

MATHEMATICS (MATH)

What is Mathematics? Studying math is an exploration of the “science of numbers and their operations, interrelations, combinations, generalizations, and abstractions and of space configurations and their structure, measurement, transformations, and generalizations.” (Merriam-Webster)

At **College of Alameda** we offer you a variety of courses intended for those who want to pursue a degree or certificate in mathematics as well as those who wish to develop quantitative and problem-solving skills for use in other fields. We teach according to the motto:

Education anytime anywhere by offering a wide range of Math classes designed to fit around anyone's busy schedules.

The faculty and staff in mathematics at College of Alameda are dedicated to working hard with you—helping you succeed in a positive atmosphere that is conducive to your learning math in the most enjoyable and competent manner possible.

MATH 1 Pre-Calculus

4 units, 4 hours lecture

Prerequisite: Math 203 or Math 211D or Math 230

Acceptable for Credit: CSU, UC

Preparation for the calculus sequence or other courses requiring a sound algebraic background: Inequalities, theory of equations, sequences and series, matrices, functions and relations, logarithmic and exponential functions; function concept used as a unifying notion. 1701.00

AA/AS area 4B

MATH 2 Pre-Calculus with Analytic Geometry

5 units, 5 hours lecture (GR)

Prerequisite: Math 50

Acceptable for credit: CSU, UC

Advanced algebra and analytic geometry: Linear, quadratic, polynomial, rational, exponential, logarithmic, and inverse functions; determinants, matrices and linear systems; zeros to polynomials, arithmetic and geometric sequences, mathematical induction; permutations and combinations, binomial theorem; vectors, conic sections, translation and rotation of axes, polar coordinates, lines and surfaces in space, quadric surfaces. 1701.00

AA/AS area 4b; CSU area B4; IGETC area 2

MATH 3A Calculus I

5 units, 5 hours lecture (GR)

Prerequisite: Math 2, or Math 1 and 50

Acceptable for credit: CSU, UC

Theorems on limits and continuous functions, derivatives, differentials and applications: Fundamental theorems of calculus and applications; properties of exponential, logarithmic, and inverse trigonometric functions, and hyperbolic functions. 1701.00

AA/AS area 4b; CSU area B4; IGETC area 2

C-ID MATH 210

MATH 3B Calculus II

5 units, 5 hours lecture (GR)

Prerequisite: Math 3A

Acceptable for credit: CSU, UC

Applications of the definite integral: Methods of integration, polar coordinates, parametric equations, infinite and power series. 1701.00

AA/AS area 4b; CSU area B4; IGETC area 2

MATH 3C Calculus III

5 units, 5 hours lecture (GR)

Prerequisite: Math 3B

Acceptable for credit: CSU, UC

Partial differentiation: Jacobians, transformations, multiple integrals, theorems of Green and Stokes, differential forms, vectors and vector functions, geometric coordinates, and vector calculus. 1701.00

AA/AS area 4b; CSU area B4; IGETC area 2

C-ID MATH 230

MATH 3E Linear Algebra

3 units, 3 hours lecture (GR)

Prerequisite: Math 3A

Not open for credit to students who have completed or are currently enrolled in Math 3D.

Acceptable for credit: CSU, UC

Linear algebra: Gaussian and Gauss-Jordan elimination, matrices, determinants, vectors in \mathbb{R}^2 and \mathbb{R}^3 , real and complex vector spaces, inner product spaces, linear transformations, eigenvalues, eigenvectors, and applications. 1701.00

AA/AS area 4b; CSU area B4; IGETC area 2

C-ID MATH 250

MATH 3F**Differential Equations**

3 units, 3 hours lecture (GR)

Prerequisite: Math 3B and 3E

Recommended Preparation: Math 3C

Math 3E plus 3F are equivalent to Math 3D.

Not open for credit to students who have completed or are currently enrolled in Math 3D.

