

Mathematics

MATHEMATICS – MATH

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Possible career opportunities

Mathematicians work in a variety of fields, among them statistics, analysis, actuarial science, mathematical modeling, computer programming, cryptography, research, and education. More than two years of college study is usually required for these career options. A strong background in mathematics is also required for many careers in engineering, accounting and finance, business administration, risk management, and business forecasting, as well as for research in computer science, social science, and the physical sciences.

Program learning outcomes

Program learning outcomes are subject to change. The most current list of program learning outcomes for each program is published on the DVC website at www.dvc.edu/slo.

Associate in science in mathematics for transfer

Students completing the program will be able to...

- A. solve problems in linear algebra and differential and integral calculus, both single and multivariable.
- B. recognize, explain, and apply basic techniques of mathematical proof.
- C. utilize knowledge and skills from mathematics to solve mathematical problems from sciences such as physics, chemistry, engineering, or computer science.

Associate in science in mathematics for transfer

The mathematics major is a liberal arts and sciences major for students planning to study mathematics, applied mathematics, or mathematics for secondary school teachers, but also for those pursuing a course of study in physics, chemistry, engineering, computer science, and economics. Mathematics at Diablo Valley College offers a broad range of courses including calculus, differential equations, linear algebra, discrete mathematics and statistics.

The associate in science in mathematics for transfer is intended for students who plan to complete a bachelor's degree in a similar major at a CSU campus. Students completing this degree are guaranteed admission to the CSU system, but not to a particular campus or major.

In order to earn the degree, students must:

- Complete 60 semester CSU-transferable units.
- Complete the California State University-General Education pattern (CSU GE); or the Intersegmental General Education Transfer Curriculum (IGETC) pattern.
- Complete a minimum of 18 semester units in the major.
- Obtain of a minimum grade point average (GPA) of 2.0.
- Earn a grade of "C" or higher in all courses required for the major.

Students transferring to a CSU campus that accepts the degree will be required to complete no more than 60 units after transfer to earn a bachelor's degree. This degree may not be the best option for students intending to transfer to a particular CSU campus or to university or college that is not part of the CSU system, or those students who do not intend to transfer.

Some courses in the major satisfy both major and CSUGE/IGETC general education requirements; however, the units are only counted once toward the 60 unit requirement for an associate's degree. Some variations in requirements may exist at certain four-year institutions; therefore, students who intend to transfer are advised to refer to the catalog of the prospective transfer institution and consult a counselor.

<i>major requirements:</i>		<i>units</i>
MATH-192	Analytic Geometry and Calculus I	5
MATH-193	Analytic Geometry and Calculus II	5
MATH-292	Analytic Geometry and Calculus III	5

<i>plus at least 3 units from*:</i>		
MATH-194	Linear Algebra	3
MATH-294	Differential Equations	5

<i>plus at least 3 units from*:</i>		
MATH-142	Elementary Statistics with Probability.....	4
MATH-194	Linear Algebra	3
MATH-195	Discrete Mathematics	4
MATH-294	Differential Equations	5

total minimum required units 22

**Note: There may be no duplication of course units between lists of restricted electives.*

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MATH-050 In-Progress Prealgebra with Arithmetic Review Self-Pace

- 4 units P/NP
- Non degree applicable
 - 216 hours laboratory per term
 - Note: Students do not enroll directly in this course. Enrollment is limited to transfer by instructor.

This course is designed to allow students who are enrolled in MATH-075SP to receive non degree applicable credit for mastery of some but not all of the outcomes in MATH-075SP. In order to receive credit for MATH-050, students must enroll in MATH-075SP and make reasonable progress through the content.

MATH-051 In-Progress Elementary Algebra Self-Paced

- 5 units P/NP
- Non degree applicable
 - 270 hours laboratory per term
 - Recommended: MATH-075 or equivalent
 - Note: Students do not enroll directly in this course. Enrollment is limited to transfer by instructor.

This course is designed to allow students enrolled in MATH-090SP to receive credit for mastery of some but not all of the outcomes in MATH-090SP. In order to receive credit for MATH-051, students must enroll in MATH-090SP and make reasonable progress through the content.

