MATHEMATICS (MATH)

MATH A008 **3 Units (54 lecture hours)**
Pre-Algebra
Prerequisite(s): MATH A005 or appropriate placement.

Grading Mode: Standard Letter, Pass/No Pass
Not Transferable.

Pre-algebra will introduce basic operations of algebra including signed numbers, exponents, first degree equations, special products, applied problems, factoring, rational expressions, radicals, proportions, and the rectangular coordinate system. These topics will utilize the student's working knowledge of decimals, fractions, and percents. Graded or Pass/No Pass option. NOT DEGREE APPLICABLE.

MATH A010 **4 Units (72 lecture hours)**
Elementary Algebra
Prerequisite(s): MATH A008 or appropriate placement.

Grading Mode: Standard Letter, Pass/No Pass
Not Transferable.

Operations of algebra including first degree equations and inequalities, exponents, special products and factoring, rational expressions, graphing, radicals, systems of linear equations and quadratic equations will be presented. A minimum of five arranged hours of supplemental learning per semester in the Success Center is suggested. This course may also be offered online. Graded or Pass/No Pass option. NOT DEGREE APPLICABLE.

MATH A030 **4 Units (72 lecture hours)**
Intermediate Algebra
Prerequisite(s): MATH A010 or appropriate placement.

Grading Mode: Standard Letter, Pass/No Pass
Not Transferable.

Topics covered will be functions, linear and quadratic equations, curve sketching, exponents, rational expressions, rational exponents, logarithms, variations, systems of equations, determinants, Cramer's Rule, and conic sections. A minimum of five arranged hours of supplemental learning per semester in the Success Center is suggested. Graded or Pass/No Pass option.

MATH A045 **6 Units (108 lecture hours)**
Combined Elementary and Intermediate Algebra
Prerequisite(s): MATH A008 or appropriate placement.

Grading Mode: Standard Letter, Pass/No Pass
Not Transferable.

This course includes all the topics that are studied in elementary algebra and intermediate algebra. Thus starting at the elementary level, each topic is cover up to the level of intermediate algebra. Topics include, introduction and advance operations with algebraic expressions, linear graphing and factoring. Functions, linear and quadratic equations, curve sketching, exponents, rational expressions, rational exponents, logarithms, variations, systems of equations, and conic sections. A minimum of five arranged hours of supplemental learning per semester in the Success Center is suggested. Graded or Pass/No Pass option.

MATH A090 **2 Units (36 lecture hours)**
Support for Liberal Arts Mathematics
Co-requisite(s): MATH A100.

Grading Mode: Pass/No Pass
A concurrent support course for Math A100, Liberal Arts Mathematics, designed to review prerequisite skills necessary for success. Topics include operations with real numbers; conversion between decimals, percents and fractions; selected algebraic topics essential to Liberal Arts Mathematics; and problem-solving strategies. NOT DEGREE APPLICABLE.

MATH A091 **2 Units (36 lecture hours)**
Support for College Algebra
Co-requisite(s): MATH A115.

Grading Mode: Pass/No Pass
A concurrent support course for MATH A115, College Algebra, designed to review prerequisite skills necessary for success. Topics include operations with real numbers, an introduction to polynomial, operations with rational and radical expressions, an introduction to polynomials, and solutions to linear equations and inequalities. NOT DEGREE APPLICABLE.

MATH A092 **2 Units (36 lecture hours)**
Support for Trigonometry
Co-requisite(s): MATH A120.

Grading Mode: Pass/No Pass
A concurrent support course designed to review prerequisite topics necessary for success in MATH A120, Trigonometry, covering operations with real numbers, relations and functions, systems of linear equations, factoring, rational expressions, quadratic equations, conic sections, and basic geometry. NOT DEGREE APPLICABLE.

MATH A094 **2 Units (36 lecture hours)**
Support for Business Calculus
Co-requisite(s): MATH A140.

