

Mathematics

Mathematics is a rapidly expanding, dynamic discipline which has contributed to recent advances in astronomy, biology, chemistry, engineering, medicine and physics. Mathematics is truly becoming the necessary language of a wide spectrum of knowledge.

The mathematics program is designed to accept students at many levels of mathematical maturity and enable them to gain the mathematical knowledge necessary for them to achieve their goals.

Career Opportunities

An undergraduate degree in mathematics can lead to a variety of jobs in business, industry, government, and teaching. Mathematicians are employed by companies in communication, computers, energy and finance.

Faculty

Bob Carlson | Nichole Carver | Joe Estephan | Patrick Malone
Pat Mauch | Arda Melkonian | Said Ngobi | Jeff Redona | Jeff Ridge
Mary Lynn Stough | Stephen Toner | Anh Weis

Degrees and Certificates Awarded

Associate in Science for Transfer, Mathematics

Associate Degree

To earn an Associate in Science degree for Transfer with a major in Mathematics, complete the required major courses and all other requirements specified on the following pages (i.e. 60 CSU transferable units, CSU GE or IGETC, etc.). For more information on the AA-T/AS-T degrees, meet with a counselor or www.adegreewithaguarantee.com

Transfer

To pursue a bachelor's degree in this field, here are some schools that have programs that might interest you. For the most up-to-date information on these programs and others, visit www.assist.org. Please stop by the Transfer Center in Building 55 or make an appointment with a counselor if you have questions.

- **California State University, San Bernardino:** Mathematics major
- **University of California, Riverside:** Mathematics major

Program Learning Outcomes

A student receiving a degree or certificate in this field will be able to:

- Calculate arithmetic, algebraic, geometric, spatial, and statistical quantities using appropriate technology.
- Estimate arithmetic, algebraic, geometric, spatial, and statistical solutions.
- Solve arithmetic, algebraic, geometric, spatial, and statistical expressions, equations, functions, and problems using appropriate technology.
- Represent mathematical information numerically, symbolically, graphically, verbally, and visually using appropriate technology.
- Interpret mathematical and statistical models such as formulas, functions, graphs, tables, and schematics, drawing conclusions and making inferences based on those models.
- Develop mathematical and statistical models such as formulas, functions, graphs, tables, and schematics using appropriate technology.
- Communicate mathematical theories and ideas clearly and concisely to others in the oral and written form.

MATHEMATICS, AS-T (31025)		
<p>The role of mathematics is vital and growing, providing solutions to problems in a wide range of sciences: social, biological, physical, behavioral, and management. As a whole, mathematics is necessary for understanding and expressing ideas in science, engineering, and human affairs. Mathematics is integrally related to computer science and statistics, which have proven invaluable to advancing research and modern industrial technology. The Mathematics curriculum academically prepares the student to transfer to a 4-year university to complete a Baccalaureate degree in a similar major.</p> <p>The major requirements for the AS-T degree align with the intersegmental Transfer Model Curriculum (TMC) for Mathematics. Students should consult with a counselor to determine whether this degree is the best option for their transfer goals.</p>		
Program Requirements: 19 units		
Required Courses (15 units total)		
MATH 226/226H	Analytic Geometry and Calculus I	4.0
MATH 227/227H	Analytic Geometry and Calculus II	4.0
MATH 228/228H	Analytic Geometry and Calculus	5.0
Additional Courses		
List A – (3 units total)		
MATH 270	Differential Equations	3.0
List B – (3 units total)		
MATH 231	Linear Algebra	3.0
<p>A student wishing to pursue an AA-T/AS-T degree in the major listed on this page must ensure the CSU of their choice is accepting that similar major. Students completing an AA-T/AS-T degree are guaranteed admissions into a CSU campus given that a student fulfills the following:</p> <ol style="list-style-type: none"> 1) 60 CSU transferable units; 2) Completes the CSU General Education (GE) or IGETC General Education pattern; 3) Completes the major requirements for the AA-T/AS-T; 4) Maintains a transferable cumulative GPA of at least 2.0 (C or better); 5) Completes the basic/Golden 4 GE requirements. <p>For more information on the AA-T/AS-T degrees, meet with a counselor or visit www.adegreewithaguarantee.com</p>		

Mathematics Courses

MATH 6 MATH OPERATIONS

Units: 1.0

16-18 hours lecture

(No prerequisite.) This course does not apply to the Associate Degree.