MATH-052 In-Progress Intermediate Algebra Self-Paced

- 5 units P/NP
- Non degree applicable
 - 270 hours laboratory per term
 - Recommended: MATH-090 or MATH-090SP or equivalent
 - Note: Students do not enroll directly in this course. Enrollment is limited to transfer by instructor.

This course is designed to allow students enrolled in MATH-120SP to receive credit for mastery of some but not all of the outcomes in MATH-120SP. In order to receive credit for MATH-052, students must enroll in MATH-120SP and make reasonable progress through the content.

MATH-053 In-Progress College Algebra Self-Paced

- 4 units P/NP
- Non degree applicable
 - 216 hours laboratory per term
 - Recommended: Placement through the assessment process or MATH-120 or MATH-120SP or equivalent
 - Note: Students do not enroll directly in this course. Enrollment is limited to transfer by instructor.

This course is designed to allow students enrolled in MATH-135SP to receive credit for mastery of some but not all of the outcomes in MATH-135SP. In order to receive credit for MATH-053, students must enroll in MATH-135SP and make reasonable progress through the content.

MATH-075 Prealgebra with Arithmetic Review

- 4 units SC
- Non degree applicable
 - 72 hours lecture per term

This course covers arithmetic review, prealgebra, and their application in everyday life. Topics include the arithmetic operations, long multiplication and division, decimals, fractions, percents, signed numbers, natural number exponents, order of operations, introduction to the concept of variables, combining like terms, solving linear equations, application problems and the use of geometric formulas.

MATH-075SP Prealgebra with Arithmetic Review-Self Paced

- 4 units SC
- Non degree applicable
 - 216 hours laboratory per term
 - Note: In this computer-assisted, flexibly-paced class, students will utilize an online learning system for their initial instruction, as well as receive assistance during weekly face-to-face meetings. Students will have some flexibility on how much time they take to learn topics and when they take assessments, though minimum requirements and deadlines will apply. The online laboratories require computer access and may be completed either on or off campus. The face-to-face meetings will be held in the DVC Math Lab (for lab schedule go to www.dvc.edu/PHCmathlab for Pleasant Hill or www.dvc.edu/SRCmathlab for SRC). Students are encouraged to complete MATH-075SP in one semester, or take up to 2 semesters. MATH-075SP is equivalent to MATH-075; students who have completed MATH-075 will not receive credit for MATH-075SP.

This course is a computer-assisted, flexibly-paced class equivalent to MATH-075. This course covers arithmetic review, prealgebra, and their application in everyday life. Topics include arithmetic operations, long multiplication and division, decimals, fractions, percents, signed numbers, natural number exponents, order of operations, introduction to the concept of variables, combining like terms, solving linear equations, application problems and the use of geometric formulas.

MATH-077 Summer Bridge to College Math

- 1 unit LR
- Non degree applicable
 - 40 hours laboratory per term
 - Note: This course is part of the EOPS Summer Institute Learning Community and is designed for recent high school graduates. Math/English assessment tests are required. Contact the EOPS Summer Institute Coordinator for more information.

This course is designed to help students transition to math in college from high school. Students work with an instructor and the web-based ALEKS program to assess and build math skills in preparation for a college math course.

Mathematics**MATH-080 Topics in Basic Skills Math**

- .3-4 units SC
- *Non degree applicable*
 - *Variable hours*

This is a supplemental course in mathematics to provide a variety of topics for basic skills students. Specific topics will be announced in the schedule of classes.

MATH-085 Accelerated Algebra I

- 4 units SC
- *Non degree applicable*
 - *54 hours lecture/54 hours laboratory per term*

This is the first course of a two-semester accelerated algebra sequence that includes the material in MATH-075 and the first half of MATH-090. Topics include algebraic reasoning, percentages, problem solving, solving linear equations, graphing lines, and systems of equations.

MATH-090 Elementary Algebra

- 5 units SC
- *Non degree applicable*
 - *90 hours lecture per term*
 - *Prerequisite: Placement through the assessment process or MATH-075 or MATH-075SP or equivalent*
 - *Formerly MATH-110*

This course is an introduction to the techniques and reasoning of algebra, including linear equations and inequalities, development and use of formulas, algebraic expressions, systems of equations, graphs and introduction to quadratic equations.