Acceptable for credit: CSU, UC

Ordinary differential equations: First-order, second-order, and higher-order equations; separable and exact equations, series solutions, Laplace transformations, systems of differential equations. 1701.00

AA/AS area 4b; CSU area B4; IGETC area 2

C-ID MATH 240

MATH 11**Discrete Mathematics**

4 units, 4 hours lecture (GR or P/NP)

Prerequisite: Math 3B

Acceptable for credit: CSU, UC

Discrete mathematics: Mathematical induction, finite series, sets, relations and functions, introduction to trees, combinatorics, algebraic structures, and probability. 1701.00

AA/AS area 4b; CSU area B4; IGETC area 2

MATH 13**Introduction to Statistics**

4 units, 4 hours lecture (GR)

Prerequisite: Math 203 or Math 206 or Math 211D or Math 230 or Math 240 or appropriate placement through multiple-measures assessment process

Acceptable for credit: CSU, UC

Introduction to theory and practice of statistics: Collecting data: Sampling, observational and experimental studies. Organizing data: Univariate and bivariate tables and graphs, histograms. Describing data: Measures of location, spread, and correlation. Theory: Probability, random variables; binomial and normal distributions. Drawing conclusions from data: Confidence intervals, hypothesis testing, z-tests, t-tests, and chi-square tests; one-way analysis of variance. Regression and non-parametric methods. 1701.00

AA/AS area 4b; CSU area B4; IGETC area 2

C-ID MATH 110

MATH 15**Mathematics for Liberal Arts Students**

3 units, 3 hours lecture (GR or P/NP)

Prerequisites: MATH 203 or 211D or 230 or 240 or equivalent

Eligible for credit by examination

Acceptable for credit: CSU, UC

Fundamental ideas underlying modern mathematics: Elements from logic, sets, and number systems; concepts of elementary algebra, geometry, topology, and combinatorics. 1701.00

AA/AS area 4b; CSU area B4

MATH 16A**Calculus for Business and Life/Social Sciences**

3 units, 3 hours lecture (GR)

Prerequisite: Math 2

Eligible for credit by examination

Acceptable for credit: CSU, UC

Introduction to analytic geometry and differential and integral calculus of algebraic functions with particular attention paid to simple applications. 1701.00

AA/AS area 4b; CSU area B4; IGETC area 2

MATH 48AA-FZ**Selected Topics in Mathematics**

.5-5 units, 0-5 hours lecture, 0-15 hours laboratory (GR or P/NP)

Acceptable for credit: CSU

See section on Selected Topics. 1701.00

MATH 49**Independent Study in Mathematics**

.5-5 units, .5-5 hours lecture (GR)

Acceptable for credit: CSU

See section on Independent Study. 1701.00

MATH 50**Trigonometry**

3 units, 3 hours lecture (GR)

Prerequisite: Math 203 or Math 211D or Math 230

Recommended Preparation: Math 202

Not open for credit to students who have completed or are currently enrolled in Math 52ABC.

Eligible for credit by examination

Acceptable for credit: CSU

Introduction to functional trigonometry: Basic definitions, identities, graphs, inverse functions, trigonometric equations and applications, solution of triangles and applications, polar coordinates, complex numbers, and De Moivre's Theorem. 1701.00

AA/AS area 4b; CSU area B4

MATH 201**Elementary Algebra**

4 units, 5 hours lecture (GR)

Prerequisite: Math 225, 250 or 253 or appropriate placement through multiple measures assessment process

Not open for credit to students who have completed or are currently enrolled in Math 210ABCD.

Eligible for credit by examination

Basic algebraic operations: Linear equations and inequalities, relations and functions, factoring quadratic polynomials, solving quadratic equations, fractions, radicals and exponents, word problems, graphing, and number systems. 1701.00

MATH 202**Geometry**

3 units, 3 hours lecture (GR)

Prerequisite: Math 201 or Math 210D or appropriate placement through multiple-measures assessment process

Eligible for credit by examination

Introduction to plane geometry emphasizing mathematical logic and proofs: Geometric constructions, congruent triangles, parallel lines and parallelograms, proportions, similar triangles, circles, polygons, and area. 1701.00

AA/AS area 4b

MATH 203**Intermediate Algebra**

4 units, 5 hours lecture (GR)

Prerequisite: Math 201 or Math 210D or appropriate placement through multiple-measures assessment process

Recommended preparation: Math 202

Not open for credit to students who have completed or are currently enrolled in Math 211ABCD.

