# MATHEMATICS
## Natural and Applied Sciences Division

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## Mathematics A.S.-T Transfer Degree

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.

A mathematics major may transfer to a four-year institution to complete a Bachelor's Degree in Mathematics, Physics, Computer Science, or Engineering. Career opportunities include teacher, researcher, and statistician. Graduates work in private industry, government, and many areas of technological research and computer-related field .

Cabrillo offers options for degrees in Mathematics. The first option listed below is the Associate in Science in Mathematics for Transfer (A.S.-T), which is intended for students who plan to complete a bachelor's degree in Mathematics or related STEM field at a CSU campus. Students completing these degrees are guaranteed admission to the CSU system, but not to a particular campus or major. This degree may not be the best option for students intending to transfer to a particular CSU campus or to a university or college that is not part of the CSU system. See a Counselor.

See Associate Degree for Transfer information in the Cabrillo College *Catalog.*

The following is required for all A.A.-T or A.S.-T degrees:
- Completion of 60 CSU-transferable semester units.

- Minimum grade-point average (GPA) of at least 2.0 in all CSU-transferable coursework. While a minimum of 2.0 is required for admission, some majors may require a higher GPA.

- Completion of a minimum of 18 semester units in the major with a letter grade of "C" or better, or a "P" if the course is taken on a "Pass/No Pass" basis. Note: this degree requires greater than 18 units in the major for completion.

- Certified ompletion of the California State University General Education- Breadth pattern (CSU GE Breadth) or the Intersegmental General Education Transfer Curriculum (IGETC) pattern.

### Learning Outcomes

The Cabrillo College Core Competencies (with an emphasis in the study of Mathematics):
1. Communication: Reading, Writing, Listening, Speaking, and/or Conversing

2. Critical Thinking and Information Competency: Analysis, Computation, Research, Problem Solving

3. Global Awareness: An appreciation of Scientific   rocesses, Global Systems and Civics, and Artistic Variety

4. Personal Responsibility and Professional Development: Self-Management and Self-Awareness, Social and Physical Wellness, Workplace Skills

**CSU** or **IGETC for CSU General Education Requirements 37-39 Units**

**Core**

| | | |
|---|---|---|
| MATH 5A | Analytic Geometry and Calculus I | 5 |
| MATH 5B | Analytic Geometry and Calculus ll | 5 |
| MATH 5C | Analytic Geometry and Calculus lll | 5 |

| **Group A (1 course)** | | **Units** |
|---|---|---|
| MATH 6 | Introduction to Linear Algebra | 3 |
| or | | |
| MATH 7 | Introduction to Differential Equations | 3 |

| **Group B (1 course)** | | **Units** |
|---|---|---|
| MATH 6 | Introduction to Linear Algebra | 3 |
| MATH 7 | Introduction to Differential Equations | 3 |
| MATH 12 | Elementary Statistics | 5 |
| or | | |
| MATH 12H | Honors Elementary Statistics | 5 |
| MATH 23 | *Discrete Mathematics | 4 |
| PHYS 4A | Physics for Scientists and Engineers I | 5 |
| CS 11 | Introduction to Programming Concepts and Methodology, C++ | 4 |
| CS 12J | Introduction to Programming Concepts and Methodology, Java | 4 |
| CS 19 | C++ Programming | 4 |
| CS 20J | Java Programming | 4 |
| CS 21 | Introduction to Data Structures and Algorithms | 4 |

*Note: All major courses (except Computer Science courses) are also general education courses.*

| **Total Units** | **60** |
|---|---|

*Spring only

## Mathematics A.S. Degree

### Learning Outcomes

The Cabrillo College Core Competencies (with an emphasis in the study of Mathematics):
1. Communication: Reading, Writing, Listening, Speaking, and/or Conversing

2. Critical Thinking and Information Competency: Analysis, Computation, Research, Problem Solving

3. Global Awareness: An appreciation of Scientific   rocesses, Global Systems and Civics, and Artistic Variety

4. Personal Responsibility and Professional Development: Self-Management and Self-Awareness, Social and Physical Wellness, Workplace Skills

### Model Program for Mathematics

This Associate Degree requires 60 units appropriate to your educational goal, to include general education and at least 30 units in a major. Courses should be selected to meet the lower-division major preparation requirements at your intended transfer university - these specific requirements can be found at www.assist.org for 4-year public institutions in California. Please see a counselor for advisement to ensure you are taking the best possible courses given your goal. This degree may be completed as a transferable Associate in Science degree with the addition of university admission requirements and increased general education requirements.