MATH-090E Elementary Algebra with Study Skills

- 6 units SC
- *Non degree applicable*
 - *108 hours lecture per term*
 - *Prerequisite: Placement through the assessment process or MATH-075 or MATH-075SP or equivalent*

This course integrates study skills for math success with an introduction to the techniques and reasoning of algebra, including linear equations and inequalities, development and use of formulas, algebraic expressions, systems of equations, graphs and introduction to quadratic equations. Study skills topics will include time management, note taking, memory techniques, studying for tests, test anxiety and math anxiety.

MATH-090SP Elementary Algebra - Self Paced

- 5 units SC
- *Non degree applicable*
 - *270 hours laboratory per term*
 - *Prerequisite: Placement through the assessment process or MATH-075 or MATH-075SP or equivalent*
 - *Note: Formerly MATH-110SP. In this computer-assisted, flexibly-paced class, students will utilize an online learning system for their initial instruction, as well as receive assistance during weekly face-to-face meetings. Students will have some flexibility on how much time they take to learn topics and when they take assessments, though minimum requirements and deadlines will apply. The online labs require computer access and may be completed either on or off campus. The face-to-face meetings will be held in the DVC Math Lab (for lab schedule go to www.dvc.edu/PHCmathlab for Pleasant Hill or www.dvc.edu/SRCmathlab for SRC). Students are encouraged to complete MATH-090SP in one semester, or take up to 2 semesters. MATH-090SP is equivalent to MATH-090; students who have completed MATH-090 will not receive credit for MATH-090SP.*

This course is a computer-assisted, flexibly-paced class equivalent to MATH-090. The topics include linear equations and inequalities, development and use of formulas, algebraic expressions, systems of equations, operations on polynomials, factoring, graphs, and an introduction to quadratic equations.

MATH-092 Math for Trade Pre-Apprentices

- 4 units P/NP
- *Non degree applicable*
 - *72 hours lecture per term*
 - *Note: This course is part of the Pre-Apprenticeship program.*

This course provides practice in the mathematics needed to pass apprenticeship exams for various trades, as well as the mathematics required by apprentices on the job site. This course offers mathematics instruction contextualized for the building trades.

MATH-094 Statway I

- 4 units SC
- *Non degree applicable*
 - *54 hours lecture/54 hours laboratory per term*
 - *Prerequisite: Placement through the assessment process or MATH-075 or MATH-075SP or equivalent*
 - *Note: TI-83 or TI-84 graphing calculator required*

This is the first semester of a two-semester course that introduces the concepts of probability and statistics with requisite arithmetic and algebraic topics integrated throughout. It is intended for students in humanities or social sciences majors. Topics include data collection, organization and graphical interpretation of data, qualitative and quantitative data sets, measures of central tendency and measures of dispersion, bivariate data and scatter plots, linear functions and their graphs, nonlinear functions and their graphs, and linear and exponential/logarithmic models. Learning strategies for success with an emphasis on study skills, resource acquisition, and maintaining a positive perspective towards learning are also discussed and applied.

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MATH-114 Geometry

3 units SC

- 54 hours lecture per term
- Prerequisite: Placement through the assessment process or MATH-090 or MATH-090E or MATH-090SP or equivalent
- Recommended: Eligibility for ENGL-116/118 or equivalent

Students will use geometric definitions, axioms, and constructions and both inductive and deductive reasoning techniques to investigate the properties of lines, polygons, and circles. Students will prove geometric theorems, and derive and apply formulas for perimeter, area, and volume for a variety of plane and solid geometric objects.

MATH-119 Accelerated Algebra II

4 units SC

- 54 hours lecture/54 hours laboratory per term
- Prerequisite: Placement through the assessment process or MATH-085 or 090 or 090SP or 090E or equivalent

This is the second course of a two-semester accelerated algebra sequence; it covers the topics in the second half of MATH-090 and in MATH-120. Special products and factors, fractional equations, inequalities, complex numbers, logarithms, and functions will be covered.

