

# MATHEMATICS (MATH)

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## **MATH 5 Support Topics for Elementary Algebra**

**2 Units** (Not Degree Applicable)  
(May be taken for Pass/No Pass only)  
Lecture: 36  
**Corequisite:** *MATH 51*

Support will focus on essential arithmetic, algebraic, and geometric skills needed for success in Elementary Algebra. Course is for students concurrently enrolled in Math 51. Support topics include order of operations, rules of exponents, geometry, linear, quadratic, rational, and radical equations, systems of equations, basic graphing techniques, factoring, polynomial, rational, and radical expressions, and applications.

## **MATH 7 Support Topics for Intermediate Algebra**

**2 Units** (Not Degree Applicable)  
(May be taken for Pass/No Pass only)  
Lecture: 36  
**Corequisite:** *MATH 71*

Support will focus on essential algebra skills needed for success in Intermediate Algebra. Course is for students concurrently enrolled in Math 71. Support topics include real numbers and their properties, algebraic expressions, integer and rational exponents, linear, quadratic, rational, radical, exponential, and logarithmic equations, systems of linear and nonlinear equations, absolute value equations and inequalities, graphing techniques, writing equations of lines, functions and relations, complex fractions, polynomial, rational, radical, and logarithmic expressions, and applications.

## **MATH 10A Support Topics for Survey of College Mathematics**

**2 Units** (Not Degree Applicable)  
(May be taken for Pass/No Pass only)  
Lecture: 36  
**Corequisite:** *MATH 100*

Support will focus on promoting mathematical reasoning, critical thinking skills, and essential skills needed for success in Survey of College Mathematics. Course is for students concurrently enrolled in Survey of College Mathematics (MATH 100). Support topics include set theory, logic, counting methods, probability and statistics, with additional topics selected from numeration and mathematical systems, number theory, geometry, graph theory, and mathematical modeling.

## **MATH 11 Support Topics for Statistics**

**2 Units** (Not Degree Applicable)  
(May be taken for Pass/No Pass only)  
Lecture: 36

Support will focus on promoting mathematical reasoning, critical thinking skills, and essential skills needed for success in Elementary Statistics. Course is for students concurrently enrolled in Elementary Statistics (MATH 110). Support topics include descriptive and inferential statistics and probability with emphasis on understanding statistical methods; descriptive analysis of sample statistics, distribution of discrete and continuous random variables, estimation theory, tests of hypotheses, regression, correlation, and analysis of variance.

## **MATH 12 Support Topics for Finite Mathematics**

**2 Units** (Not Degree Applicable)  
(May be taken for Pass/No Pass only)  
Lecture: 36  
**Corequisite:** *MATH 120*

Support will focus on promoting mathematical reasoning, critical thinking skills, and essential skills needed for success in Finite Mathematics. Course is for students concurrently enrolled in Finite Mathematics (Math 120). Support topics include linear functions and models, matrices, linear programming problems, math of finance, set theory, counting methods, probability, statistics, and Markov chains.

## **MATH 13 Support Topics for College Algebra**

**2 Units** (Not Degree Applicable)  
(May be taken for Pass/No Pass only)  
Lecture: 36  
**Corequisite:** *MATH 130*

Support will focus on promoting mathematical reasoning, critical thinking skills and essential skills needed for success in College Algebra. Course is for students concurrently enrolled in College Algebra (Math 130). Support topics include real numbers and sets, algebraic functions and relations, radicals and exponents, linear and quadratic equalities and inequalities, exponential and logarithmic functions, systems on linear and quadratic equations, complex fractions, series, theory of equations, mathematical induction and binomial formula.

## **MATH 13A Support Topics for Precalculus Algebra**

**2 Units** (Not Degree Applicable)  
(May be taken for Pass/No Pass only)  
Lecture: 36  
**Corequisite:** *MATH 135*

Support will focus on promoting mathematical reasoning, critical thinking skills, and essential skills needed for success in Precalculus Algebra. Course is for students concurrently enrolled in Precalculus Algebra (MATH 135). Support topics include linear, polynomial, absolute value, rational, radical, exponential, and logarithmic functions and equations and their graphs; complex numbers; linear, nonlinear and absolute value inequalities; systems of linear and nonlinear equations and inequalities; conic sections; sequences and series; and the Binomial theorem.