The department presents the following suggested Model Program for this major. The courses listed below may or may not be appropriate depending on your specific goal. Please see a counselor for advisement for transfer to any 4-year institution.

| A.S. General Education | | 21 Units |
|---|---|---|
| **Core Courses (18 units)** | | |
| MATH 5A | Analytic Geometry and Calculus I | 5 |
| MATH 5B | Analytic Geometry and Calculus II | 5 |
| MATH 5C | Analytic Geometry and Calculus III | 5 |
| MATH 7 | Introduction to Differential Equations | 3 |
| **Approved Electives (21 units)** | | |
| MATH 6 | Introduction to Linear Algebra | 3 |
| MATH 12 | Elementary Statistics | 5 |
| or | | |
| MATH 12H | Honors Elementary Statistics | 5 |
| MATH 23 | *Discrete Mathematics | 4 |
| PHYS 4A | Physics for Scientists and Engineers I | 5 |
| PHYS 4B | **Physics for Scientists and Engineers II | 5 |
| PHYS 4C | *Physics for Scientists and Engineers III | 5 |
| CHEM 1A | General Chemistry I | 5 |
| CHEM 1B | General Chemistry II | 5 |
| CS 19 | C++ Programming | 4 |
| **Total Units** | | **60** |

*Spring only; **Fall only.
**Note: No other math class counts toward an associate degree in mathematics.**

### General Information about Meeting Prerequisites

A minimum grade of "C" is required in the prerequisite course for all transfer-level courses except MATH 12. It is strongly recommended that prerequisite course work not be more than two years old. Verific - tion of prerequisites will be required and will be computer enforced for transfer-level courses except MATH 12.

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 and high school GPA

- For certain courses, equivalent professional experience If you believe you have completed the listed prerequisites or co-requisites for a course as listed in the *Catalog* or *Schedule of Classes,* make an appointment to see a counselor.

## Basic Mathematics I Certifi ate of Completion

The certific te of completion in basic mathematics skills is designed to prepare students for higher level math skills. The noncredit courses needed for completion cover arithmetic procedures involving whole numbers and decimals, fractions, ratios, proportions and percents.

### Learning Outcomes

Demonstrate arithmetic literacy with whole numbers and decimals. Demonstrate arithmetic literacy with fractions. Demonstrate arithmetic literacy with ratios, proportions, and percents.

### Required Courses

| MATH 350A | Whole Numbers and Decimals |
|---|---|
| MATH 350B | Fractions |
| MATH 350C | Ratios, Proportions and Percents |

## Basic Mathematics II Certifi ate of Completion

The certific te of completion in basic mathematics skills is designed to prepare students for higher level math skills. The noncredit courses needed for completion cover arithmetic procedures involving geometry, graphs, measurements, statistics, signed numbers, algebraic expressions and simple linear equations.

### Learning Outcomes

Determine and apply appropriate formulas to problems involving geometry and basic statistics and demonstrate mathematical literacy with graphs and with measurements in the U.S. system and metric system. Demonstrate arithmetic literacy with signed numbers. Demonstrate algebraic literacy with expressions and linear equations.

### Required Courses

| MATH 350D | Geometry, Graphs, Measurements and Statistics |
|---|---|
| MATH 350E | Signed Numbers |
| MATH 350F | Linear Equations |

## Math PLUS: Preparation for Pre-Algebra Level Math Certifi ate of Completion

The certific te of completion in basic mathematics skills is designed to strengthen pre-algebra level math skills. The noncredit courses needed for completion cover community building, learning skills material, and mathematic topics central to the level of math students are preparing for.

### Learning Outcomes

Evaluate mathematical progress and utilize problem-solving and planning skills to implement behaviors needed to facilitate academic success. Demonstrate mathematical literacy for pre-algebra topics, including whole numbers, fractions, decimals, percents, signed numbers, equations, statistics, proportions, and geometry.