MATH-120 Intermediate Algebra

5 units SC

- 90 hours lecture per term
- Prerequisite: Placement through the assessment process or MATH-090 or MATH-090E or MATH-090SP or equivalent

This course will expand upon the material covered in elementary algebra. Topics will include special products and factors, fractional equations, systems of linear equations, inequalities, conics, complex numbers, the binomial theorem, logarithms, and functions. The course is equivalent to a second year high school algebra course.

MATH-120SP Intermediate Algebra - Self Paced

5 units SC

- 270 hours laboratory per term
- Prerequisite: Placement through the assessment process or MATH-090 or MATH-090E or MATH-090SP or equivalent
- Note: In this computer-assisted, flexibly-paced class, students will utilize an online learning system for their initial instruction, as well as receive assistance during weekly face-to-face meetings. Students will have some flexibility on how much time they take to learn topics and when they take assessments, though minimum requirements and deadlines will apply. The online laboratories require computer access and may be completed either on or off campus. The face-to-face meetings will be held in the DVC Math Lab (for lab schedule go to www.dvc.edu/PHCmathlab for Pleasant Hill or www.dvc.edu/SRCmathlab for SRC). Students are encouraged to complete MATH-120SP in one semester, or take up to 2 semesters. MATH-120SP is equivalent to MATH-120; students who have completed MATH-120 will not receive credit for MATH-120SP.

This course is a computer-assisted flexibly-paced class equivalent to MATH-120. The topics include special products and factors, fractional equations, systems of linear equations, inequalities, conics, complex numbers, the binomial theorem, logarithms, and functions. The course is equivalent to a second year high school algebra course.

MATH-121 Plane Trigonometry

3 units SC

- 54 hours lecture per term
- Prerequisite: Placement through the assessment process or MATH-120 or 120SP or equivalent
- Recommended: High school geometry or equivalent

This course focuses on the theory and applications of trigonometry, including right triangle trigonometry, general angle trigonometry, and trigonometry on the unit circle, as well as trigonometric functions of real numbers. Applications include solutions of right and oblique triangles in problems in surveying, physics, engineering and navigation. CSU

MATH-124 Mathematics for Liberal Arts

3 units LR

- 54 hours lecture per term
- Prerequisite: Placement through the assessment process or MATH-119 or MATH-120 or 120SP or equivalent

This course presents applications of techniques and concepts of intermediate algebra and critical thinking to the solving of contemporary problems in mathematics. Topics may include exponential functions, logarithmic scales, probability, statistics, finance, matrix operations, logic or geometry. Historical context of some of the great ideas of mathematics will also be explored. CSU, UC

Mathematics**MATH-125 Mathematical Concepts for Elementary School Teachers**

- 3 units SC
- 54 hours lecture per term
 - Prerequisite: Placement through the assessment process or MATH-119 or MATH-120 or 120SP or equivalent

This course focuses on the development of quantitative reasoning skills through in-depth, integrated explorations of topics in mathematics, including real number systems and subsystems. Emphasis is on comprehension and analysis of mathematical concepts and applications of logical reasoning. CSU

MATH-135 College Algebra

- 4 units LR
- 72 hours lecture per term
 - Prerequisite: Placement through the assessment process or MATH-119 or MATH-120 or 120SP or equivalent

This course presents a study of functions and their graphs, including polynomial, rational, radical, exponential, absolute value, and logarithmic functions; systems of equations; theory of polynomial equations; analytic geometry. Other topics include inequalities, nonlinear systems, conic sections. CSU, UC (credit limits may apply to UC - see counselor)

MATH-135SP College Algebra - Self-Paced

- 4 units LR
- 216 hours laboratory per term
 - Prerequisite: Placement through the assessment process or MATH-119 or MATH-120 or 120SP or equivalent
 - Note: In this computer-assisted, flexibly-paced class, students will utilize an online learning system for their initial instruction, as well as receive assistance during weekly face-to-face meetings. Students will have some flexibility on how much time they take to learn topics and when they take assessments, though minimum requirements and deadlines will apply. The online laboratories require computer access and may be completed either on or off campus. The face-to-face meetings will be held in the DVC Math Lab (for lab schedule go to www.dvc.edu/PHCmathlab for Pleasant Hill or www.dvc.edu/SRCmathlab for SRC). Students are encouraged to complete MATH-135SP in one semester, or take up to 2 semesters. MATH-135SP is equivalent to MATH-135; students who have completed MATH-135 will not receive credit for MATH-135SP.

