

MATHEMATICS

Natural and Applied Sciences Division

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Information for Mathematics Majors

The major in mathematics provides a broad foundation of problem solving and logical reasoning skills. The mathematics major learns to use patterns and relationships to analyze mathematical situations and solve a wide variety of problems.

Career opportunities include teacher, researcher, and statistician. Graduates work in private industry, government and many areas of technological research and computer-related fields.

MODEL PROGRAM FOR MATHEMATICS

The following model program fulfills requirements for the A.S./A.A. Degree in Mathematics at Cabrillo College. Specific lower division major preparation at four-year public institutions in California can be found at www.assist.org. Please see a counselor for advisement for transfer to any four-year institution.

Core Courses	Units
MATH 5ABC Analytic Geometry and Calculus I, II, III.	12
MATH 6 Introduction to Linear Algebra.	3
MATH 7 Introduction to Differential Equations	3
Electives	
MATH 12 Elementary Statistics	4
MATH 23 Discrete Mathematics.	4
Note: No other math class counts toward an associate degree in mathematics.	
Recommended from Related Disciplines	
Natural, Physical, Computer Science and/or Engineering	3-12
PHYS 4ABC Physics for Scientists & Engineers	15
Associate in Arts Degree in Mathematics	
General Education	30
Mathematics Core Courses	18
Physics 4ABC Physics for Scientists and Engineers.	15
Total for A.A. Degree in Mathematics	63

Associate in Science Degree in Mathematics

General Education	21
Mathematics Core Courses	18
Physics 4ABC Physics for Scientists and Engineers.	15
Mathematics, Natural, Physical, Computer Science and/or Engineering Electives	6
Total for A.S. Degree in Mathematics	60

GENERAL INFORMATION ABOUT MEETING PREREQUISITES

A minimum grade of "C" is required in the prerequisite course. It is strongly recommended that prerequisite course work not be more than two years old. Verification of prerequisites will be required. Prerequisites for courses in this department are computer enforced. Students should be sure their records have been entered into the Cabrillo computer system before attempting to enroll. Course prerequisites may be met in the following ways:

- Successful completion of the prerequisite course as listed in the *Catalog* or *Schedule of Classes*
- Successful completion of appropriate coursework at another college or university
- An appropriate placement score
- For certain courses, equivalent professional experience

If you believe you have completed the listed prerequisites or corequisites for a course as listed in the *Catalog* or *Schedule of Classes*, make an appointment to see a counselor.

Mathematics Courses

MATH 4

Pre-Calculus Algebra and Trigonometry

5 units; 5 hours Lecture

Prerequisite: MATH 152 or equivalent skills.

Recommended Preparation: MATH 153 or high school geometry or equivalent skills; Eligibility for ENGL 100 and READ 100.

A study of functions and their properties including trigonometric, logarithmic, exponential, polynomial, rational functions and their graphs, inverses and applications. The relationship between the equation form of a function and its graph will be emphasized. May not be taken credit/no credit. May be offered in a Distance-Learning Format.

Transfer Credit: Transfers to CSU; UC. CAN MATH16.

MATH 5A

Analytic Geometry and Calculus I

4 units; 5 hours Lecture

Prerequisite: MATH 4 or equivalent skills.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Designed for majors in mathematics, engineering and physical sciences. Plane analytic geometry of lines and graphing, differential calculus of algebraic and transcendental functions of one variable with applications. May not be taken credit/no credit.

Transfer Credit: Transfers to CSU; UC, with limits: MATH 5A & 18 combined-maximum credit-1 course CAN MATH18.

MATH 5B

Analytic Geometry and Calculus II

4 units; 5 hours Lecture

Prerequisite: MATH 5A or equivalent skills.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Designed for majors in mathematics, engineering, and physical sciences. Integral calculus of algebraic and transcendental functions of one variable with applications, techniques of integration, sequences and series. May not be taken credit/no credit.

Transfer Credit: Transfers to CSU; UC. CAN MATH20.