### Required Courses

| MATH 300 | Math PLUS: Study Skills |
|---|---|
| MATH 301 | Math PLUS: Pre-Algebra Review |

## Math PLUS: Preparation for Elementary Algebra Level Math Certifi ate of Completion

The certific te of completion in basic mathematics skills is designed to strengthen elementary algebra level math skills. The noncredit courses needed for completion cover community building, learning skills material, and mathematic topics central to the level of math students are preparing for.

### Learning Outcomes

Evaluate mathematical progress and utilize problem-solving and planning skills to implement behaviors needed to facilitate academic success. Demonstrate mathematical literacy for elementary algebra topics, including arithmetic computations on algebraic expressions, and solving equations, inequalities, and systems of equations.

### Required Courses

| | |
|---|---|
| MATH 300 | Math PLUS: Study Skills |
| MATH 303 | Math PLUS: Elementary Algebra Review |

## Math PLUS: Preparation for Intermediate Algebra Level Math Certifi ate of Completion

The certific te of completion in mathematics skills is designed to strengthen intermediate algebra level math skills. The noncredit courses needed for completion cover community building, learning skills material, and mathematic topics central to the level of math students are preparing for.

### Learning Outcomes

Evaluate mathematical progress and utilize problem-solving and planning skills to implement behaviors needed to facilitate academic success. Demonstrate algebraic literacy for subsequent math courses for intermediate algebra topics, including evaluating appropriate techniques to apply to various types of equations and inequalities, produce solution(s), and interpret solution(s).

### Required Courses

| | |
|---|---|
| MATH 300 | Math PLUS: Study Skills |
| MATH 304 | Math PLUS: Intermediate Algebra Review |

## Math PLUS: Preparation for Statistics Level Math Certifi ate of Completion

The certific te of completion in basic mathematics skills is designed to strengthen statistics level math skills. The noncredit courses needed for completion cover community building, learning skills material, and mathematic topics central to the level of math students are preparing for.

### Learning Outcomes

Evaluate mathematical progress and utilize problem-solving an planning skills to implement behaviors needed to facilitate academic success. Demonstrate arithmetic and basic algebraic literacy, such as working with whole numbers, fractions, and decimals, and using the order of operations and apply those skills to develop statistical thinking and conceptual understanding

### Required Courses

| | |
|---|---|
| MATH 300 | Math PLUS: Study Skills |
| MATH 302 | Math PLUS: Essential Math Preparation for Statistics |

# Mathematics Courses

### MATH 2          Precalculus Algebra
4 units; 4 hours Lecture
Prerequisite: MATH 152 or MATH 152B or equivalent skills. Note: MATH 142 does NOT satisfy the prerequisite.
Repeatability: May be taken a total of 1 time.
Presents functions and their properties including polynomial, rational, exponential and logarithmic functions and their graphs, inverses and applications. May not be taken Pass/No Pass.
*Transfer Credit:* Transfers to CSU; UC, with limits: Math 2 and 4 combined: maximum credit- 5 semester units.

### MATH 3          Precalculus Trigonometry
3 units; 3 hours Lecture
Prerequisite: MATH 152 or MATH 152B or equivalent skills. Note: MATH 142 does NOT satisfy the prerequisite.
Recommended Preparation: MATH 153 or high school geometry or equivalent skills.
Repeatability: May be taken a total of 1 time.
Presents right and oblique triangle trigonometry with applications including vectors, graphing, identities, trigonometric equations and functions, and inverse trigonometric functions. May not be taken Pass/No Pass.
*Transfer Credit:* Transfers to CSU.

### MATH 4           Precalculus Algebra and Trigonometry
5 units; 5 hours Lecture
Prerequisite: MATH 152 or MATH 152B or equivalent skills. Note: MATH 142 does NOT satisfy the prerequisite.
Recommended Preparation: MATH 153 or high school geometry or equivalent skills.
Repeatability: May be taken a total of 1 time.
Covers topics in MATH 2 and MATH 3 and is designed for the motivated student able to fulfill the requirements of both courses in a single course. 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 Pass/No Pass. May be offered in a Distance-Learning Format.
*Transfer Credit:* Transfers to CSU; UC, with limits: Math 2 and 4 combined: maximum credit- 5 semester units.

