1. Students are advised to consult a counselor when selecting a Mathematics course.

2. New students will need to take an assessment test to determine initial course placement. See Student Success and Support Program for alternatives and exemptions.

3. Individualized Self-Study Mathematics MATH 001 is available for MATH 102 to be taken for credit, one unit at a time.

4. Some courses below dotted line may not be transferable to certain four-year institutions. Consult Counselors/Transfer Center/4 yr. catalogs.
Definition
Mathematics is an important tool with which problems can be solved. Numbers, letters, or other symbols constitute the language of mathematics and, as in any language, are used to convey ideas and relationships especially in science. The final balance in a checkbook is a simple example of this relationship while landing astronauts on the moon reveals its complexity.

Staff
To access faculty and staff, dial (661) 722-6300, then the 4-digit extension.

Dean:
Vacant ext. 6415

Administrative Assistant:
Wendy Cios ext. 6415

Clerical Assistant III:
Suzanne Olson ext. 6415

Department Chair:
James Dorn ext. 6811

Lab Technician:
Jason Kirkendall ext. 6071

STEM
Christos Valiotos, Director ext. 6024
Jamie Jones, Coordinator ext. 6992
Christopher Bellingham, Lab Technician ext. 6992

Faculty:
Dr. Paul Ahad ext. 6954
Snizhana (Jane) Bowers ext. 6947
Dr. Magdalena Caproiu ext. 6576
Roberto Diaz ext. 6421
James Dorn ext. 6811
Katherine Engelen ext. 6776
Luis Enriquez ext. 6244
Dezdemona Ginosian ext. 6971
Tooraj Gordi ext. 6019
Dr. Cindy Hendrix ext. 6744
Dr. Tony Lam ext. 6735
Dr. Igor Marder ext. 6238
Andrew Mashhour ext. 6081
Dr. Peter McLoughlin ext. 6108
Alexander Nickolaychuk ext. 6741
Dr. Ryoichi Osawa ext. 6291
Kenan Shahla ext. 6759
Mariko Shimizu ext. 6091
Michael Tran ext. 6595
Eugenie Trow ext. 6425
Pavinee Villapando ext. 6129

Adjunct Faculty:
To access adjunct faculty voice mail, dial (661) 722-6300, then the 4-digit number.

Mark Acuff 2992
Steve Brown 2238
James Brownlow 2492
David Butzke 2351
Daniel Byrne 2372
Larry Dale 2230
Nhan Doan 2087
Timothy Ferguson 2381
Monette Fowler 2207
Larry Gorden 2603
Robert Haynes 2318
Norman Hines 2356
James Jackson 2396
Dr. William Kitto 2948
Michael McMillan 2499
Jose Menjivar 2393
Lyudmila Michael 2159
Hasmik Mkrtchyan 2047
Gohar Petikyan 2271
Peter Robles 2236
William Rogers 2401
Nash Saleh 2131
Timothy Schroeder 2690
John Thurston 2249
Thomas Weadock 2472
Rong You 2484
Malik Younus 2258
Jietong Zhang 2253

Program Description
A student may improve basic mathematical skills through remedial course work or prepare for transfer to a B.A. or B.S. program in Mathematics, Physics, Chemistry, or Engineering.

Students must receive a minimum grade of “C” or better in all required core courses and the specific courses listed as program electives in order to qualify for the degree or certificate.

Distinctive Features
Courses in arithmetic and algebra provide the basic mathematical skills required in many fields. Statistics, linear algebra, calculus, and differential equations provide problem-solving tools for the physical and social sciences and engineering.

Math Labs: There is a math laboratory located in the Learning Center and additional support for math courses utilizing computer based instruction is found in The Prime Room, ME 100. Help in the Learning Center including tutoring is available on a drop-in basis. The Prime Room houses primarily Math 001, Individualized Self-Study courses. Students who are not enrolled in any of the Math 001 sections will have a limited access to this room. All math students are encouraged to utilize these learning resources.
Career Options
Actuary
Appraiser
Assessor
Auditor
Biometrician
Budget Analyst
Casualty Rater
Controller
Computer Programmer
Demographer
Econometrician
Engineering Analyst
Epidemiologist
Financial Analyst
Investment Analyst
Management Scientist
Mathematician
Operations Researcher
Public Opinion Analyst
Statistician
Surveyor
Systems Analyst
Teacher
Urban Planner
(Most of these careers require education beyond the two-year college level.)

Program Learning Outcomes

AS in Mathematics and AS-T in Mathematics
1. Demonstrate computational mastery.
2. Solve mathematical problems, both computational and proof, independently.
3. Understand and apply algorithms to solve problems.
4. Model and analyze real world problems by reformulating them into mathematical context.
5. Recognize the interdependency of different areas in mathematics, and the connection between mathematics and other disciplines.

Certificate Program
Certificate not applicable.