MATH 5C

Analytic Geometry and Calculus III

4 units; 5 hours Lecture

Prerequisite: MATH 5B or equivalent skills.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Designed for majors in mathematics, engineering, and physical sciences. Vectors and vector functions, multivariable calculus of algebraic and transcendental functions, line and surface integrals, vector field theory. May not be taken credit/no credit.

Transfer Credit: Transfers to CSU; UC. CAN MATH22.

MATH 6

Introduction to Linear Algebra

3 units; 3 hours Lecture

Prerequisite: MATH 5C or equivalent skills.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Introduces linear algebra, including vectors in n -dimensional R , matrices, row reductions, inverse matrices, determinants, vector spaces, basis, change of basis, linear independence, transformations, eigenvalues, eigenvectors, Gram-Schmidt process. Offered spring only. May not be taken credit/no credit.

Transfer Credit: Transfers to CSU; UC. CAN MATH26.

MATH 7

Introduction to Differential Equations

3 units; 3 hours Lecture

Prerequisite: MATH 5C or equivalent skills.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

An introductory course in Differential Equations: first order, second order, homogeneous, nonhomogeneous, variation of constants, applications. Simple linear systems with constant coefficients, Laplace transforms, Euler's method. May not be taken credit/no credit.

Transfer Credit: Transfers to CSU; UC. CAN MATH24.

MATH 10

Survey of College Mathematics

3 units; 3 hours Lecture

Prerequisite: MATH 152 or equivalent skills.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

A survey course in mathematics that uses intermediate algebra skills to examine the concepts and applications of various topics. Core topics are: set theory, logic, mathematical modeling, probability and statistics. Additional topics may include: mathematical systems, the mathematics of finance, ideas from geometry, or an introduction to calculus concepts.

Transfer Credit: Transfers to CSU, UC.

MATH 12

Elementary Statistics

4 units; 5 hours Lecture, 0.5 hour Laboratory

Prerequisite: MATH 152 or equivalent skills.

Recommended Preparation: CABT 106 (may be taken concurrently) or previous Cabrillo computer course or equivalent knowledge of MSDOS and Windows. Eligibility for ENGL 100 and READ 100.

Histograms, measures of central tendency and dispersion, probability, binomial and normal distributions, estimation and hypothesis testing, regression and correlation. Recommended for social science majors, environmental studies majors, and some liberal arts majors. See model programs in the college catalog. This course requires extensive use of a graphing calculator or desktop computer to complete several required lab assignments. See your instructor for details.

Transfer Credit: Transfers to CSU; UC, with limits: MATH 12 combined with BUS 9-maximum credit-1 course CAN STAT2.

MATH 13

Finite Mathematics

3 units; 3 hours Lecture

Prerequisite: MATH 152, or equivalent skills.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Set theory, linear programming, matrices, mathematics of finance, probability, with applications to business and the social sciences.

Transfer Credit: Transfers to CSU; UC. CAN MATH12.

MATH 15

Number Systems

3 units; 3 hours Lecture, 1 hour Laboratory

Prerequisite: MATH 152 and MATH 153, OR equivalent.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Provides an understanding of the nature of arithmetic and the structure of mathematical systems as used by liberal arts students and prospective elementary teachers. Topics covered may include a study of sets, relations, systems of numeration, and the real number system. Offered spring only-even years.

Transfer Credit: Transfers to CSU; UC: Does not meet CSU or UC math admissions requirement. CAN MATH4.

MATH 18

Business Calculus

3 units; 3 hours Lecture

Prerequisite: MATH 152 or equivalent skills.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Provides an intuitive introduction to differential and integral calculus for functions of one variable and an introduction to functions of several variables including partial differentiation and maxima/minima problems.

Transfer Credit: Transfers to CSU; UC, with limits: MATH 5A & 18 combined-maximum credit-1 course CAN MATH34.

MATH 23

Discrete Mathematics

4 units; 3 hours Lecture, 3 hours Laboratory

Prerequisite: MATH 5A or equivalent.