### MATH 5A          Analytic Geometry and Calculus I
5 units; 5 hours Lecture
Prerequisite: MATH 4 or MATH 2 and MATH 3 or equivalent skills.
Repeatability: May be taken a total of 1 time.
Presents plane analytic geometry of lines and graphing, differential calculus of algebraic and transcendental functions of one variable with applications, and introductory integral calculus. Designed for majors in mathematics, engineering, and physical sciences. May not be taken Pass/No Pass.
*Transfer Credit:* Transfers to CSU; UC, with limits: MATH 5A & 18 combined: maximum credit-1 course.   C-ID: MATH 210

## MATH 5B       Analytic Geometry and Calculus II
5 units; 5 hours Lecture
Prerequisite: MATH 5A or equivalent skills.
Repeatability: May be taken a total of 1 time.
Presents integral calculus of algebraic and transcendental functions of one variable with applications, techniques of integration, sequences and series. Designed for majors in mathematics, engineering, and physical sciences. May not be taken Pass/No Pass.
*Transfer Credit:* Transfers to CSU; UC. C-ID: MATH 220

## MATH 5C       Analytic Geometry and Calculus III
5 units; 5 hours Lecture
Prerequisite: MATH 5B or equivalent skills.
Repeatability: May be taken a total of 1 time.
Presents vector valued functions, calculus of functions of more than one variable, partial derivatives, multiple integration, Green's Theorem, Stokes' Theorem, divergence theorem. Designed for majors in mathematics, engineering, and physical sciences. May not be taken Pass/No Pass.
*Transfer Credit:* Transfers to CSU; UC. C-ID: MATH 230

## MATH 6       Introduction to Linear Algebra
3 units; 3 hours Lecture
Prerequisite: MATH 5C or equivalent skills.
Repeatability: May be taken a total of 1 time.
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, and the Gram-Schmidt process. Students enrolled in the Honors Transfer Program may count this course towards the Honors Scholar designation with an Honors Contract. May not be taken Pass/No Pass.
*Transfer Credit:* Transfers to CSU; UC. C-ID: MATH 250

## MATH 7       Introduction to Differential Equations
3 units; 3 hours Lecture
Prerequisite: MATH 5C or equivalent skills.
Repeatability: May be taken a total of 1 time.
Presents an introductory course in Differential Equations: first order, second order, homogeneous, nonhomogeneous, variation of parameters, applications, simple linear systems with constant coefficients, Laplace transforms, and power series solutions. Students enrolled in the Honors Transfer Program may count this course towards the Honors Scholar designation with an Honors Contract. May not be taken Pass/No Pass.
*Transfer Credit:* Transfers to CSU; UC. C-ID: MATH 240

## MATH 10       Survey of College Mathematics
3 units; 3 hours Lecture
Prerequisite: MATH 142 or MATH 142B or MATH 152 or MATH 152B or equivalent skills.
Repeatability: May be taken a total of 1 time.
Presents concepts and applications of various topics in mathematics that use intermediate algebra skills. 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
5 units; 5 hours Lecture
Prerequisite: MATH 112 or MATH 142 or MATH 142B or MATH 152 or MATH 152B or equivalent skills or placement by multiple measures.
Repeatability: May be taken a total of 1 time.
Presents 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 (ANOVA); chi-square and t-tests; and application of technology for statistical analysis including the interpretation of the relevance of statistical findings. May be offered in a Distance-Learning Format.
*Transfer Credit:* Transfers to CSU; UC, with limits: MATH 12/12H, BUS 9 and PSYCH 2A combined: maximum credit- 1 course. C-ID:  MATH 110

## MATH 12H       Honors Elementary Statistics
5 units; 5 hours Lecture
Prerequisite: Honors Standing. MATH 112 or MATH 142 or MATH 142B or MATH 152 or MATH 152B or equivalent skills or placement by multiple measures.
Recommended Preparation: ENGL 1A/1AH/1AMC/1AMCH.
Repeatability: May be taken a total of 1 time.
Presents 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 (ANOVA); chi-square and t-tests; and application of technology for statistical analysis including the interpretation of the relevance of statistical findings. May not be taken Pass/No Pass.
*Transfer Credit:* Transfers to CSU; UC, with limits: MATH 12/12H, BUS 9 and PSYCH 2A combined: maximum credit- 1 course. C-ID: MATH 110

