

# MATHEMATICS

School of Mathematics, Computer Science and Engineering

**Dean:** Kathleen Schrader, D.N.Sc.

**Academic Chair:** Dorothy Sherling, Ph.D.

**Faculty:** Abdulmagid Aburwein, Ph.D., Jack Appleman, Mohammad Araiepour, Terry Barbee, Ph.D., Minh Can, Miriam Castroconde, Shu-Yung Chen, Terry Cheng, Howard Dachslager, Ph.D., Ilknur Erbas-White, Farimah Fazeli, Megan Granich, Sanjai Gupta, Ph.D., Mas Hayashi, Steve Houseman, Barbara Hudgins, Steve Kassman, Brent Monte, Joseph Ninh, Jo Ann Noyes, Bob Papendick, Barry Pearlstein, Lan Pham, Ph.D., Shahriar Razari-Arjmand, Dorothy Sherling, Ph.D., Eric Shulman, Richard Zucker

## CURRICULUM

The Mathematics Department at Irvine Valley College offers a wide range of courses to meet the varied needs of students pursuing their academic and vocational goals. The department offers a comprehensive curriculum for students who plan to transfer to four-year colleges and universities. In addition, the department offers developmental courses taught in a variety of formats. Students can enroll in these courses for personal enrichment and/or to get ready to take courses at the college level. The department offers support for all mathematics students in the Mathematics Tutorial Center, a facility staffed by faculty and tutors.

## MAJOR

The completion of the Associate in Arts degree in mathematics demonstrates commitment to the field and provides comprehensive preparation for upper division courses in most professional careers related to mathematics.

## CAREER OPTIONS

Occupations that require knowledge of mathematics or, in some cases, a degree in mathematics, include the following:

- Computer Programmer
- Computer Scientist
- Computer Software Engineer
- Computer Systems Analyst
- Database Administrator
- Operations Research Analyst
- Statistician

A strong background in mathematics also facilitates employment for the following:

- Astronomers
- Economists
- Engineers
- Financial Analysts
- Market and Survey Researchers
- Personal Financial Advisors
- Physicists
- Teachers—Postsecondary
- Teachers—Preschool, Kindergarten, Elementary, Middle and Secondary

## ASSOCIATE DEGREE

- **Associate in Arts Degree in Mathematics**

Students must complete a minimum of 60 units of credit, including the courses in the major ("Major Requirements") and general education requirements (pages 43-49), with an overall GPA of 2.0 or better, and a grade of "A," "B," "C," or "P" in all courses to be counted toward the major. A minimum of 12 units must be completed at Irvine Valley College. See pages 33-34 for further information.

## TRANSFER PREPARATION

Courses that fulfill major requirements for an associate degree at Irvine Valley College may not be the same as those required for completing the major at a transfer institution offering a bachelor's degree. Students who plan to transfer to a four-year college or university should schedule an appointment with an IVC counselor to develop a plan of study before beginning their program. It may be helpful to meet with the department faculty at IVC.

### ASSOCIATE IN ARTS DEGREE MAJOR REQUIREMENTS: MATHEMATICS

Complete the following courses:		Units
<b>MATH 3A</b>	Analytic Geometry and Calculus I	5
<b>MATH 3B</b>	Analytic Geometry and Calculus II	5
<b>MATH 4A</b>	Analytic Geometry and Calculus III	5
<b>MATH 24</b>	Elementary Differential Equations	4
<b>MATH 26</b>	Introduction to Linear Algebra	4
Complete <u>one</u> of the following courses:		
<b>PHYS 4A</b>	General Physics	4
<b>CS 36</b>	C Programming	4
<b>CS 37</b>	C++ Programming	4
<b>TOTAL UNITS:</b>		<b>27</b>

**COURSES**

**MATHEMATICS:  
COLLEGE LEVEL**

**MATH 2: PRE-CALCULUS**

5 Units

5 hours lecture

Transfers: CSU, UC credit proviso (see UC course list)

Prerequisite: Math 124

Recommended Preparation:

Concurrent enrollment in TU 301 strongly recommended

This course is designed for students who seek a better understanding of and preparation for mathematics prior to enrolling in a calculus course. Topics include the complex number system; elementary functions, including polynomial, rational, algebraic, exponential, logarithmic and trigonometric functions; polar coordinates and parametric equations; relations and their graphs; and methods for solving linear and non-linear systems of equations. (CAN MATH 16) NR

**MATH 3A: ANALYTIC GEOMETRY AND CALCULUS I**

5 Units

5 hours lecture

Transfers: CSU, UC credit proviso (see UC course list)

Prerequisite: Math 2

Recommended Preparation:

Concurrent enrollment in TU 301 strongly recommended

This course covers basic concepts of analytic geometry, limits and continuity; and differentiation and integration of algebraic and trigonometric functions. Applications include related rates and optimization problems, area between curves, and volumes of solids of revolution. (CAN MATH 18; Math 3A+3B: CAN MATH SEQ B; Math 3A+3B+4A: MATH SEQ C) NR

**MATH 3B: ANALYTIC GEOMETRY AND CALCULUS II**

5 Units

5 hours lecture

Transfers: CSU, UC

Prerequisite: Math 3A

Recommended Preparation:

Concurrent enrollment in TU 301 strongly recommended

This course continues the study of single-variable differential and integral calculus begun in Math 3A. It covers integration and differentiation of trigonometric, exponential, logarithmic and hyperbolic functions; parametric equations; transformations in the plane; indeterminate forms; and improper integrals. Taylor's formula and infinite series are studied. (CAN MATH 20; Math 3A+3B: CAN MATH SEQ B; Math 3A+3B+4A: MATH SEQ C) NR

**MATH 4A: ANALYTIC GEOMETRY AND CALCULUS III**

5 Units

5 hours lecture

Transfers: CSU, UC

Prerequisite: Math 3B

Recommended Preparation:

Concurrent enrollment in TU 301 strongly recommended

This course studies vectors and parametric equations, partial differentiation, functions of two or more variables, gradients, higher-order derivatives, multiple integrals, cylindrical and spherical coordinates, vector functions and their derivatives, vector fields, surface and line integrals, the theorems of Green and Stokes, and the Divergence Theorem. Math 4A may be taken concurrently with Math 24 and/or Math 26. (CAN MATH 22; Math 3A+3B+4A: MATH SEQ C) NR

**MATH 8: COLLEGE ALGEBRA**

5 Units

5 hours lecture

Transfers: CSU, UC credit proviso (see UC course list)

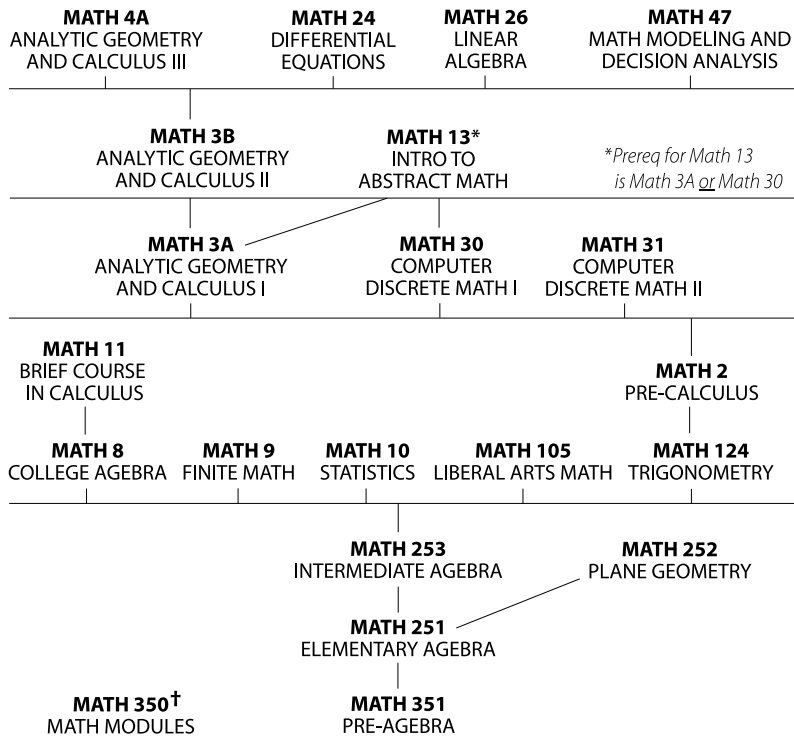
Prerequisite: Math 253

Recommended Preparation:

Concurrent enrollment in TU 301 strongly recommended

This course examines algebraic topics and elementary functions for those seeking preparation prior to enrolling in a calculus course for non-science majors. Course topics include equations and inequalities, relations and functions, polynomial and rational functions, exponential and logarithmic functions, matrices and determinants, sequences and series, limits, the binomial expansion, and curve sketching techniques. NR

**MATH COURSE SCHEMATIC**



† Please note: Math 350 (Math Modules) may be taken at any time.

**MATH 9: FINITE MATHEMATICS****3 Units****3 hours lecture****Transfers: CSU, UC****Prerequisite: Math 253***Recommended Preparation:**Concurrent enrollment in TU 301**strongly recommended*

This course includes a study of linear functions, matrices, and vectors, and how these topics apply to linear programming problems. It also involves the study of sets, logic, and counting, and their application to probability and stochastic processes. The course also covers topics in statistics and the mathematics of finance. (CAN MATH 12) NR

**MATH 10: INTRODUCTION TO STATISTICS****3 Units****3 hours lecture****Transfers: CSU, UC credit proviso (see UC course list)****Prerequisite: Math 253***Recommended Preparation:**Concurrent enrollment in TU 301**strongly recommended*

This course teaches students to collect, organize and describe data using graphical and numerical techniques. Students study the measures of central tendency, dispersion, and correlation; laws of probability; and laws of statistical estimation, including the use of z-, t-, Chi-square-, and F-distributions to perform confidence intervals and hypothesis testing. Students use a calculator and/or computer to make measurements on a set of data. The course stresses the application of statistical analysis to the natural, social, and business sciences and to the understanding and use of numerical data by the general public. (CAN STAT 2 ) NR

**MATH 11: A BRIEF COURSE IN CALCULUS****4 Units****4 hours lecture****Transfers: CSU, UC credit proviso (see UC course list)****Prerequisite: Math 8***Recommended Preparation:**Concurrent enrollment in TU 301**strongly recommended*

This course focuses on the application of concepts in calculus to business, economics, and the social and biological sciences. Topics include limits, derivatives, integrals, and differential equations as applied to functions of one or more variables. The course is designed for students who need only one semester of calculus. (CAN MATH 34) NR

**MATH 13: INTRODUCTION TO ABSTRACT MATHEMATICS****4 Units****4 hours lecture****Transfers: CSU, UC credit pending****Prerequisite: Math 3A or Math 30***Recommended Preparation:**Concurrent enrollment in TU 301**strongly recommended*

This course provides students experience in analyzing and creating mathematics at the introductory level and prepares students for upper division mathematics. Students construct and analyze proofs in a variety of abstract topics using different methods, including direct proof, indirect proof, case analysis, and mathematical induction. Topics include introductory mathematical logic and set theory, equivalence relations, functions and relations, and cardinality. The course is designed for students who will be taking additional courses in mathematics, and it is strongly recommended for mathematics majors. NR

**MATH 24: ELEMENTARY DIFFERENTIAL EQUATIONS****4 Units****4 hours lecture****Transfers: CSU, UC****Prerequisite: Math 3B***Recommended Preparation:**Concurrent enrollment in TU 301**strongly recommended*

This course includes the study of first-order differential equations; second- and higher-order linear differential equations; equations with constant coefficients; variation of parameters; the Laplace transform; systems of equations; series solutions; and the numerical methods of solutions with applications to physics and engineering. Mathematics 24 may be taken concurrently with Mathematics 26. (CAN MATH 24) NR

**MATH 26: INTRODUCTION TO LINEAR ALGEBRA****4 Units****4 hours lecture****Transfers: CSU, UC****Prerequisite: Math 3B***Recommended Preparation:**Concurrent enrollment in TU 301**strongly recommended*

This course introduces the concepts of linear algebra. Studies include vectors; vector spaces and subspaces; matrices; systems of linear equations; dimension; determinants; eigenvalues and eigenvectors; and linear transformations and their applications. Mathematics 26 may be taken concurrently with Mathematics 24 or Mathematics 4A. (CAN MATH 26 ) NR