Associate Degree

Associate in Science in Mathematics for Transfer
The Associate in Science in Mathematics for Transfer (AS-T in Mathematics) degree offers students a fundamental knowledge of Mathematics and its relation to science, technology, and engineering. Students will enhance their problem solving and critical thinking skills by applying mathematical models to real world problems or utilizing mathematical objects and theorems to evaluate the validity of a statement or to prove mathematical statements.

The Associate in Science in Mathematics for Transfer (AS-T in Mathematics) degree meets the requirements of SB 1440 for Associate Degrees for Transfer (ADT). These degrees are intended to make it easier for students to transfer to California State University campuses, but do not exclude admittance to other colleges or universities.

To earn an Associate in Science in Mathematics for Transfer (AS-T in Mathematics) degree a student must complete the following:
(1) Completion of 60 semester units or 90 quarter units that are eligible for transfer to the California State University, including both of the following:
   (A) The Interssegmental General Education Transfer Curriculum (IGETC) or the California State University General Education – Breadth Requirements.
   (B) A minimum of 18 semester units or 27 quarter units in a major or area of emphasis, as determined by the community college district.
(2) Obtainment of a minimum grade point average of 2.0.
ADTs also require that students must earn a C or better in all courses required for the major or area of emphasis.

Required Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 150, Calculus and Analytic Geometry</td>
<td>5</td>
</tr>
<tr>
<td>MATH 160, Calculus and Analytic Geometry</td>
<td>4</td>
</tr>
<tr>
<td>MATH 250, Calculus and Analytic Geometry</td>
<td>4</td>
</tr>
</tbody>
</table>

Choose a minimum of 8 units from the lists below with at least 4 units from A:

Required Electives A:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 220, Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>MATH 230, Introduction to Ordinary Differential Equations</td>
<td>4</td>
</tr>
</tbody>
</table>

Required Electives B:

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 110, General Physics</td>
<td>4</td>
</tr>
<tr>
<td>MATH 116, Introduction to Statistics Using R</td>
<td>4</td>
</tr>
<tr>
<td>MATH 115, Statistics</td>
<td>4</td>
</tr>
</tbody>
</table>

*Courses denoted with an asterisk will fulfill the completion requirements for both the major and general education.

Except in cases of a prerequisite requirement, it is not required to take courses in exactly this sequence; they are recommended in this order to facilitate success.

Recommended Plan of Study

<table>
<thead>
<tr>
<th>Semester</th>
<th>First Semester</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSU GE requirement Area A2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CSU GE requirement Area C1</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CSU GE requirement Area C2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CSU GE requirement Area D</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CSU GE requirement Area E</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total 15</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>Second Semester</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 150, Calculus and Analytic Geometry (CSU GE B4)</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
Mathematics Courses

MATH 001 INDIVIDUALIZED SELF-STUDY INTERMEDIATE ALGEBRA
1–12 units
3-36 hours weekly
Advisory: Eligibility for ENGL 100A and READ 095.
(The Course Requisites for each class taken in MATH 001 are the same as those for the course named in the course description.) Individualized and self-paced study of Intermediate Algebra in a supervised computer lab environment for the motivated student. These courses include MATH 102C, 102D, 102E, and 102F. Students may enroll in only one unit at a time. Upon satisfactory completion of that unit, students may proceed to the next unit. At least four units must be completed in any academic year which also includes Winter and Summer sessions. The instructor will explain the unit system and assist students with selection of the appropriate unit course at the first class meeting. The instructor will also give initial orientation explaining testing, review tests to help students define what skills have been mastered, and refer students to readily available support services. Instructor does not lecture nor does he/she structure the pace of materials or determine when a student needs to proceed other than by setting deadlines for completion of one unit. Regular attendance is expected.

MATH 020 MANAGING MATH ANXIETY
.5 unit
9 hours total
Advisory: Eligibility for ENGL 100A and READ 095.
Designed to provide students with the skills to reduce math frustration by diagnosing social causes and educational contexts and overcoming math myths and misconceptions. This course will also cover the following skills: recognizing math anxiety, developing various coping skills which include relaxation and wellness techniques, and becoming aware of personal learning style preferences for math. Math-specific testing skills will be taught using currently adopted texts for MATH 065. NOTE: No grade will be given for this class; student will receive “pass” or “no pass” only. (Credit course not applicable to the associate degree and certificate programs.)

MATH 021 MATH STUDY STRATEGY
1 unit
18 hours total
Advisory: Eligibility for ENGL 100A and READ 095.
Designed to assist students in improving their math study skills so they can develop appropriate study strategies for math classes. Various methods and techniques will be explored including: developing a math textbook study system, math textbook annotating, math lecture note taking, listening, math problem solving strategies, test preparation, test taking strategies, relating learning preferences to math, and effective memory techniques. Time management at test time and identifying available campus resources for math will also be presented. NOTE: No grade will be given for this class; student will receive “pass” or “no pass” only. (Credit course not applicable to the associate degree and certificate programs.)