## **MATH 14 Support Topics for Business Calculus**

**2 Units** (Not Degree Applicable)  
(May be taken for Pass/No Pass only)  
Lecture: 36  
**Corequisite:** *MATH 140*

Support will focus on promoting mathematical reasoning, critical thinking skills, and essential skills needed for success in Business Calculus. Course is for students concurrently enrolled in Business Calculus (MATH 140). Support topics include Calculus for business, social science, and non-science majors. Algebraic, logarithmic, and exponential functions; limits; differentiation with applications; various techniques of integration with applications; differential equations; and multivariable calculus.

**MATH 15 Support Topics for Trigonometry**

**2 Units** (Not Degree Applicable)  
 (May be taken for Pass/No Pass only)  
 Lecture: 36  
**Corequisite:** *MATH 150*

Support will focus on promoting mathematical reasoning, critical thinking skills and essential skills needed for success in Trigonometry. Course is for students concurrently enrolled in Trigonometry (MATH 150). Support topics include trigonometric functions and inverse trigonometric functions and the graphical representation of these functions; solutions to right and oblique triangles with laws of sines and cosines; vectors; solutions to trigonometric equations; identities; polar coordinates; complex numbers and De Moivre's Theorem.

**MATH 16 Support Topics for Precalculus**

**2 Units** (Not Degree Applicable)  
 (May be taken for Pass/No Pass only)  
 Lecture: 36  
**Corequisite:** *MATH 160*

Support will focus on essential trigonometry and algebra skills needed for success in Precalculus Mathematics. Course is for students concurrently enrolled in Math 160. Support topics include set notation, complex rational expressions and radical expressions, lines, piecewise-defined functions, circles, modeling with functions, factoring, asymptotes, solving inequalities, simplifying exponential expressions, evaluating trigonometric and inverse trigonometric functions, solving exponential, logarithmic, and trigonometric equations, vectors, and systems of equations.

**MATH 18A Support Topics for Calculus I**

**2 Units** (Not Degree Applicable)  
 (May be taken for Pass/No Pass only)  
 Lecture: 36  
**Corequisite:** *MATH 180*

Support will focus on promoting mathematical reasoning, critical thinking skills, and essential skills needed for success in MATH 180. Course is for students concurrently enrolled in Calculus and Analytic Geometry I (MATH 180). Support topics include differential and integral calculus with application; functions, limits, the derivative, curve sketching, optimization, and rules for differentiation of algebraic, exponential, logarithmic, and trigonometric functions with their inverses, with applications; indefinite and definite integrals.

**MATH 18B Support Topics for Calculus II**

**2 Units** (Not Degree Applicable)  
 (May be taken for Pass/No Pass only)  
 Lecture: 36  
**Corequisite:** *MATH 181*

Support will focus on promoting mathematical reasoning, critical thinking skills, and essential skills needed for success in MATH 181. Course is for students concurrently enrolled in Calculus and Analytic Geometry II (MATH 181). Support topics include differential and integral calculus with infinite series and applications; applications of integration, techniques of integration, numerical integration, indeterminate forms and improper integrals, differential equations, and polar coordinates.

**MATH 50 Pre-Algebra**

**3 Units** (Not Degree Applicable)  
 Lecture: 54  
**Prerequisite:** *LERN 49 or appropriate placement.*

Fundamental principles of mathematics designed to ease the transition from arithmetic to algebra. Concepts, computational skills, thinking skills and problem-solving skills are balanced to build proficiency in elementary topics from algebra and mastery in arithmetic.

**MATH 51 Elementary Algebra**

**4 Units** (Not Degree Applicable)  
 Lecture: 72  
**Prerequisite:** *MATH 50 or appropriate placement*

Basic algebra, equivalent to first year high school algebra. Includes: operations with signed numbers and algebraic expressions; linear, quadratic, rational, and radical equations; linear inequalities of one and two variables; slope, graphing, and equations of lines; introduction to functions; systems of linear equations; exponent rules; polynomial operations; scientific notation; factoring; rational expressions; variation; radicals; fractional exponents; formulas; applications.