Recommended Preparation: CS 19 or CS 20J or equivalent; Eligibility for ENGL 100 and READ 100.

Presents discrete mathematical systems including methods of proof that shape the foundations of computer science. Includes set and number theory, Boolean Algebra, deductive and inductive proof, logic, equivalence, order, and recurrence relations, combinatorics, graph and network models, circuits and circuit minimization techniques, automata, and grammars. Computer science majors should enroll in CS 23 (identical to MATH 23). Offered spring only.

Transfer Credit: Transfers to CSU; UC. CAN CSCI26.

MATH 152

Intermediate Algebra

4 units; 5 hours Lecture

Prerequisite: MATH 154 or equivalent skills.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Further development of algebra skills acquired in elementary algebra, which include the system of real numbers, polynomials, algebraic equations (linear, systems of linear, quadratic, and applications). The characteristics and properties of linear and quadratic functions are studied in detail, with an introduction to negative exponents, systems of linear equations in three variables, complex rational expressions, complex numbers, inverse, exponential and logarithmic functions, conic sections, and non-linear systems. Problem-solving skills are developed to encourage students to use their basic knowledge of algebra to explore problems. May not be taken credit/no credit. May be offered in a Distance-Learning Format.

MATH 152A

Intermediate Algebra—First Half

2 units; 3 hours Lecture

Prerequisite: MATH 154 or equivalent skills.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Designed for a wide variety of students, including those who have been unsuccessful in MATH 152, are math anxious, or desire a slower paced, year-long version of MATH 152. This course is the first half of Intermediate Algebra and, when followed by MATH 152B, satisfies Cabrillo's math graduation requirement for Associate of Arts and Associate of Science Degree. The content covered contains linear equations, functions and graphs, systems of linear equations and inequalities, compound inequalities, factoring, and polynomial equations. Offered fall only. May not be taken credit/no credit.

MATH 152B

Intermediate Algebra—Second Half

2 units; 3 hours Lecture

Prerequisite: MATH 152A.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Designed for a wide variety of students, including those who have been unsuccessful in MATH 152, are math anxious, or desire a slower paced, year-long version of MATH 152. This course is the second half of Intermediate Algebra and, when taken after MATH 152A, satisfies Cabrillo's math graduation requirement for Associate of Arts and Associate of Science Degree. The content covered includes rational, radical, exponential, and logarithmic expressions and equations, composition and inverse of functions, graphs, and applications. Offered spring only. May not be taken credit/no credit.

MATH 153

Plane Geometry

3 units; 3 hours Lecture

Prerequisite: MATH 154 or equivalent skills.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Introduces the vocabulary and principles of Euclidean geometry, developing critical thinking skills using inductive and deductive reasoning while exploring the concepts of congruence and similarity, the properties of angles, lines, polygons, circles, and solids. May be offered in a Distance-Learning Format.

MATH 154

Elementary Algebra

4 units; 5 hours Lecture

Prerequisite: MATH 254 or equivalent skills.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Presents a systematic development of numbers, polynomials and polynomial fractions. Applications to the solution of linear equations, graphing of and solutions for systems of linear equations, quadratic equations and an introduction to exponents and radicals. Contains topics typical of first-year high school algebra, but taught at a college level. May not be taken credit/no credit. May be offered in a Distance-Learning Format.

MATH 154A

Elementary Algebra—First Half

2 units; 5 hours Lecture, 4 hours Laboratory

Prerequisite: MATH 254 or equivalent skills.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Designed for a wide variety of students, including those who have been unsuccessful in MATH 154, are math anxious, have learning disabilities in mathematics, or desire a slower paced, year-long version of MATH 154. Course is supplemented with individual tutoring within the class structure to provide extra individual assistance and has an excellent track record of student success. This course is the first half of Elementary Algebra. The content covered contains a systematic development of numbers, solving first degree equations and inequalities, graphing two variable linear equations, and two variable systems of equations. Offered fall only. May not be taken credit/no credit.