MATH 065 BASIC MATH
4 units
4 hours weekly
Advisory: Eligibility for ENGL 100A.
This course is intended to prepare students for beginning algebra and college level courses and programs. It covers basic operations with whole numbers, rational numbers and integers.
Students will learn how to solve proportions, percent problems and find perimeter, area, and volume of basic geometric figures and solids. Students will be introduced to the language of algebra and learn how to evaluate algebraic expressions and solve first degree equations. MATH 065 is not a transferable course and does not satisfy GE requirements. NOTE: No grade will be given for this class; student will receive “pass” or “no pass” only. (Credit course not applicable to the associate degree and certificate programs.)

**MATH 070 ELEMENTARY ALGEBRA**

4 units

4 hours weekly

Prerequisite: Eligibility for MATH 070 (AVC Placement through multiple measures) or Completion of MATH 065.

Advisory: Eligibility for READ 099.

This course is for the student who has had some previous training in algebra. Topics in Math 070 include operations with signed numbers, variables, algebraic expressions, linear equations, word problems, exponents, polynomials, special products, factoring, algebraic fractions, graphing, systems of equations, and graphing linear equations in two variables. NOTE: No grade will be given for this class; student will receive “pass” or “no pass” only. (Credit course not applicable to the associate degree and certificate programs.)

**MATH 102 *INTERMEDIATE ALGEBRA**

4 units

4 hours weekly

Prerequisite: Eligibility for MATH 102 (AVC Placement through multiple measures).

Advisory: Eligibility for READ 099.

This course is for the student who has been very successful completing Elementary Algebra and who is comfortable taking math classes. Topics include: Radical Expressions and Equations, Quadratic Equations and their graphs, Circles, Introduction to Functions, Systems of Linear Equations and Inequalities, Compound and Absolute Value Inequalities, Exponential and Logarithmic Functions, and word problems appropriate to all these topics. (AVC)

**MATH 105 METHODS OF PROOF FOR PRECALCULUS**

3 units

3 hours weekly

Prerequisite: Eligibility for MATH 105 (AVC Placement through multiple measures) or Completion for MATH 102.

Advisory: Eligibility for READ 099.

This course is designed to give STEM students an introductory overview, appreciation, and understanding of the role of theorem and proof in mathematics in preparation for the calculus sequence and beyond. Emphasis is placed on identifying the components of a mathematical system and the logical sequencing and formal proof of mathematical statements within a mathematical system. Students will get extensive practice with methods of direct and indirect proof, proof by math induction, and analytic geometry proofs in a variety of precalculus mathematical systems involving geometric figures, numbers, sets, and functions. (CSU, AVC)

**MATH 110 MATHEMATICS FOR LIBERAL ARTS STUDENTS**

3 units

3 hours weekly

Prerequisite: Completion of MATH 102.

Advisory: Eligibility for College Level Reading.

This is a survey of mathematics course and is designed for students who are taking mathematics for liberal arts majors or as a fulfillment of their general education requirements. The course is a survey of mathematical topics that introduces the art, history, and applications to a general audience. Students will appreciate mathematics through exploration of a wide range of applications in physical and social sciences, and also via its unparalleled and often surprising appearance in humanities. (CSU, UC, AVC)

**MATH 115 STATISTICS**

4 units

4 hours weekly

Prerequisite: Completion of MATH 102.

Advisory: Eligibility for College Level Reading.

The use of probability techniques, hypothesis testing, and predictive techniques to facilitate decision-making. Topics include descriptive statistics; probability and sampling distributions; statistical inference; correlation and linear regression; analysis of variance, chi-square and t-tests; and application of technology for statistical analysis including the interpretation of the relevance of the statistical findings. Applications using data from disciplines including business, social sciences, psychology, life science, health science, and education. (C-ID: MATH 110) (CSU, UC, AVC)

**MATH 116 INTRODUCTION TO STATISTICS USING R**

4 units

4 hours weekly

Prerequisite: Completion of MATH 102 (AVC Placement through multiple measures).

Advisory: Eligibility for College Level Reading.