Eligible for credit by examination

Intermediate algebraic operations: Real number properties and operations; solutions and graphs of linear equations in one and two variables; absolute value equations; advanced factoring; complex numbers; quadratic equations and systems of quadratic equations; conics; determinants; solutions and graphs of first-degree, quadratic, and rational inequalities; exponential and logarithmic functions; and sequences and series. 1701.00

AA/AS area 4b

MATH 206**Algebra for Statistics**

5 units, 6 hours lecture (GR)

Prerequisite: Math 253 or appropriate placement through multiple measures assessment process

Integrated mathematics for statistics: Exploratory data analysis and principles of data collection and calculation; ratios, rates, and proportional reasoning; fractions, decimals and percents; evaluating expressions; analyzing algebraic expressions of statistical measures; modeling bivariate data with linear and exponential functions; graphical and numerical descriptive statistics for quantitative and categorical data. Not recommended for science, technology, engineering, mathematics, nursing or business majors. 1701.00

MATH 213**Support for Statistics**

2 units, 2 hours lecture (P/NP)

Corequisite: Math 13

Competencies and concepts needed in statistics: arithmetic, pre-algebra, elementary and intermediate algebra, and descriptive statistics; descriptive data analysis, solving and graphing linear equations, and modeling with linear functions. Intended for students who are concurrently enrolled in MATH 13. 1701.00

MATH 215**Support for Pre-Calculus**

2 Units, 2 hours lecture (P/NP)

Corequisites: Math 1

Recommended Preparation: This course is appropriate for students who are confident in their graphing and beginning algebra skills.

Review of the core prerequisite skills, competencies, and concepts needed in pre-calculus: Factoring, operations on rational and radical expressions, absolute value equations and inequalities, exponential and logarithmic expressions and equations, conic sections, functions including composition and inverses, an in-depth focus on quadratic functions, and a review of topics from geometry. Intended for students majoring in business, science, technology, engineering, and mathematics and concurrently enrolled in MATH 1. This course is appropriate for students who are confident in their graphing and beginning algebra skills. 1701.00

MATH 216**Support for Trigonometry**

1 Unit, 1 hour lecture (P/NP)

Prerequisite: Math 50

Recommended Preparation: This course is appropriate for students who are confident in their graphing and beginning algebra skills.

Review of the core prerequisite skills, competencies, and concepts needed in trigonometry: Geometry, transformations of graphs, trigonometric functions and applications, conic sections, polar coordinates including the complex plane and analytic geometry. Intended for students majoring in science, technology, engineering, and mathematics and who are concurrently enrolled in MATH 50, Trigonometry. This course is appropriate for students who are confident in their graphing and beginning algebra skills. 1701.00

MATH 225**Mathematics for Technicians**

3 units, 3 hours lecture (GR)

Prerequisite: Math 250 or 251D or 253 or appropriate placement based on a multiple-measure assessment process

Eligible for credit by examination

Mathematics for technicians: Signed numbers, formulas, fractions, English and metric measurements, decimals, accurate readings of scales, errors, simple algebra and geometry, reading graphs, and use of the calculator. 1701.00

MATH 230**Elementary and Intermediate Algebra for Business or STEM majors**

6 units, 6 hours lecture (GR)

Prerequisites: Math 253 or 250 or 225 or appropriate placement through multiple measures assessment process

A combined course in algebra: Systems of equations; inequalities, graphs and functions; radicals, quadratic polynomials, rational expressions; exponential and logarithmic functions, and problem solving, with emphasis on knowledge skills appropriate for students pursuing a major in STEM (Science, Technology, Engineering, Mathematics) or Business. 1701.00

MATH 248AA-FZ**Selected Topics in Mathematics**

.5-5 units, 0-5 hours lecture, 0-15 hours laboratory (GR or P/NP)

See section on Selected Topics. 1701.00

MATH 250**Arithmetic**

3 units, 3 hours lecture (GR or P/NP)

Not open for credit to students who have completed or are concurrently enrolled in Math 251ABCD.