**MATH 51A Elementary Algebra - First Half**

**3 Units** (Not Degree Applicable)  
 Lecture: 54  
**Prerequisite:** *MATH 50 or appropriate placement*

Contains the first half of elementary algebra. Operations with signed numbers and algebraic expressions, linear equations and inequalities, exponent rules, polynomial operations, scientific notation, factoring, solving quadratic equations by factoring, rational expressions and equations, formulas, variation, and applications.

**MATH 51B Elementary Algebra - Second Half**

**3 Units** (Not Degree Applicable)  
 Lecture: 54  
**Prerequisite:** *MATH 51A*

Contains the second half of elementary algebra. Includes: Cartesian Coordinate System, slope, graphing, and equations of lines, solving systems of linear equations, algebraic operations with radicals, solving equations with radicals, solving second degree equations using methods of completing the square and the quadratic formula. Students must complete both MATH 51A and MATH 51B to have taken the equivalent of Elementary Algebra (MATH 51).

**MATH 61 Plane Geometry**

**3 Units** (Degree Applicable)  
 Lecture: 54  
**Prerequisite:** *MATH 51 or MATH 51B or appropriate placement*

Points, lines, polygons and circles; their relationships to each other on plane surfaces; congruence, similarity and area. Introduction to inductive, deductive and indirect reasoning. The formal proof is introduced and practiced throughout the course. Stress is placed on accuracy of statement as a background for analytical and scientific reasoning.

**MATH 71 Intermediate Algebra****5 Units** (Degree Applicable)

Lecture: 90

**Prerequisite:** *MATH 51 or MATH 51B or appropriate placement.*

Extends concepts from elementary algebra to prepare students for college-level mathematics courses. Polynomial, rational, radical, exponential and logarithmic expressions are simplified, equations solved and functions graphed and studied; linear and nonlinear systems of equations and inequalities; conic sections; sequence, series and the binomial theorem

**MATH 71A Intermediate Algebra - First Half****3 Units** (Not Degree Applicable)

Lecture: 54

**Prerequisite:** *MATH 51 or MATH 51B or appropriate placement.*

Algebra of functions, polynomials, and rational expressions; functions and their graphs; systems of equations with two or three variables; absolute value and compound inequalities. Covers approximately half of the MATH 71 topics. A student must complete both MATH 71A and 71B to have taken the equivalent of MATH 71, Intermediate Algebra.

**MATH 71B Intermediate Algebra - Second Half****3 Units** (Degree Applicable)

Lecture: 54

**Prerequisite:** *MATH 71A*

Quadratic equations and graphs; exponents, radicals and logarithms; conic sections. Covers remaining MATH 71 topics. A student must complete both MATH 71A AND 71B to have taken the equivalent of MATH 71, Intermediate Algebra.

**MATH 71X Practical Intermediate Algebra****5 Units** (Degree Applicable)

Lecture: 90

**Prerequisite:** *MATH 51 or MATH 51B or appropriate placement*

Intermediate Algebra for the non-calculus path. Polynomial, rational, radical, exponential, and logarithmic expressions are simplified, equations solved, and real-world phenomena are modeled using least-squares methods, functions graphed and analyzed; linear and nonlinear systems of equations and inequalities; sequences, series, and probabilities; data gathering instruments are used to sample data for curve fitting.

**MATH 99 Special Projects in Mathematics****2 Units** (Degree Applicable, CSU)

Lecture: 36

**Prerequisite:** *Instructor authorization*

In order to offer selected students recognition for their academic interests and ability and the opportunity to explore their disciplines to greater depth, the Math Department from time to time offers special projects courses. The content of each course and the methods of study vary from semester to semester and depend on the particular project under consideration. Instructor authorization needed prior to enrollment.

**MATH 100 Survey of College Mathematics****3 Units** (Degree Applicable, CSU, UC)

Lecture: 54

**Prerequisite:** *MATH 71 or MATH 71X or MATH 71B or appropriate placement*

Mathematical methods and reasoning. Topics include: set theory, logic, counting methods, probability and statistics, with additional topics selected from numeration and mathematical systems, number theory, geometry, graph theory, and mathematical modeling.