## MATH 13       Finite Mathematics
3 units; 3 hours Lecture
Prerequisite: MATH 152 or MATH 152B or equivalent skills. NOTE: Math 142 does NOT satisfy the prerequisite.
Repeatability: May be taken a total of 1 time.
Presents linear functions, systems of linear equations and inequalities, matrices, linear programming, mathematics of finance, sets and Venn diagrams, combinatorial techniques, and an introduction to probability. Includes applications in business, economics, and social sciences. May be offered in a Distance-Learning Format.
*Transfer Credit:* Transfers to CSU; UC. C-ID: MATH 130

## MATH 15          Number Systems

3 units; 3 hours Lecture, 1 hour Laboratory
Prerequisite: MATH 142 or MATH 152 or equivalent skills and MATH 153 or equivalent skills.
Repeatability: May be taken a total of 1 time.
Develops quantitative reasoning skills for elementary school teachers 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. Offered spring only.
*Transfer Credit:* Transfers to CSU; UC: Does not meet the UC math admissions requirement. C-ID: MATH 120

## MATH 18          Business Calculus

4 units; 4 hours Lecture
Prerequisite: MATH 152 or equivalent skills. Note: MATH 142 does NOT satisfy the prerequisite.
Repeatability: May be taken a total of 1 time.
Presents the techniques of calculus with emphasis placed on the application of these concepts to business and management-related problems. The applications of derivatives and integrals of functions including polynomial, rational, exponential and logarithmic functions are studied. May be offered in a Distance-Learning Format.
*Transfer Credit:* Transfers to CSU; UC, with limits: MATH 5A & 18 combined: maximum credit-1 course.  C-ID: MATH 140

## MATH 23          Discrete Mathematics

4 units; 3 hours Lecture, 3 hours Laboratory
Prerequisite: CS 11 or CS 11M or CS 12GP or CS 12J or equivalent skills; MATH 5A or equivalent skills.
Recommended Preparation: CS 19 or CS 20J or equivalent skills.
Repeatability: May be taken a total of 1 time.
Presents discrete mathematical systems including methods of proof that shape the foundations of computer science. Includes propositional logic, set and number theory, Boolean Algebra, deductive and inductive proof, functions and relations, combinatorics, discrete probability, graph theory and network models, and efficie y of algorithms. CS majors should enroll in CS 23 (identical to MATH 23). May be offered in a Distance-Learning Format.
*Transfer Credit:* Transfers to CSU; UC. C-ID: COMP 152

## MATH 104          Math Success Strategies for Precalculus and Beyond

1.5 units; 4.5 hours Laboratory
Co-requisite: MATH 4
Repeatability: May be taken a total of 1 time.
Improves skills in computation, communication, critical thinking, and effective study approaches for precalculus and calculus, and is taken concurrently with MATH 4. Prepares students for precalculus and subsequent math coursework through review, consolidation of key concepts; practice communicating mathematical concepts to others; learning to make effective use of textbooks, peers, online resources; and forming a personalized study plan. May be taken Pass/No Pass only.
*Transfer Credit:* Non-transferable.

## MATH 112          Pre-Statistics

5 units, 5 hours Lecture
Prerequisite: MATH 254SI or MATH 254CM or MATH 254B or equivalent skills.
Develops quantitative reasoning skills needed for elementary statistics through hands-on explorations of descriptive statistics, data analysis and probability, and linear and exponential models; satisfies prerequisite for MATH 12 only; NOT a prerequisite for any other math course. May not be taken Pass/No Pass.
*Transfer Credit:* Non-transferable.

## MATH 142          Applied Intermediate Algebra

5 units; 5 hours Lecture
Prerequisite: MATH 154 or MATH 154B or equivalent skills.
Repeatability: May be taken a total of 1 time.
Presents intermediate algebra topics with an emphasis on data analysis and modeling; satisfies prerequisite for MATH 10, MATH 12, MATH 12H or MATH 15; NOT a prerequisite for MATH 2, MATH 3, MATH 4, MATH 13, or MATH 18. Topics include mathematical modeling using real-world data, systems of equations, and graphs; and linear, exponential, logarithmic, polynomial and quadratic functions, equations, and graphs. May be offered in a Distance-Learning Format. May not be taken Pass/No Pass.
*Transfer Credit:* Non-transferable.