Eligible for credit by examination

Non-degree applicable

Refresher course in the fundamental processes of arithmetic: Whole numbers, fractions, decimals and percents; metric system introduced and incorporated throughout the arithmetic material. 4930.41

MATH 253**Pre-Algebra**

3 units, 3 hours lecture (GR or P/NP)

Recommended preparation: Math 250 or appropriate placement through multiple-measures assessment process

Non-degree applicable

Fundamentals of pre-algebra: Properties of real numbers, factoring and multiples, ratio and proportion, signed numbers, linear equations and formulas, powers and roots, percents and averages, and English and metric measurements. 1701.00

NONCREDIT COURSE**MATH 521****Algebra 1 Review**

0 units, 1-5 lecture hours (P/NP)

Review of the California State Standards for Algebra 1: Key components of first year high school algebra; symbolic reasoning and calculations with symbols as applied to solving, graphing equations, functions, and inequalities. 1702.00

MATHEMATICS ASSOCIATE OF SCIENCE

The **AS degree in Mathematics** will be awarded upon completion of the major course requirements listed below and the General Education requirements for the Associate in Science Degree listed in the Degrees, Programs & Transfer Requirements section of this Catalog.

Career Opportunities

Why Study Mathematics? Today's world has many fields that need specialists in mathematics. Careers in mathematics include: scientists, researchers, space technicians, mathematics teachers, actuaries and insurance specialists, and people who can combine mathematical knowledge with a scientific, computer, or business background.

Program Learning Outcomes

Upon completion of this program a student will be able to:

- **Problem Solving:** Use quantitative reasoning to solve everyday mathematical problems in the workplace and in the home.
- **Solve Equations:** Read, write, and critique technical writings and analytical arguments.
- **Graphing:** Convey and interpret information through visual representations.

Degree Major Requirements:

Dept/No.	Title	Units
MATH 3A	Calculus I	5
MATH 3B	Calculus II	5
MATH 3C	Calculus III	5
MATH 3E	Linear Algebra	3
MATH 3F	Differential Equations	3

Select one course (4 units) from the following:

MATH 11	Discrete Mathematics (4)	
MATH 13	Introduction to Statistics (4)	<u>4</u>
	Total Required Units	25

(Total: 25 units – transfers to math major at both UC and CSU systems)

MATHEMATICS ASSOCIATE OF SCIENCE FOR TRANSFER

The AS-T degree in Mathematics is designed to prepare students for transfer into the mathematics major at any university in the CSU system. It requires fewer units than the AS degree and allows students to a wider range of choices to complete the degree requirements.

The AS-T degree in Mathematics will be awarded upon completion of the major course requirements listed below and the General Education requirements for the Associate in Science Degree listed in the Degrees and Programs section of this Catalog.

Career Opportunities

Why Study Mathematics? Today's world has many fields that need specialists in mathematics. Careers in mathematics include: scientists, researchers, space technicians, mathematics teachers, actuaries and insurance specialists, and people who can combine mathematical knowledge with a scientific, computer, or business background.

Program Learning Outcomes

Upon completion of this program a student will be able to:

- **Problem Solving:** Use quantitative reasoning to solve everyday mathematical problems in the workplace and in the home.
- **Solve Equations:** Read, write, and critique technical writings and analytical arguments.
- **Graphing:** Convey and interpret information through visual representations.

Degree Major Requirements:

Dept/No.	Title	Units
MATH 3A	Calculus I	5
MATH 3B	Calculus II	5
MATH 3C	Calculus III	5

**At least one(1) course from Group A
(If a student chooses both, Group B is optional).**

GROUP A

MATH 3E	Linear Algebra (3)	
MATH 3F	Differential Equations (3)	3

**At least one (1) course from Group B if necessary
to complete 21 units for the major.**

GROUP B

MATH 11	Discrete Mathematics (4)	
MATH 12	Symbolic Logic (4)	
MATH 13	Introduction to Statistics (4)	
PHYS 4A	General Physics with Calculus (5)	
PHYS 4B	General Physics with Calculus (5)	
PHYS 4C	General Physics with Calculus (5)	<u>4-5</u>
Minimum Required Units:		22-23

CSU General Education or IGETC Pattern	38-41
CSU Transferrable Elective Units (as needed to reach 60 transferable units)	
Total Units Required for Degree	60

* For the Associate in Science Degree in Mathematics for Transfer, students must complete the IGETC or CSU GE-Breadth Education pattern and elective courses for additional 41-42 units: some units can be double counted in order to stay within the 60-unit requirement for the degree.