This course is a computer-assisted, flexibly-paced class, equivalent to MATH-135. This course presents a study of functions and their graphs, including polynomial, rational, radical, exponential, absolute value, and logarithmic functions; systems of equations; theory of polynomial equations; analytic geometry. Other topics include inequalities, nonlinear systems, conic sections. CSU, UC (credit limits may apply to UC - see counselor)

MATH-140 Tutor Training

- 1 unit LR
- 10 hours lecture/12 hours laboratory/12 hours laboratory by arrangement per term
 - Prerequisite: Placement through the assessment process or MATH-142 or MATH-144 or MATH-182 or MATH-191 or equivalent

Basic principles and methods of tutoring, including the tutoring sequence, leading and probing questions, communication skills, and learning theory. Application of tutoring techniques to specific areas of mathematics including algebra, trigonometry, and pre-calculus. Students will receive instruction in helping tutees with special needs. CSU

MATH-142 Elementary Statistics with Probability

- 4 units LR
- 72 hours lecture per term
 - Prerequisite: Placement through the assessment process or MATH-119 or MATH-120 or 120SP or equivalent
 - Note: TI-83 or TI-84 graphing calculator required

This course is designed to introduce the student to the study of statistics and probability. Topics include descriptive statistics (organization of data, histograms and measures of central tendency and spread), linear correlation and regression, design of experiments, introductory probability, random variables, the normal distribution and student's t-distribution, and statistical inference, including confidence intervals and tests of significance. Use of a graphing calculator or computer for statistical analysis is required. C-ID MATH 110, CSU, UC (credit limits may apply to UC - see counselor)

MATH-144 Statway II

- 4 units LR
- 54 hours lecture/54 hours laboratory per term
 - Prerequisite: MATH-094 or equivalent
 - Note: TI-83 or TI-84 graphing calculator required

This is the second semester of a two-semester course that introduces the concepts of probability and statistics with requisite arithmetic and algebraic topics integrated throughout. It is intended for students in humanities or social sciences majors. Topics include sampling distributions, the Central Limit theorem, confidence intervals and hypothesis testing for means and proportions, chi square tests and mathematical modeling. Learning strategies for success with an emphasis on study skills, resource acquisition, and maintaining a positive perspective towards learning are also discussed and applied. CSU, UC (credit limits may apply to UC-see counselor)

MATH-150 Topics in Mathematics

- .3-4 units SC
- Variable hours

A supplemental course in mathematics to provide a study of current concepts and problems. Specific topics will be announced in the schedule of classes. CSU

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MATH-181 Finite Mathematics

- 3 units LR
- 54 hours lecture per term
- Prerequisite: Placement through the assessment process or MATH-119 or MATH-120 or 120SP or equivalent

This course applies intermediate algebra and critical thinking to the solution of contemporary problems in business and the life sciences. Topics include linear models, systems of linear equations and inequalities, linear programming (with geometric method and the simplex method), matrix equations, sets and probabilities, and finance. Students will use a graphing calculator or computer software to manipulate matrices. CSU, UC

MATH-182 Calculus for Management, Life Science and Social Science I

- 4 units LR
- 72 hours lecture per term
- Prerequisite: Placement through the assessment process or MATH-135 or MATH-135SP or MATH-191 or equivalent
- Recommended: Eligibility for ENGL-122 or equivalent

The first in a two-term calculus sequence for management, life science, and social science majors. Topics include the derivative and its applications (including curve sketching, optimization, and rates of change), an introduction to the integral (including Riemann sums and the Fundamental Theorem of Calculus) and its applications. C-ID MATH 140, CSU, UC (credit limits may apply to UC - see counselor)

MATH-183 Calculus for Management, Life Science and Social Science II

- 4 units LR
- 72 hours lecture per term
- Prerequisite: MATH-182 or equivalent
- Recommended: MATH-121 or equivalent; eligibility for ENGL-122 or equivalent

This is the second course in a two-term sequence in calculus for management, life science, and social science majors, and is a continuation of MATH-182. Topics include techniques of integration, applications of the integral, multivariable functions, differential equations, and Taylor polynomials. CSU, UC (credit limits may apply to UC - see counselor)

MATH-191 Pre-Calculus

- 5 units LR
- 90 hours lecture per term
- Prerequisite: Placement through the assessment process or MATH-120 or equivalent and MATH-121 or equivalent
- Note: This course has a technology requirement. See individual instructor for further information.