## MATH 142A      Applied Intermediate Algebra - First Half

4 units; 3 hours Lecture, 3 hours Laboratory
Prerequisite: MATH 154 or MATH 154B or equivalent skills.
Repeatability: May be taken a total of 1 time.
Presents the first half of Applied Intermediate Algebra and is designed for a wide variety of students, including those who have been unsuccessful in MATH 142, are math anxious, or desire a slower paced, year-long version of MATH 142. When followed by MATH 142B satisfies Cabrillo's math graduation requirement for Associate of Arts and Associate of Science Degree. Successful completion of both MATH 142A and MATH 142B satisfies the prerequisite for MATH 10, MATH 12, MATH 12H or MATH 15; NOT a prerequisite for MATH 2, MATH 3, MATH 4, MATH 13, or MATH 18. Topics include mathematical modeling using real-world data and graphs as well as linear, exponential, and logarithmic functions and equations. May not be taken Pass/No Pass.
*Transfer Credit:* Non-transferable.

## MATH 142B      Applied Intermediate Algebra - Second Half

4 units; 3 hours Lecture, 3 hours Laboratory
Prerequisite: MATH 142A.
Repeatability: May be taken a total of 1 time.
Presents the second half of Applied Intermediate Algebra and is designed for a wide variety of students, including those who have been unsuccessful in MATH 142, are math anxious, or desire a slower paced, year-long version of MATH 142. When completed after MATH 142A satisfies Cabrillo's math graduation requirement for Associate of Arts and Associate of Science Degree. Successful completion of both MATH 142A and MATH 142B satisfies the prerequisite for MATH 10, MATH 12, MATH 12H, or MATH 15; NOT a prerequisite for MATH 2, MATH 3, MATH 4, MATRH 13, or MATH 18. Topics include mathematical modeling using real-world data, systems of equations, and graphs as well as linear, polynomial and quadratic functions and equations. May not be taken Pass/No Pass.
*Transfer Credit:* Non-transferable.

## MATH 152      Intermediate Algebra

5 units; 5 hours Lecture
Prerequisite: MATH 154 or MATH 154B or equivalent skills.
Repeatability: May be taken a total of 1 time.
Continues 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 Pass/No Pass. May be offered in a Distance-Learning Format.
*Transfer Credit:* Non-transferable.

## MATH 152A      Intermediate Algebra - First Half

5 units; 4 hours Lecture, 4 hours Laboratory
Prerequisite: MATH 154 or MATH 154B or equivalent skills.
Repeatability: May be taken a total of 1 time.
Presents the first half of Intermediate Algebra and is 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. When followed by MATH 152B, satisfies Cabrillo's math graduation requirement for Associate of Arts and Associate of Science Degree. Covers linear equations, functions and graphs, systems of linear equations and inequalities, compound inequalities, factoring, polynomial equations, rational expressions and rational equations. Offered fall only. May not be taken Pass/No Pass.
*Transfer Credit:* Non-transferable.

## MATH 152B      Intermediate Algebra - Second Half

5 units; 4 hours Lecture, 4 hours Laboratory
Prerequisite: MATH 152A.
Repeatability: May be taken a total of 1 time.
Presents the second half of Intermediate Algebra for Non-Science Majors and is designed for a wide variety of students, including those who have been unsuccessful in MATH 142, are math anxious, or desire a slower paced, year-long version of MATH 142. When followed by MATH 142B, satisfies Cabrillo's math graduation requirement for Associate of Arts and Associate of Science Degree. Covers linear, exponential, and logarithmic equations and functions along with modeling and applications. Successful completion of both MATH 142A and MATH 142B, satisfies the prerequisite for MATH 10, MATH 12, MATH 12H, MATH 13, or MATH 15; does NOT satisfy the prerequisite for MATH 2, MATH 3, MATH 4, MATH 18, or MATH 23. May not be taken Pass/No Pass.
*Transfer Credit:* Non-transferable.

## MATH 153      Geometry

3 units; 3 hours Lecture
Prerequisite: MATH 154 or equivalent skills.
Repeatability: May be taken a total of 1 time.
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.
*Transfer Credit:* Non-transferable.