This math course will review computations (addition, subtraction, multiplication, division) with whole numbers. The course also introduces students to operations with rational numbers and decimals.

MATH 10 BASIC MATH SKILLS

Units: 3.0

48-54 hours lecture

(No prerequisite.) This course does not apply to the Associate Degree.

This course covers the basic operations applied to whole numbers, fractions (including mixed numbers) and decimals. Prime factorization, least common multiple, ratio and proportion, similar triangles, averages; graphs and tables, square roots, the Pythagorean theorem, measurement, operations on signed-numbers and solutions of simple linear equations are also covered.

MATH 12 PRE-ALGEBRA

Units: 3.0

48-54 hours lecture

(Prerequisite: Eligibility as determined by VVC assessment.) This course does not apply to the Associate Degree.

This course reviews fractions, decimals and integers with a strong emphasis on solving equations and problem solving in order to prepare students for Introductory Algebra. Ratios and proportions are also covered, as well as an introduction to graphing linear equations, working with polynomials, and factoring.

MATH 42 ELEMENTARY ALGEBRA

Units: 4.0

64-72 hours lecture

(Prerequisite: MATH 12 minimum grade C, or eligibility as determined by VVC assessment. Corequisite: MATH 42S) This course does not apply to the Associate Degree.

To be taken with MATH 42S. This course covers a review of arithmetic operations with whole, decimal, fractional and signed numbers, exponential notations, percentages, and order of operations. Algebraic expressions, solving and graphing linear equations and inequalities, polynomial operations and polynomial factoring, rational and radical expressions and equations, quadratic equations and solutions to quadratic equations are also covered.

MATH 42S ELEMENTARY ALGEBRA WITH SKILLS SUPPORT

Units: 5.0

80-90 hours lecture

Prerequisite: MATH 12 with a Grade of "C" or better or eligibility as determined by VVC assessment) This course does not apply to the Associate Degree

This course covers a review of arithmetic operations with whole, decimal, fractional and signed numbers, exponential notation, percentages, and order of operations. Algebraic expressions, solving and graphing linear equations and inequalities, polynomial operations and polynomial factoring, rational and radical expressions and equations, quadratic equations and solutions to quadratic equations are also covered. This course does not apply to the Associate Degree. This class focuses on study skills and extra support for students by teaching some concepts using different learning modalities.

MATH 63 PRE-STATISTICS MATHEMATICS

Units: 5.0

80-90 hours lecture

(Prerequisite: MATH 12 OR MATH 42 with a grade of 'C' or better, or eligibility as determined by VVC assessment.)

This non-STEM course covers core algebra skills needed to understand the concepts, formulas, and graphs used in transfer-level statistics. Integrates numeracy, proportional reasoning, algebraic reasoning, and functions. Develops conceptual and procedural tools that support the use of key mathematical concepts in a variety of contexts. Throughout the course, college success content will be integrated with mathematical topics. This course is NOT intended for math, science, computer science, business, or engineering majors.

MATH 90 INTERMEDIATE ALGEBRA

Units: 4.0 | 64-72 hours lecture

(Prerequisite: MATH 42 (formerly MATH 50 or both MATH 50A and MATH 50B), MATH 42-S or MATH 63 with a grade of 'C' or better or eligibility as determined by VVC assessment.)