**MATH 30: COMPUTER DISCRETE MATHEMATICS I****3 Units****3 hours lecture****Transfers: CSU, UC****Prerequisite: Math 2***Recommended Preparation:**Concurrent enrollment in TU 301**strongly recommended*

This course is designed primarily for computer science majors. Areas of study include Boolean algebra, propositional calculus, and predicate calculus. Topics include truth tables, minimization, sets, relations, switching networks, digital circuits, and duality. This course is also listed as Computer Science 6A; credit will be given in either area, not both. NR

**MATH 31: COMPUTER DISCRETE MATHEMATICS II****3 Units****3 hours lecture****Transfers: CSU, UC****Prerequisite: Math 2***Recommended Preparation:**Concurrent enrollment in TU 301**strongly recommended*

This course is designed primarily for computer science majors. Major topics include permutations, combinations, binomial coefficients, recurrence relations, graph theory, generating functions, and probability theory. This course is also listed as Computer Science 6B; credit will be given in either area, not both. NR

**MATH 47: FINITE MATHEMATICAL MODELING AND DECISION ANALYSIS****3 Units****3 hours lecture****Prerequisite: Math 3B****Transfers: CSU, UC credit pending**

Applications of calculus, matrix algebra, discrete math and probability theory to topics in physical science, biology, engineering, social sciences, and business. The course material is organized around real-world decision-making cases and projects from business, government and non-profit sectors. The course covers multiple topics in applied calculus and finite mathematics including matrices, combinatorics, probability, Bayes Theorem, Markov chains, and linear programming. NR

**MATH 105: MATHEMATICS FOR LIBERAL ARTS STUDENTS****3 Units****3 hours lecture****Transfers: CSU****Prerequisite: Math 253***Recommended Preparation:**Concurrent enrollment in TU 301 strongly recommended*

This course examines the nature of mathematics and its role in society, history of mathematical ideas and methods and the use of mathematics in problem solving. The major categories of mathematics will be studied including probability, graph theory, codes and coding, and mathematics as applied to the sciences, social sciences, and other disciplines, and to real-world consumer applications. (CAN MATH 2) NR

**MATH 124: TRIGONOMETRY****3 Units****3 hours lecture****Transfers: CSU****Prerequisite: Math 253***Recommended Preparation:**Concurrent enrollment in TU 301 strongly recommended*

This course introduces circular and trigonometric functions, their inverses and interrelationships, focusing on both the unit circle and right triangle methodologies. Topics include graphing, conditional equations, laws of sines and cosines, vectors, complex numbers, polar coordinates, and DeMoivre's Theorem. NR

**MATH 251: ELEMENTARY ALGEBRA****5 Units****5 hours lecture****Prerequisite: Math 351***Recommended Preparation:**Concurrent enrollment in TU 301 strongly recommended*

This is the first course in algebra. The course introduces signed numbers, equations and inequalities, graphs, linear equations, functions, and polynomials. Students perform arithmetic operations with a real numbers and algebraic expressions; graph and solve linear equations and inequalities; and perform algebraic operations with polynomials, rational expressions, and equations. This course is similar to the first year of high school algebra. NR

**MATH 252: PLANE GEOMETRY****5 Units****5 hours lecture****Prerequisite: Math 251***Recommended Preparation:**Concurrent enrollment in TU 301 strongly recommended*

This course studies the terminology and theorems of plane geometry, including congruence, parallelism, similarity, areas, volumes, and coordinate geometry. Students will use algebra to solve problems involving geometric figures. NR

**MATH 253: INTERMEDIATE ALGEBRA****5 Units****5 hours lecture****Prerequisite: Math 251***Recommended Preparation:**Concurrent enrollment in TU 301 strongly recommended*

This course is the continuation of elementary algebra and is intended to prepare students for subsequent math classes. It includes the study of the real number system, open sentences in one variable, polynomials, factoring, systems of linear equations, rational numbers, and functions. The course also covers irrational and complex numbers, quadratic equations and functions, exponential and logarithmic functions, and quadratic relations and systems. NR