## MATH 154    Elementary Algebra

5 units; 5 hours Lecture
Prerequisite: MATH 254B or MATH 254CM or MATH 254SI or MATH 350A and MATH 350B and MATH 350C or equivalent skills.
Repeatability: May be taken a total of 1 time.
Presents a systematic development of numbers, polynomials and polynomial fractions, along with 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 firs -year high school algebra, but taught at a college level. May not be taken Pass/No Pass. May be offered in a Distance-Learning Format.
*Transfer Credit:* Non-transferable.

## MATH 154A    Elementary Algebra - First Half

5 units; 4 hours Lecture, 4 hours Laboratory
Prerequisite: MATH 254B or MATH 254CM or MATH 254SI or MATH 350A and MATH 350B and MATH 350C and MATH 350D and MATH 350E and MATH 350F or equivalent skills.
Repeatability: May be taken a total of 1 time.
Presents the first half of Elementary Algebra and is designed for a wide variety of students, including those who have been unsuccessful in MATH 154, are math anxious, or desire a slower paced, year-long version of MATH 154; and along with MATH 154B is equivalent to MATH 154. Provides a systemic development of numbers, solving first degree equations and inequalities, graphing two variable linear equations, and two variable systems of equations. May not be taken Pass/No Pass.
*Transfer Credit:* Non-transferable.

## MATH 154B    Elementary Algebra-Second Half

5 units; 4 hours Lecture, 4 hours Laboratory
Prerequisite: MATH 154A.
Repeatability: May be taken a total of 1 time.
Presents the second half of Elementary Algebra and is intended only for students who have successfully completed MATH 154A. Provides a systematic development of polynomials, polynomial fractions, applications to the solution of quadratic equations, and an introduction to exponents and radicals. May not be taken Pass/No Pass.
*Transfer Credit:* Non-transferable.

## MATH 158BF    Algebra Review- Basic Factoring

0.5 unit;  1.5 hours Laboratory
Co-requisite: MATH 154 or higher level math course.
Repeatability: May be taken a total of 1 time.
Covers Prerequisite skills for factoring followed by extensive drill on the fi e factoring techniques typically included in an elementary algebra course. May be taken Pass/No Pass only.
*Transfer Credit:* Non-transferable.

## MATH 158FT    Field Teaching for Math and Science

1 unit; 1 hour Lecture
Prerequisite: MATH 4 or MATH 2 and MATH 3 or equivalent skills.
Repeatability: May be taken a total of 1 time.
Introduces the teaching of mathematics and science in middle and high schools providing opportunities to determine interest in the pursuit of a career in teaching. Student field work in middle/high school is required as part of the Aurora Teaching Initiative. May be taken Pass/No Pass only.
*Transfer Credit:* Non-transferable.

## MATH 158PF    Algebra Review-Polynomial Fractions

0.5 unit;  1.5 hours Laboratory
Co-requisite: MATH 154 or higher level math course.
Repeatability: May be taken a total of 1 time.
Covers addition and subtraction of polynomial fractions at the level of elementary algebra in an independent instruction module. 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 Pass/No Pass only.
*Transfer Credit:* Non-transferable.

## MATH 158SI    Using the Metric System

0.5 unit;  1.5 hours Laboratory
Co-requisite: MATH 154 or higher level math course.
Repeatability: May be taken a total of 1 time.
Introduces the units and uses of the metric system and its applications in an independent instruction module. May be taken for Pass/No Pass only.
*Transfer Credit:* Non-transferable.

## MATH 158T    Preparation for Tutoring Mathematics

1 unit;  3 hours Laboratory
Recommended Preparation: MATH 4 with a "B" or better or MATH 2 with a "B" or better and MATH 3 with a "B" or better.
Repeatability: May be taken a total of 1 time.
Provides tutoring techniques and hands-on training for math tutors and those interested in tutoring mathematics. Emphasizes strategies for maximizing active learning. Specifically designed for students enrolled in or recently completing MATH 12, 12H, 13, 15, 5A, 5B, or 5C.
*Transfer Credit:* Non-transferable.

## MATH 190A-Z    Survey Topics in Mathematical Literacy

1 – 5 units; 1 – 5 hours Lecture or 3 – 15 hours Laboratory
Repeatability: May be taken a total of 1 time.
Presents math topics with an emphasis on numeracy. The specific course content will be described in the *Schedule of Classes*.
*Transfer Credit:* Non-transferable.