This course is designed to serve as a preparation for the study of College Algebra, Statistics, Trigonometry and other college mathematics courses. Topics include a review of the real number system, an introduction to imaginary and complex numbers, the solution of first degree, quadratic and systems of equations, polynomials, rational expressions, exponents and radicals, graphs of functions (both linear and nonlinear) and of relations, and exponential and logarithmic functions.

MATH 90S INTERMEDIATE ALGEBRA WITH SKILLS SUPPORT

Units: 5.0 | 64-72 hours lecture

(Prerequisite: MATH 42, MATH 42S, or MATH 63 with a grade of "C" or better or eligibility as determined by VVC assessment.)

This course is designed to serve as a preparation for the study of College Algebra and Trigonometry and other college mathematics courses. Topics include a review of the real number system, an introduction to imaginary and complex numbers, the solution of first degree, quadratic and systems of equations, polynomials, rational expressions, exponents and radicals, graphs of functions (both linear and nonlinear) and of relations, and exponential and logarithmic functions. This class also focuses on study skills and extra support for students by teaching some concepts using different learning modalities.

MATH 104 TRIGONOMETRY

Units: 4.0 | [CSU](#) | 64-72 hours lecture

(Prerequisite: MATH 90 or MATH 90S with a grade of 'C' or better.)

Topics for this preparatory course for calculus include trigonometric functions and equations, solutions of both right and oblique triangles, trigonometric forms of complex numbers and De Moivre's Theorem. Course content also includes verification of trigonometric identities, inverse trigonometric functions, half and multiple angles, vectors and their applications, parametric equations, polar coordinates and polar equations.

MATH 105 COLLEGE ALGEBRA

Units: 4.0 | [CSU, UC](#) | 64-72 hours lecture

(Prerequisite: MATH 90 or MATH 90S with a grade of 'C' or better or eligibility as determined by VVC assessment.) (UC credit limitation)

The course offers a review of real numbers, real number exponents, and factoring polynomials. The course also covers equations and inequalities, solutions to systems of equations and inequalities, solutions to equations and inequalities involving absolute value, graphing relations and functions, matrices, determinants of matrices, and matrix algebra. Complex numbers, the real and complex zeros of polynomials, the zeros of exponential, rational and radical functions, the conic sections, sequences, mathematical induction and the binomial theorem are also covered.

MATH 105H HONORS COLLEGE ALGEBRA

Units: 4.0 | [CSU, UC](#) | 64-72 hours lecture

(Prerequisite: MATH 90 or MATH 90S with a grade of 'C' or better.) (UC credit limitation)

This course covers all the topics of the regular MATH 105 course, but the topics are covered in greater depth. Exponents and radicals, theory of quadratic equations, simultaneous quadratic equations, complex numbers, equations of higher degree, inequalities, logarithmic and exponential equations, binomial theorem, matrices and determinants, partial fractions, sequences and series.

MATH 116 PREPARATION FOR CALCULUS

Units: 3.0 | [CSU, UC](#) | 48-54 hours lecture

(Prerequisite: Math 104 and Math 105 or H105, minimum grade C, or eligibility as determined by the VVC assessment test. Co-requisite: MATH 104 or MATH 105 or MATH 105H.)

Function, theory, techniques for graphing functions (polynomials, rational functions, trig functions, exponential functions, log functions, and compositions of these such as trig polynomials), conic sections, solutions of systems of linear and non-linear equations, inequalities, introduction to limits.

Mathematics Courses

MATH 120 INTRODUCTION TO STATISTICS

Units: 4.0 **CSU, UC** | 64-72 hours lecture

(Prerequisite: MATH 90, MATH 90S or MATH 63 with a grade of 'C' or better, or eligibility as determined by VVC assessment.)

The use of probability techniques, hypothesis testing, and predictive techniques to facilitate decision-making. Topics include descriptive statistics; probability and sampling distributions; statistical inference; correlation and linear regression; analysis of variance, chi-square and t-tests; and application of technology for statistical analysis including the interpretation of the relevance of the statistical findings. Applications using data from disciplines including business, social sciences, psychology, life science, health science, and education.