**MATHEMATICS: BASIC SKILLS****MATH 350A: WHOLE NUMBERS MODULE****.5 Unit****.5 hour lecture***Recommended Preparation:**Concurrent enrollment in TU 301 strongly recommended*

Math 350A includes a series of online instructional videos and exercises. This module defines whole numbers and introduces operations, rounding, and order of operations with whole numbers using a problem-solving approach. This course is offered pass/no-pass only. R-E-1

**MATH 350B: FRACTIONS PART 1 MODULE****.5 Unit****.5 hour lecture***Recommended Preparation:**Concurrent enrollment in TU 301 strongly recommended*

Math 350B includes a series of online instructional videos and exercises. This module defines fractions and mixed numbers and introduces multiplication and division with fractions and mixed numbers using a problem-solving approach. This course is offered pass/no-pass only. R-E-1

**MATH 350C: FRACTIONS PART 2 MODULE****.5 Unit****.5 hour lecture***Recommended Preparation:**Concurrent enrollment in TU 301 strongly recommended*

Math 350C includes a series of online instructional videos and exercises. This module introduces addition and subtraction of fractions and mixed numbers, their comparison, and applications of the order of operations using a problem-solving approach. This course is offered pass/no-pass only. R-E-1

**MATH 350D: DECIMALS MODULE****.5 Unit****.5 hour lecture***Recommended Preparation:**Concurrent enrollment in TU 301 strongly recommended*

Math 350D includes a series of online instructional videos and exercises. This module defines decimals, introduces operations, rounding and order of operations with decimals using a problem-solving approach. This course is offered pass/no-pass only. R-E-1

**MATH 350E: RATIOS AND PROPORTIONS MODULE****.5 Unit****.5 hour lecture***Recommended Preparation:**Concurrent enrollment in TU 301 strongly recommended*

Math 350E is a series of online instructional videos and exercises. This module defines ratios and proportions using a problem-solving approach. This course is offered pass/no-pass only. R-E-1

**MATH 350F: PERCENTS PART 1  
MODULE****.5 Unit****.5 hour lecture***Recommended Preparation:  
Concurrent enrollment in TU 301  
strongly recommended*

Math 350F is a series of online instructional videos and exercises. This module defines percents, introduces conversions of decimals and fractions into percents and vice versa, and uses percents in solving word problems. This course is offered pass/no-pass only. R-E-1

**MATH 350G: PERCENTS PART 2  
MODULE****.5 Unit****.5 hour lecture***Recommended Preparation:  
Concurrent enrollment in TU 301  
strongly recommended*

Math 350G is a series of online instructional videos and exercises. This module covers applications of percents, including calculating percentage increases and decreases, sales tax, commissions, discounts, and interest using a problem-solving approach. This course is offered pass/no-pass only. R-E-1

**MATH 350H: MEASUREMENT  
AND GEOMETRY MODULE****.5 Unit****.5 hour lecture***Recommended Preparation:  
Concurrent enrollment in TU 301  
strongly recommended*

Math 350H is a series of online instructional videos and exercises. This module covers the conversions within and between the British and metric units of measurement as well as procedures to calculate perimeter, circumference, area and volume using a problem-solving approach. This course is offered pass/no-pass only. R-E-1

**MATH 351: ARITHMETIC REVIEW AND  
PRE-ALGEBRA MATHEMATICS****3 Units****3 hours lecture***Recommended Preparation:  
Concurrent enrollment in TU 301  
strongly recommended*

This course reviews the fundamentals of arithmetic computation with whole numbers, fractions and decimals. Students focus on developing estimating skills and solving a variety of problems using ratios and proportions, percents, measurements in U.S. and metric units, and geometric formulas. The course is designed for students who need a rapid review before taking a more advanced mathematics courses. NR

**MATHEMATICS  
SPECIAL SERVICES****MSS 325: BASIC ARITHMETIC SKILLS****3 Units****3 hours lecture**

**Limitation: Placement in this course is based on learning disability assessment, eligibility, and an individual educational plan.**

Although this course is open to anyone, it is designed for students with learning disabilities who need to review the fundamentals of arithmetic computation. Course topics include adding, subtracting, multiplying, and dividing whole numbers and fractions; converting fractions, decimals, and percents; solving word problems; and calculating ratios and proportions. R-E-1