Grading Mode: Pass/No Pass
A concurrent support course designed to review topics necessary in Math A140 Business Calculus, including operations with expressions, relations and functions, factoring, rational expressions, quadratic equations, logarithmic and exponential expressions and equations, and basic geometry. NOT DEGREE APPLICABLE.

MATH A096 **2 Units (36 lecture hours)**
Support for Introduction to Statistics
Co-requisite(s): MATH A160.

Grading Mode: Pass/No Pass
A concurrent support course for MATH A160, Introduction to Statistics, designed to review prerequisite skills necessary for success. Topics include operations with real numbers; percents, ratios and proportions; selected algebraic topics essential to statistics; the graph of a line; and problem-solving strategies. NOT DEGREE APPLICABLE.

MATH A100 **3 Units (54 lecture hours)**
Liberal Arts Mathematics
Prerequisite(s): MATH A030 or higher or appropriate placement.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC.

This is a survey course designed for non-science majors. Topics include mathematics of finance, probability, statistics, set theory, voting methods, and other selected topics such as logic, geometry, and graph theory. Graded or Pass/No Pass option.

MATH A104 **3 Units (54 lecture hours)**
Mathematics for Elementary Teachers
Prerequisite(s): MATH A030 or higher or appropriate placement.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC.

Designed for prospective elementary school teachers, the course emphasizes mathematical structure and problem solving techniques associated with the real number system, elementary number theory, ratio and proportion, set theory, elementary logic, and percent. Instructional delivery design techniques and technological applications will be explored. Graded or Pass/No Pass option.

MATH A115 **4 Units (72 lecture hours)**
College Algebra
Prerequisite(s): MATH A030 or higher or appropriate placement.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC: Credit Limitation: MATH A115 and MATH A170 combined: maximum credit, 5 semester/7.

Topics include linear, quadratic, rational, logarithmic, and exponential functions and their graphs, systems of equations, matrices, sequences, series, and basic combinations. This course prepares students to enter MATH A140 but does not provide sufficient preparation to enter MATH A180. This course may also be offered online. Graded or Pass/No Pass option. 5 quarter units.

MATH A120 **3 Units (54 lecture hours)**
Trigonometry
Prerequisite(s): MATH A030 or higher or appropriate placement.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU.

Topics covered will be trigonometric (circular) and inverse trigonometric functions, graphs of trigonometric functions, identities and conditional equations, solutions for triangles, vectors, complex numbers and applications. Graded or Pass/No Pass option. **C-ID:** MATH 851.

MATH A140 **4 Units (90 lecture hours)**
Business Calculus
Prerequisite(s): MATH A115, MATH A155, or MATH A170 or appropriate placement.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC: Credit Limitation: MATH A140, MATH A180, MATH A180H and MATH A182H combined: maximum credit, 1 course.

Analytic geometry and limits; introduction to differential and integral calculus with applications to include polynomial, rational, exponential and logarithmic functions and their graphs. Multivariate calculus to include partial differentiation, multiple integration. Introduction to the calculus of probability with applications. Graded or Pass/No Pass option.

MATH A155 **4 Units (72 lecture hours)**
Finite Mathematics with Applications
Prerequisite(s): MATH A030 or higher or appropriate placement.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC.

Functions including linear, exponential, and logarithmic; systems of linear equations and matrices; systems of linear inequalities and linear programming; mathematics of finance; set theory including sets and Venn diagrams; and probability and combinatorics. Graded or Pass/No Pass option.

MATH A160 **4 Units (72 lecture hours)**
Introduction to Statistics
Prerequisite(s): MATH A030 or higher or appropriate placement.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC: Credit Limitation: MATH A160, and PSYC A160 combined: maximum credit, 1 course.

A general education course covering descriptive statistics, probability, binomial and normal distributions, variation, linear regression, correlation and hypothesis testing. Applications taken from natural sciences, social sciences, business, and everyday life. Students completing MATH A160 may petition for credit for PSYC A160. Graded or Pass/No Pass option. This course may also be offered online. Lecture. **C-ID:** MATH 110.