MATH 120S INTRODUCTION TO STATISTICS

Units: 5.0 **CSU, UC** | 80-90 hours lecture

(Prerequisite: MATH 90, MATH 90S or MATH 63 with a grade of 'C' or better, or eligibility as determined by VVC assessment.)

Prerequisite: Math 90, Math 90-S, or Math 63 with a grade of "C" or better, or eligibility as determined by VVC assessment test. The use of probability techniques, hypothesis testing, and predictive techniques to facilitate decision-making. Topics include descriptive statistics; probability and sampling distributions; statistical inference; correlation and linear regression; analysis of variance, chi-square and t-tests; and application of technology for statistical analysis including the interpretation of the relevance of the statistical findings. Applications using data from disciplines including business, social sciences, psychology, life science, health science, and education. This class also focuses on study skills and extra support for students by teaching some concepts using different learning modalities.

MATH 120H HONORS INTRODUCTION TO STATISTICS

Units: 4.0 **CSU, UC** | 64-72 hours lecture

(Prerequisite: MATH 90, MATH 63 or MATH 66 with a grade of 'C' or better.)

Basic statistical techniques, design and analysis for both parametric and non-parametric data are included. Descriptive statistics are included. Graphing techniques of illustrating the data are covered. Probability is covered. Inferential statistics included are estimation and hypothesis testing, chi-square, analysis of variance, and regression. Applications are drawn from a variety of fields. In addition, the Honors component will include the design of surveys, probability testing, and a research project.

MATH 129 INDEPENDENT STUDY

Units: 1-3 units **CSU** |

See Independent Study listing

MATH 129AH INDEPENDENT STUDY HONORS - FIRST SEMESTER

Units: 1.0 **CSU** | 54 hours independent study

(No prerequisite)

Independent study provides individual students challenging and in-depth study on approved topics within any subject area. Independent study proposals must have the approval of the instructor and appropriate administrator. It is expected that the study will not duplicate existing curriculum; rather, it will be of an advanced nature and extend approved courses or series of courses. This first semester honors independent study course is intended to begin the study of advanced topics at an honors level.

MATH 129BH INDEPENDENT STUDY HONORS - SECOND SEMESTER

Units: 1.0 **CSU** | 54 hours independent study

(Prerequisite: MATH 129AH)

Independent study provides individual students challenging and in-depth study on approved topics within any subject area. Independent study proposals must have the approval of the instructor and appropriate administrator. It is expected that the study will not duplicate existing curriculum; rather, it will be of an advanced nature and extend approved courses or series of courses. This second semester honors independent study course is intended to provide students who have completed a first semester of independent study with the opportunity to deepen their understanding of their chosen advanced topic of mathematics at an honors level.

MATH 129CH INDEPENDENT STUDY HONORS - THIRD SEMESTER

Units: 1.0 **CSU** | 54 hours independent study

(Prerequisite: MATH 129BH)

Independent study provides individual students challenging and in-depth study on approved topics within any subject area. Independent study proposals must have the approval of the instructor and appropriate administrator. It is expected that the study will not duplicate existing curriculum; rather, it will be of an advanced nature and extend approved courses or series of courses. This third semester honors independent study course is intended to provide students who have completed two semesters of independent study with the opportunity to further deepen their understanding of their chosen advanced topic of mathematics at an honors level with the goal of public presentation or publication.

MATH 132 THE IDEAS OF MATH

Units: 3.0 **CSU, UC** | 48-54 hours lecture

(Prerequisite: MATH 90 or MATH 90S with a grade of 'C' or better or eligibility as determined by VVC assessment.)

Sets and their application to permutations, combinations, binomial theorem, correspondence, countability, finite probability measures, and expectation; linear, exponential and geometric modeling with applications.