This course is an in-depth treatment of functions and their graphs, including polynomial, rational, logarithmic, exponential and trigonometric functions. Conic sections, nonlinear systems, vectors and complex numbers are also covered. Use of a graphing calculator or a computer algebra system is required. CSU, UC (credit limits may apply to UC - see counselor)

MATH-192 Analytic Geometry and Calculus I

- 5 units LR
- 90 hours lecture per term
- Prerequisite: Placement through the assessment process or MATH-191 or equivalent
- Recommended: Eligibility for ENGL-122 or equivalent

This course presents the elements of analytic geometry, differentiation and integration of algebraic and transcendental functions with applications. Use of a graphing calculator or a computer algebra system is required. C-ID MATH 210, CSU, UC (credit limits may apply to UC - see counselor)

MATH-193 Analytic Geometry and Calculus II

- 5 units LR
- 90 hours lecture per term
- Prerequisite: MATH-192 or equivalent
- Recommended: Eligibility for ENGL-122 or equivalent

This course is a continuation of MATH-192. Techniques and applications of integration in geometry, science and engineering will be explored. Work with algebraic and transcendental functions will be continued. Other topics will include numerical methods in evaluation of the integral, infinite series, solving differential equations, applications of differential equations, polar coordinates, parametric equations and conic sections. C-ID MATH 220, CSU, UC (credit limits may apply to UC - see counselor)

MATH-194 Linear Algebra

- 3 units LR
- 54 hours lecture per term
- Prerequisite: MATH-193 or equivalent
- Recommended: Eligibility for ENGL-122 or equivalent

This course is an introduction to linear algebra, covering vector spaces, matrices, determinants, bases, and linear transformations. Techniques for solving systems of equations using matrices, and applications of linear transformations will be covered. C-ID MATH 250, CSU, UC

MATH-195 Discrete Mathematics

- 4 units LR
- 72 hours lecture per term
- Prerequisite: MATH-193 or equivalent
- Recommended: Eligibility for ENGL-122 or equivalent
- Note: MATH-193 or equivalent may be taken either as a prerequisite or concurrently

This course provides an introduction to propositional logic, induction, set theory, relations, and functions, counting and combinatorics, introduction to trees, graph theory, algorithms, and algebraic structures. The emphasis is on topics of interest to computer science students. CSU, UC

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MATH-292 Analytic Geometry and Calculus III

5 units LR

- 90 hours lecture per term
- Prerequisite: MATH-193 or equivalent

This class covers the further study of limits, parametric equations, vector-valued functions, analytic geometry of three dimensions, partial derivatives, multiple integrals, and Green's, Stokes' and the Divergence theorems. C-ID MATH 230, CSU, UC

MATH-294 Differential Equations

5 units LR

- 90 hours lecture per term
- Prerequisite: MATH-292 or equivalent
- Recommended: MATH-194 or equivalent (may be taken concurrently)

This course presents an introduction to the theory and applications of ordinary differential equations and an introduction to partial differential equations. C-ID MATH 240, CSU, UC

MATH-298 Independent Study

.5-3 units SC

- Variable hours
- Note: Submission of acceptable educational contract to department and Instruction Office is required.

This course is designed for advanced students who wish to conduct additional research, a special project, or learning activities in a specific discipline/subject area and is not intended to replace an existing course. The student and instructor develop a written contract that includes objectives to be achieved, activities and procedures to accomplish the study project, and the means by which the supervising instructor may assess accomplishment. CSU

MATH-299 Student Instructional Assistant

.5-3 units SC

- Variable hours
- Note: Applications must be approved through the Instruction Office. Students must be supervised by a DVC instructor.

Students work as instructional assistants, lab assistants and research assistants in this department. The instructional assistants function as group discussion leaders, meet and assist students with problems and projects, or help instructors by setting up laboratory or demonstration apparatus. Students may not assist in course sections in which they are currently enrolled. CSU