**MATH 105 Mathematical Concepts for Elementary School Teachers****4 Units** (Degree Applicable, CSU, UC)

Lecture: 72

**Prerequisite:** *MATH 71 or appropriate placement*

Focuses on the development of quantitative reasoning skills. Exploration of topics in mathematics, including real number systems and subsystems. Comprehension and analysis of mathematical concepts and applications of logical reasoning are emphasized. Designed for pre-service elementary school teachers.

**MATH 110 Elementary Statistics****3 Units** (Degree Applicable, CSU, UC, C-ID #: MATH 110)

UC Credit Limitation

Lecture: 54

**Prerequisite:** *MATH 71 or MATH 71X or MATH 71B or appropriate placement*

Descriptive and inferential statistics and probability with emphasis on understanding statistical methods. Descriptive analysis of sample statistics, distribution of discrete and continuous random variables, estimation theory, tests of hypotheses, regression, correlation, and analysis of variance.

**MATH 110H Elementary Statistics - Honors****3 Units** (Degree Applicable, CSU, UC, C-ID #: MATH 110)

UC Credit Limitation

Lecture: 54

**Prerequisite:** *(MATH 71 or MATH 71X or MATH 71B or appropriate placement and acceptance into the Honors Program*

Descriptive and inferential statistics and probability with an emphasis on understanding statistical methods. Descriptive analysis of sample statistics, distribution of discrete and continuous random variables, estimation theory, tests of hypotheses, regression, correlation, and analysis of variance. An honors course designed to provide an enriched experience. May not receive credit for MATH 110 and MATH 110H.

**MATH 120 Finite Mathematics****3 Units** (Degree Applicable, CSU, UC)

Lecture: 54

**Prerequisite:** *MATH 71 or MATH 71X or MATH 71B or appropriate placement*

Linear programming, matrix theory, probability, statistics, stochastic processes, Markov chains, and math of finance. Applications for business, economics, and social sciences.

**MATH 130 College Algebra****4 Units** (Degree Applicable, CSU, UC)

UC Credit Limitation

Lecture: 72

**Prerequisite:** *MATH 71 or MATH 71B or appropriate placement*

College-level Algebra course for non-STEM majors. This course covers polynomial, rational, and radical expressions; factoring of polynomials, complex numbers; exponents; linear, quadratic, rational, exponential and logarithmic functions: graphing, expressions, equations and their applications; linear and nonlinear inequalities; theory of polynomial equations; systems of linear and quadratic equations.

**MATH 135 Precalculus Algebra****4 Units** (Degree Applicable, CSU, UC)

Lecture: 72

**Prerequisite:** *MATH 71 or appropriate placement*

Course covering algebraic topics from precalculus which prepares students for the calculus sequence. MATH 135 in combination with MATH 150 (Trigonometry) serves as a prerequisite for MATH 180 (Calculus I). Topics covered include linear, polynomial, absolute value, rational, radical, exponential, and logarithmic functions and equations and their graphs; complex numbers; linear, nonlinear and absolute value inequalities; systems of linear and nonlinear equations and inequalities; conic sections; sequences and series; and the Binomial theorem.

**MATH 140 Calculus for Business****4 Units** (Degree Applicable, CSU, UC)

UC Credit Limitation

Lecture: 72

**Prerequisite:** *MATH 71 or appropriate placement*

Calculus for business, social science, and non-science majors. Algebraic, logarithmic, and exponential functions; limits; differentiation with applications; various techniques of integration with applications; differential equations; and multivariable calculus.

**MATH 150 Trigonometry****3 Units** (Degree Applicable, CSU)

Lecture: 54

**Prerequisite:** *MATH 71 or MATH 71B or appropriate placement on assessment measures*

Trigonometric functions and inverse trigonometric functions and the graphical representations of these functions; solutions to right and oblique triangles with laws of sines and cosines; vectors; solutions to trigonometric equations; identities; polar coordinates; complex numbers; and DeMoivre's Theorem.