MATH A170 **4 Units (90 lecture hours)**
Precalculus
Prerequisite(s): MATH A070 or MATH A120 or appropriate placement.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC: Credit Limitation: MATH A115 and MATH A170 combined: maximum credit, 5 semester/7.

The course includes structure and properties of number systems; applications, solution and graphs of polynomials, rational, exponential, logarithmic and trigonometric functions; matrices; sequences and series; analytic geometry. Prepares students for MATH A180. Graded or Pass/No Pass option. This course may also be offered online. 5 quarter units.

MATH A180 **4 Units (90 lecture hours)**
Calculus 1
Prerequisite(s): MATH A170 or appropriate placement.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC: Credit Limitation: MATH A140, MATH A180, MATH A180H and MATH A182H combined: maximum credit, 1 course; MATH A180/H, MATH A185/H combined are equivalent to MATH A182H.

This is the first course in the calculus sequence. It satisfies the sequence for majors in mathematics, science, or engineering. Topics include limits, derivatives of algebraic and transcendental functions, applications of derivatives, indefinite integrals, definite integrals, the Fundamental Theorem of Calculus, and applications of integration. Graded or Pass/No Pass option. **C-ID:** MATH 210.

MATH A180H **4 Units (90 lecture hours)**
Calculus 1 Honors
Prerequisite(s): MATH A170 or appropriate placement.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC: Credit Limitation: MATH A140, MATH A180, MATH A180H and MATH A182H combined: maximum credit, 1 course; MATH A180/H, MATH A185/H combined are equivalent to MATH A182H.

This is the first course in the calculus sequence. It satisfies the sequence for majors in mathematics, science, or engineering. Topics include limits, derivatives of algebraic and transcendental functions, applications of derivatives, indefinite integrals, definite integrals, the Fundamental Theorem of Calculus, and applications of integration. Graded or Pass/No Pass option. **C-ID:** MATH 210.

MATH A182H **5 Units (90 lecture hours)**
Calculus 1 and 2 Honors
Prerequisite(s): MATH A140, MATH A180, MATH A180H or AP Calculus AB score of 3 or higher.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC: Credit Limitation: MATH A140, MATH A180, MATH A180H and MATH A182H combined: maximum credit, 1 course; MATH A182H and MATH A185, MATH A185H combined: maximum credit, 1 course.

An in-depth honors level study of elementary differential and integral calculus which includes exponential, logarithmic, and trigonometric functions, techniques of integrations, sequences and series, and applications. Combines content of MATH A180 and MATH A185 with emphasis on theory and challenging problems in a fast-paced course for well-prepared students with previous calculus experience. Graded or Pass/No Pass option.

MATH A185 **4 Units (90 lecture hours)**
Calculus 2
Prerequisite(s): MATH A180, MATH A180H or MATH A182H.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC: Credit Limitation: MATH A182H and MATH A185, MATH A185H combined: maximum credit, 1 course; MATH A180/H, MATH A185/H combined are equivalent to MATH A182H.

This is the second course in the calculus sequence. It satisfies the sequence for majors in mathematics, science, or engineering. Topics include techniques and some applications of integration, calculus applied to parametric curves and polar curves, analytic geometry, sequences, series, and an introduction to differential equations. Graded or Pass/No Pass option. **C-ID:** MATH 220.

MATH A185H **4 Units (90 lecture hours)**
Calculus 2 Honors
Prerequisite(s): MATH A180, MATH A180H or MATH A182H.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC: Credit Limitation: MATH A182H and MATH A185, MATH A185H combined: maximum credit, 1 course; MATH A180/H, MATH A185/H combined are equivalent to MATH A182H.

This is the second course in the calculus sequence. It satisfies the sequence for majors in mathematics, science, or engineering. Topics include techniques and some applications of integration, calculus applied to parametric curves and polar curves, analytic geometry, sequences, series, and an introduction to differential equations. Graded or Pass/No Pass option.

MATH A220 **3 Units (54 lecture hours)**
Introduction to Symbolic Logic
Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC.