## MATH 195A-Z   Survey Topics in the Scientific    ethod

2 units; 2 hours Lecture, 1 hour Laboratory
Repeatability: May be taken a total of 1 time.
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.
*Transfer Credit:* Non-transferable.

## MATH 254A   Essential Mathematics - First Half

4 units; 4 hours Lecture
Repeatability: May be taken a total of 1 time.
Presents the first half of Essential Mathematics and along with MATH 254B is equivalent to MATH 254CM or 254SI. Covers arithmetic procedures involving whole numbers, fractions, and decimals integrated with proportions.
*Transfer Credit:* Non-transferable.

## MATH 254B   Essential Mathematics - Second Half

4 units; 4 hours Lecture
Prerequisite: MATH 254A or equivalent skills.
Repeatability: May be taken a total of 1 time.
Presents the second half of Essential Mathematics and is intended only for students who have successfully completed MATH 254A. Covers integers, percents, linear equations, measurements, geometry, and statistics.
*Transfer Credit:* Non-transferable.

## MATH 254CM   Essential Mathematics-Computer Mediated

2 units; 6 hours Laboratory
Repeatability: May be taken a total of 1 time.
Presents topics in an accelerated format using computer software, assisted by the instructor, and covers whole numbers, fractions, decimals, percents, signed numbers, equations, statistics, proportions, and geometry. May be offered in a Distance-Learning Format.
*Transfer Credit:* Non-transferable.

## MATH 254SI   Essential Mathematics with Supplemental Instruction

6 units; 6 hours Lecture
Recommended Preparation: Eligibility for READ 205 by Assessment.
Repeatability: May be taken a total of 1 time.
Presents topics in an accelerated format and covers whole numbers, fractions, decimals, percents, signed numbers, equations, statistics, proportions, and geometry with a supplemental instruction component.
*Transfer Credit:* Non-transferable.

## MATH 300   Math PLUS: Study Skills

0 units; 9 hours Laboratory
Presents study methods and learning techniques designed to strengthen students' math skills.

## MATH 301   Math PLUS: Pre-Algebra Review

0 units; 18-72 hours Laboratory
Co-requisite: MATH 300
Presents a review designed to strengthen students' math skills at the essential math level and covers whole numbers, fractions, decimals, percents, signed numbers, equations, statistics, proportions, and geometry.

## MATH 302   Math PLUS: Essential Math Preparation for Statistics

0 units; 5-72 hours Laboratory
Co-requisite: MATH 300
Presents a review designed to strengthen essential math skills and cover topics and concepts considered necessary preparation for success in statistics.

## MATH 303   Math PLUS: Elementary Algebra Review

0 units; 18-72 hours Laboratory
Co-requisite: MATH 300
Presents a review designed to strengthen students' math skills at the elementary algebra level and covers a systematic development of numbers, polynomials and polynomial fractions, along with 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.

## MATH 304   Math PLUS: Intermediate Algebra Review

0 units; 18-72 hours Laboratory
Co-requisite: MATH 300
Presents a review designed to strengthen students' math skills at the intermediate algebra level, which include the system of real numbers, polynomials, algebraic equations (linear, systems of linear, quadratic, and applications).

**MATH 350A    Whole Numbers and Decimals**

0 units; 42.6 hours Laboratory

Covers arithmetic procedures involving whole numbers and decimals.

**MATH 350B    Fractions**

0 units; 42.6 hours Laboratory

Covers arithmetic procedures involving fractions.

**MATH 350C    Ratios, Proportions and Percents**

0 units; 42.6 hours Laboratory

Covers arithmetic procedures involving ratios, proportions, and percents.

**MATH 350D    Geometry, Graphs, Measurements, and Statistics**

0 units; 42.6 hours Laboratory

Covers geometry, graphs, measurements, and statistics.

**MATH 350E    Signed Numbers**

0 units; 42.6 hours Laboratory

Covers arithmetic procedures involving signed numbers.

**MATH 350F    Linear Equations**

0 units; 42.6 hours Laboratory

Covers algebraic expressions and simple linear equations.

**MATH 502    Supervised Tutoring**

0 units; 10 hours Laboratory

Provides supervised tutoring assistance in basic skills mathematics and basic skills mathematics applications found in other courses.