**MATH 160 Precalculus Mathematics****4 Units** (Degree Applicable, CSU, UC)

UC Credit Limitation

Lecture: 72

**Prerequisite:** *MATH 150 or appropriate placement*

Prepares students for the calculus sequence. Real-valued functions, including algebraic, trigonometric, exponential, and logarithmic functions. Also includes proofs, inequalities, introductory analytical geometry, series, sequences, and vectors.

**MATH 175 Precalculus and Trigonometry****6 Units** (Degree Applicable, CSU, UC)

Lecture: 108

**Prerequisite:** *MATH 71 or appropriate placement*

This course is a combination of Precalculus Algebra and Trigonometry in a one-semester option to prepare students for Calculus I. The course covers the material presented in MATH 135 and MATH 150. Topics include linear, polynomial, absolute value, rational, radical, exponential, and logarithmic functions and equations and their graphs; complex numbers; linear, nonlinear and absolute value inequalities; systems of linear and nonlinear equations and inequalities; conic sections; sequences and series; binomial theorem; trigonometric functions and inverse trigonometric functions and the graphical representations of these functions; solutions to right and oblique triangles with laws of sines and cosines; vectors; solutions to trigonometric equations; identities; polar coordinates; complex numbers and DeMoivre's Theorem.

**MATH 180 Calculus and Analytic Geometry I****4 Units** (Degree Applicable, CSU, UC)

UC Credit Limitation

Lecture: 72

**Prerequisite:** *(MATH 135 and MATH 150) or MATH 160 or MATH 175 or appropriate placement.*

Differential and integral calculus with applications. Functions, limits, the derivative, curve sketching, optimization, and rules for differentiation of algebraic, exponential, logarithmic, and trigonometric functions with their inverses, with applications. Indefinite and definite integrals.

**MATH 181 Calculus and Analytic Geometry II****4 Units** (Degree Applicable, CSU, UC, C-ID #: MATH 220)

Lecture: 72

**Prerequisite:** *MATH 180*

Differential and integral calculus with infinite series and applications. Includes applications of integration, techniques of integration, numerical integration, indeterminate forms and improper integrals, differential equations, and polar coordinates.

**MATH 260 Linear Algebra****3 Units** (Degree Applicable, CSU, UC)

Lecture: 54

**Prerequisite:** *MATH 181*

Matrices, linear systems, determinants, vector and inner product spaces, linear transforms, eigenvalues, and eigenvectors.

**MATH 280 Calculus and Analytic Geometry III****5 Units** (Degree Applicable, CSU, UC, C-ID #: MATH 230)

Lecture: 90

**Prerequisite:** *MATH 181*

Multivariate and vector calculus, which includes vectors in two and three space and surfaces in space. Analysis of vector-valued functions. Partial derivatives, differentials, the chain rule, directional derivatives, and the gradient. Extrema of functions of several variables with applications. Multiple integrals in various coordinate systems with applications. Vector fields, line integrals, and independence of path. Green's Theorem, surface integrals, flux, divergence, and curl. Stokes' Theorem and the Divergence Theorem.

**MATH 285 Linear Algebra and Differential Equations****5 Units** (Degree Applicable, CSU, UC)

Lecture: 90

**Prerequisite:** *MATH 280*

First order ordinary differential equations, with applications and numerical methods. Solutions to higher order differential equations using undetermined coefficients, variation of parameters, and power series, with applications. Solutions to linear and non-linear systems of differential equations, including numerical solutions. Matrix algebra, solutions of linear systems of equations, and determinants. Vector spaces, linear independence, basis and dimension, subspace and inner product space, including the Gram-Schmidt procedure. Linear transformations, kernel and range, eigenvalues, eigenvectors, diagonalization and symmetric matrices.

**MATH 290 Differential Equations****4 Units** (Degree Applicable, CSU, UC)

Lecture: 72

**Prerequisite:** *MATH 280*

First-order ordinary differential equations, including separable, linear, homogeneous, Bernoulli, and exact, with applications and numerical methods. Solutions to higher-order differential equations using undetermined coefficients, variation of parameters, power series, and Laplace transforms, with applications. Solutions to linear and non-linear systems of differential equations, including numerical solutions.