Students learn to translate simple, quantified, and multiply-quantified English sentences into symbolic form in both sentence logic and predicate logic with quantifiers. Truth tables are used to both classify and compare symbolic sentence's properties. Proof techniques for determining validity or invalidity of arguments containing simple sentences, compound sentences, and sentences containing quantifiers in sentence and predicate logic systems are learned including truth tables, truth trees, and natural deduction style proofs with inference, replacement and quantifier rules. Same as MATH A220. Students completing PHIL A220 may not receive credit for MATH A220. Graded or Pass/No Pass option.

MATH A230 **5 Units (90 lecture hours)**
Introduction to Discrete Mathematics
Prerequisite(s): MATH A185, MATH A185H or MATH A182H.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC.

Introduction to logic, sets, relations, algorithms, number theory, combinatorics, graphs, trees, and Boolean algebra. Graded or Pass/No Pass option.

MATH A235 **3 Units (54 lecture hours)**
Applied Linear Algebra
Prerequisite(s): MATH A185 or MATH A185H or MATH A182H or Appropriate OCC Math placement.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC.

Introduction to linear algebra, classical linear algebra problems, and applications to computer science and related technologies including matrices, determinants, linear spaces, linear transformations, and eigenvalues. Graded or Pass/No Pass option.

MATH A280 **4 Units (90 lecture hours)**
Calculus 3
Prerequisite(s): MATH A185, MATH A185H or MATH A182H.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC.

Multivariable calculus including vectors, vector-valued functions, functions of several variables, partial derivatives, multiple integrals, calculus of vector fields, Green's Theorem, Stokes' Theorem, and the Divergence Theorem. Graded or Pass/No Pass option.

MATH A280H **5 Units (108 lecture hours)**
Calculus 3 Honors
Prerequisite(s): MATH A185, MATH A185H or MATH A182H.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC.

MATH A280 in a regular section with an additional one hour per week of honors material. Multivariable calculus including vectors, vector-valued functions, functions of several variables, partial derivatives, multiple integrals, calculus of vector fields, Green's Theorem, Stokes' Theorem, and the Divergence Theorem. Selected introductory topics in differential geometry will be discussed in the honors-specific portion of this course. May be taken for grades or on a pass-no pass basis.

MATH A285 **4 Units (90 lecture hours)**
Introduction to Linear Algebra and Differential Equations
Prerequisite(s): MATH A185, MATH A185H or MATH A182H.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC.

Introduction to linear algebra and differential equations. Topics include matrices, determinants, vector spaces, linear systems of equations, inner product spaces, first and second order differential equations, systems of differential equations, and Laplace transforms. Graded or Pass/No Pass option.

MATH A285H **5 Units (108 lecture hours)**
Introduction to Linear Algebra and Differential Equations Honors
Prerequisite(s): MATH A185, MATH A185H or MATH A182H.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC.

Introduction to linear algebra and differential equations. Topics include matrices, determinants, vector spaces, linear systems of equations, linear product spaces, first and second order differential equations, systems of differential equations, and Laplace transforms. Additional honors topics include Jacobian matrices, properties of R3 and simple abstract topological spaces, and some exterior algebra. Graded or Pass/No Pass option.

MATH A287 **4 Units (72 lecture hours)**
Introduction to Abstract Mathematics
Prerequisite(s): MATH A185 or MATH A185H or MATH A182H.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU.

This course is an introduction to proof writing and mathematical reasoning. Topics include logic, set theory, functions, induction, equivalence relations, cardinality, and proof writing techniques.

MATH A290H **5 Units (90 lecture hours)**
Introduction to Tensors and Calculus on Manifolds Honors
Prerequisite(s): MATH A280 or MATH A280H; and MATH A285 or MATH A285H.

Grading Mode: Standard Letter, Pass/No Pass
Transfer Credit: CSU; UC.

Introductory study of elementary tensor algebra and calculus, differential and integral calculus in higher dimensions, differential forms, and calculus on manifolds. Graded or Pass/No Pass option.