MATH 138 COOPERATIVE EDUCATION

Units: 1-8 units **CSU** |

See Cooperative Education listing

MATH 226 ANALYTIC GEOMETRY AND CALCULUS

Units: 4.0 **CSU, UC** | 64-72 hours lecture

(Prerequisites: MATH 104 and MATH 105 or MATH 105H with a grade of C or better, or placement by VVC assessment.)

This class offers an introduction to the calculus of single variables. Topics covered include limits, using limits of functions to determine continuity, finding derivatives and integrals of functions, basic properties of derivatives and integrals, the relationship between derivatives and integrals as given by the Fundamental Theorem of Calculus, and applications.

MATH 226H HONORS ANALYTIC GEOMETRY AND CALCULUS

Units: 4.0 **CSU, UC** | 64-72 hours lecture

(Prerequisite: MATH 104 and MATH 105 or MATH 105H with a grade of C or better, or placement by VVC assessment.) (UC Credit Limitation)

As an introduction to the calculus of single variables, students will develop the concept of limit; apply limits to functions to determine if they are continuous; find the derivative and determine integrals. Students will study the properties of the derivative and integral, their relationship to each other given by the Fundamental Theorem of Calculus. In addition, the honors component will include reading proofs, and writing simple proofs.

MATH 227 ANALYTIC GEOMETRY AND CALCULUS II

Units: 4.0 **CSU, UC** | 64-72 hours lecture

(Prerequisite: MATH 226 or MATH 226H with a grade of 'C' or better.)

This second course in differential and integral calculus of a single variable: integration; techniques of integration; infinite sequences and series; polar and parametric equations; applications of integration.

MATH 227H HONORS ANALYTIC GEOMETRY AND CALCULUS II

Units: 4.0 **CSU, UC** | 64-72 hours lecture

(Prerequisite: MATH 226 or MATH 226H with a grade of 'C' or better.) (UC credit limitation)

The second course in differential and integral calculus of a single variable: integration; techniques of integration; infinite sequences and series; polar and parametric equations; applications of integration. In addition, the honors component will include reading proofs, writing complete proofs from sketches of proofs and applying techniques learned to real-life problems.

Mathematics Courses

MATH 228 ANALYTIC GEOMETRY AND CALCULUS

Units: 5.0 **CSU, UC** | 80-90 hours lecture

(Prerequisite: MATH 227 or MATH 227H with a grade of 'C' or better.)

This course covers vectors and the geometry of space, vector-valued functions, the calculus of functions as several variables, multiple integration, Green's Theorem, divergence theorem, Stoke's Theorem and applications.

MATH 228H HONORS ANALYTIC GEOMETRY AND CALCULUS

Units: 5.0 **CSU, UC** | 80-90 hours lecture

(Prerequisite: MATH 227 or MATH 227H with a grade of "C" or better.)

Vectors and the geometry of space, vector-valued functions, the calculus of functions of several variables, multiple integration, Green's Theorem, divergence theorem, Stoke's Theorem, and applications. In addition, the honors component will include reading proofs, writing complete proofs from sketches of proofs and apply techniques learned to real-life problems.

MATH 231 LINEAR ALGEBRA

Units: 3.0 **CSU, UC** | 48-54 hours lecture

(Prerequisite: MATH 226 or MATH 226H with a grade of 'C' or better or concurrent enrollment in MATH 226.)

An introduction to linear algebra that compliments advanced courses in calculus. Topics include systems of linear equations, matrix operations, determinants, vectors and vector spaces, eigenvalues and eigenvectors and linear transformations. With orthogonality, inner product spaces and numerical methods if time permits.

MATH 270 DIFFERENTIAL EQUATIONS

Units: 3.0 **CSU, UC** | 48-54 hours lecture

(Prerequisite: MATH 227 or MATH 227H with a grade of 'C' or better)

This course covers elementary differential equations, solutions of first order equations, linear equations with constant coefficients, simultaneous linear systems, series solutions, the Laplace transform, and applications to physics and engineering.