MATH 154B

Elementary Algebra-Second Half

2 units; 5 hours Lecture, 4 hours Laboratory

Prerequisite: MATH 154A.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

The second half of Elementary Algebra and intended only for students who have successfully completed MATH 154A. Provides a systematic development of polynomial fractions, applications to the solution of quadratic equations, and an introduction to exponents and radicals. Offered spring only. May not be taken credit/no credit.

MATH 158BF

Algebra Review- Basic Factoring

0.5 unit; 1.5 hours Laboratory

Corequisite: MATH 154 or higher level math course.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

This independent instruction module covers prerequisite skills for factoring followed by extensive drill on the five factoring techniques typically included in an elementary algebra course. This course may be taken credit/no credit only.

MATH 158GC

Introduction to the Graphing Calculator

0.5 unit; 0.5 hour Lecture

Recommended Preparation: Completion of or concurrent enrollment in MATH 152 or equivalent skills; Eligibility for ENGL 100 and READ 100.

An introduction to the use of handheld graphing calculators in mathematics courses. Emphasis will be placed on the Texas Instruments TI-83 (and TI-83 Plus), TI-85, TI-86, and TI-89. Strongly recommended for students enrolled in a mathematics course where the use of a graphing calculator is required. May be taken for credit/no credit only.

MATH 158PF

Algebra Review-Polynomial Fractions

0.5 unit; 1.5 hours Laboratory

Corequisite: MATH 154 (or higher level math course).

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

This independent instruction module covers addition and subtraction of polynomial fractions at the level of elementary algebra. A brief review of the least common multiple of two or more polynomials is included, and the ability to express an answer in lowest terms is emphasized. May be taken for credit/no credit only.

MATH 158SI

Using the Metric System

0.5 unit; 1.5 hours Laboratory

Corequisite: MATH 154 or higher level math course.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

This independent instruction module introduces the units and uses of the metric system and its applications. May be taken for credit/no credit only.

MATH 158T

Preparation for Tutoring Mathematics

1 unit; 3 hours Laboratory

Repeatability: May be taken a total of 2 times.

Recommended Preparation: MATH 4 or equivalent skills. Grade of "B" in recently completed MATH classes. Eligibility for ENGL 100 and READ 100.

Provides tutoring techniques and hands-on training for math tutors and those interested in tutoring mathematics. Strategies for maximizing active learning are emphasized. Specifically designed for students enrolled in or recently completing MATH 12, 13, 15, 5A, 5B, or 5C.

MATH 195A-Z

Survey Topics in the Scientific Method

2 units; 2 hours Lecture, 1 hour Laboratory

Repeatability: May be taken a total of 4 times.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Introduces to the prospective math or science major some of the tools and skills that assist scientists in their work. Covers the general framework and philosophy of the scientific method, which forms the basis of the adoption and rejection of any theory in science.

MATH 254

Essential Mathematics

3 units; 6 hours Laboratory

Presents topics using computer software, assisted by the instructor, and covers arithmetic procedures involving whole numbers, fractions, decimals, percent, integrated with signed numbers, equations, statistics, proportions, graphing, and geometry.

MATH 254A

Essential Mathematics—First Half

2 units; 3 hours Lecture, 2 hours Laboratory

Covers arithmetic procedures involving whole numbers, fractions, and decimals integrated with equations and proportions.

MATH 254B

Essential Mathematics—Second Half

2 units; 3 hours Lecture, 2 hours Laboratory

Prerequisite: MATH 254A.

Continuation of arithmetic studies of MATH 254A with decimals and percent integrated with signed numbers, equations, proportion, statistics and graphing. This course is the second half of MATH 254.

MATH 502

Supervised Tutoring

0 units; 5 hours Laboratory

Repeatability: May be repeated.

Supervised individual and group drop-in tutoring assistance in basic skills, high school equivalent, and transfer mathematics courses, including mathematics applications found in science courses. Repeatable with each enrollment in a Cabrillo mathematics course.