1 Credit
Topics include evaluating and simplifying algebraic expressions, factoring, 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.

MATH A055C Elementary Algebra C 1 Credit
Topics include evaluating and simplifying algebraic expressions, factoring, 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 A055C with a minimum grade of C.

MATH A060 Essential Mathematics 4 Credits
Teaches the concepts of basic arithmetic and introductory algebra. Includes operations and properties on real numbers, ratio, proportion, percent, scientific notation and variation, topics from consumer mathematics, evaluation of literal expressions, solution and graphs of linear equations and inequalities; radicals and exponents, polynomials, factoring and special products, fundamental operations with algebraic fractions, solution of quadratic equations, and elementary systems of equations. Geometric formulae are presented on a case-by-case basis as needed.
Special Note: Equivalent to MATH A054 and MATH A055. Credit will not be given for both MATH A055 and MATH A060. Placement test not 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 A104 Technical Mathematics 3 Credits
Covers proportions and rational equations, applications of percentages, measurement conversions, area and volume calculations, logarithms, and trigonometry. Applications emphasize the relationship of these mathematical concepts to quantitative decision making in technical fields.
Special Note: Does not fulfill the prerequisite for any other mathematics course.
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 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.
Attributes: UAA Quantitative Skills GER.
MATH A105 Intermediate Algebra 3 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 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: 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 A121 College Algebra for Managerial and Social Sciences 3 Credits
Emphasizes quantitative decision making in the managerial and social sciences. Covers linear and quadratic equations and inequalities, algebra of matrices, introductory linear programming, exponential and logarithmic functions.
Prerequisites: MATH A105 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 A121 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 STAT A200 with a minimum grade of C.

MATH A122 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 STAT A200 with a minimum grade of C.

MATH A151 College Algebra for Calculus 4 Credits
Study of algebraic, logarithmic and exponential functions; systems of equations; 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 A105 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 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 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 and MATH A212 with a minimum grade of C are required to meet State of Alaska teacher certification standards.
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 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 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 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.
Registration Restrictions: If the prerequisite is not satisfied, an approved UAA placement test is required.
Prerequisites: MATH A251 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.
Registration Restrictions: If the prerequisite is not satisfied, an approved UAA placement test is required.
Prerequisites: MATH A252 with a minimum grade of C.
Attributes: UAA Quantitative Skills GER.

MATH A261 Introduction to Discrete Mathematics 3 Credits
Introduces concepts of discrete mathematics including relations and graph theory along with prerequisite topics including sets, logic and mathematical proof.
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.

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

MATH A265 Fundamentals of Mathematics 3 Credits
Studies 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 A303 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 A305 Introduction to Geometries 3 Credits
Introduces Euclidean and non-Euclidian plane geometry and topics selected from affine geometry and projective geometry.
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 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.

MATH A321 Analysis of Several Variables 3 Credits
Vector calculus, exterior calculus, optimization techniques, and integration with applications. Emphasizes the use of linear and multilinear algebra techniques to generalize the basic methods of calculus to several independent and dependent variables.
Prerequisites: MATH A253 and MATH A314.
MATH A324 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 A371 Stochastic Processes 3 Credits
Theory and applications, including moment generating functions,
conditional expectation, Poisson processes, Markov chains, and topics
selected from branching processes, queuing theory, random walks, and
reliability theory.
Prerequisites: MATH A252 and STAT A307.

MATH A407 Mathematical Statistics I 3 Credits
Topics include random variables, distribution functions, expectation
and moment generating function, special parametric families of
univariate distributions, joint and conditional distributions, stochastic
independence, conditional expectation, distributions of functions of
random variables, convergence concepts, and parametric estimation by
maximum likelihood.
Prerequisites: MATH A253 and STAT A307.

MATH A410 Introduction to Complex Analysis 3 Credits
Explores analytic functions, Cauchy's theorem, sequences and series,
inversion, 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 and
(MATH A261 with a minimum grade of C or MATH A265 with a
minimum grade of C).
Attributes: UAA Integrative Capstone GER.

MATH A422 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 A423 Advanced Engineering Mathematics 3 Credits
A practical review of mathematics for engineers. Includes partial
differential equations, vector and matrix analysis, Fourier analysis, and
complex analysis.
Special Note: Course does not satisfy mathematics major requirements.
Prerequisites: MATH A302.

MATH A424 Advanced Engineering Mathematics: Linear and
Numerical Analysis 3 Credits
Emphasizes mathematics used in engineering. Includes applications
of matrices, vector spaces, inner products, and linear transformations;
umerical 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
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.
Registration Restrictions: Completion of a programming course with a
minimum grade of C.
Prerequisites: MATH A302 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 A324 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 A490 Selected Topics in Mathematics 1-3 Credits
Presents advanced topics in mathematics selected as continuations
of, or complements to, the content of upper-division undergraduate
mathematics courses. Emphasizes theoretical developments.
Special Note: Depending on topic selected, use of symbolic
computation software may be required. May be repeated once for credit
with a change in subtitle.
Registration Restrictions: Instructor permission required.
Prerequisites: MATH A265 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.