This course introduces students to statistical thinking and literacy through the analysis of large real data bases using robust statistical computer software. Students will be introduced to the common traditional statistical methods taught in an introductory statistics course using the statistical software R. Probability techniques, hypothesis testing, and predictive techniques will be used to facilitate decision-making. Topics will include descriptive statistics; probability and sampling distributions; statistical inference; correlation and linear regression; analysis of variance, chi square and t tests. Results will be reported using R-markdown authoring in the RStudio program. (CSU, UC, AVC)
MATH 120 *MATH FOR TEACHERS
3 units
3 hours weekly
Prerequisite: Completion of MATH 102.
Advisory: Eligibility for College Level Reading.
This course is designed to provide students with a deep conceptual understanding of the mathematics taught at the elementary and middle school level, with focus on quantitative reasoning skills. Topics covered include problem-solving skills, the structure of the real number systems with an emphasis on comprehension and analysis of mathematical topics. Additionally, students will look at the Common Core State Standards and how these standards are applied in the content covered in class. (CSU, UC, AVC)

MATH 124 FINITE MATH
4 units
4 hours weekly
Prerequisite: Completion MATH 102.
Finite Math is designed for students interested in business, social and behavioral sciences. Topics include Linear Functions, Matrices, Linear Programming, Mathematics of Finance, Sets and Logic, Probability, Statistics, and Markov Chains. (C-ID: MATH 130) (CSU, UC, AVC)

MATH 128 *COLLEGE ALGEBRA FOR LIBERAL ARTS
3 units
3 hours weekly
Prerequisite: Eligibility for MATH 128 (AVC Placement through multiple measures) or Completion of MATH 102.
Advisory: Eligibility for College Level Reading.
A college-level course in algebra for non-STEM or liberal arts majors covering the properties and graphs of polynomial, rational, radical, absolute value, and exponential and logarithmic functions; solutions and applications of equations and systems of equations and inequalities from these functions; linear programming; and introduction to matrices and determinants in solving linear systems. (This course will not satisfy the algebra prerequisite for the calculus sequence.) (C-ID: MATH 150) (CSU, UC, AVC)

MATH 135 *PLANE TRIGONOMETRY
3 units
3 hours weekly
Prerequisite: Completion of MATH 102 or Eligibility for MATH 135 (AVC Placement through multiple measures).
Advisory: Concurrent enrollment in MATH 105, Eligibility for ENGL 101 and College Level Reading.
This course is for the student who is preparing for calculus, physics, engineering, and other applications requiring trigonometry. Topics include the trigonometric functions, basic identities, inverse trigonometric functions, solutions of triangles, trigonometric equations, and introduction to vectors. (CSU, AVC)

MATH 140 *PRECALCULUS
4 units
4 hours weekly
Prerequisite: Completion of MATH 105 and MATH 135, or Eligibility for MATH 140 (AVC Placement through multiple measures).
Advisory: Eligibility for College Level Reading.
This course is primarily for students who have completed intermediate algebra and trigonometry and are planning to study calculus or other mathematically oriented courses in satisfaction of STEM major areas of study such as chemistry, physics, engineering, biological sciences, economics and technology. Topics include equation-solving, graphing, and analysis of polynomial, absolute value, radical, rational, exponential, logarithmic, trigonometric, conic and polar functions. (CSU, UC, AVC)

MATH 148 CALCULUS FOR BUSINESS & ECONOMICS
4 units
4 hours weekly
Prerequisite: Completion of MATH 128.
Calculus for Business & Economics is a course designed for students in business, management, economics, and social sciences who require more advanced mathematics. The course emphasizes on applications of derivatives and integrals. Topics include functions, limits, continuity, graphing, differentiation, and integration. (C-ID: MATH 140) (CSU, UC, AVC)

MATH 150 CALCULUS AND ANALYTIC GEOMETRY
5 units
5 hours weekly
Prerequisite: Completion of MATH 140 or Eligibility for MATH 150 (AVC Placement through multiple measures).
Advisory: Eligibility for College Level Reading.
This course is for the student planning upper-division work in math, physics, engineering or business. It involves differentiation and integration of algebraic, trigonometric, exponential, and logarithmic functions. Applications include extrema, graphing, related rates, area. (C-ID: MATH 900S) (CSU, UC, AVC)

MATH 160 CALCULUS AND ANALYTIC GEOMETRY
4 units
4 hours weekly
Prerequisite: Completion of MATH 150.
Advisory: Eligibility for College Level Reading.
This course is a continuation of Math 150. It includes applications of integration, integration techniques, indeterminate forms, improper integrals, infinite series, and topics in analytic geometry. (C-ID: MATH 220, MATH 900S) (CSU, UC, AVC)
MATH 220  LINEAR ALGEBRA
4 units
4 hours weekly
Prerequisite: Completion of MATH 160.
Advisory: Eligibility for College Level Reading.
This is an introductory course in linear algebra, designed for transfer students majoring in the mathematical, biological, physical, engineering, sociological or managerial sciences. Topics to be covered include systems of linear equations, matrices, determinants, vector spaces, inner product spaces, linear transformations, eigenvalues and eigenvectors. This course will include references to applications of the above topics in the areas of differential equations, least squares fitting to data, geometry of linear operators on R2, diagonalizing quadratic forms and conic sections. (C-ID: MATH 250) (CSU, UC, AVC)

MATH 230  INTRODUCTION TO ORDINARY DIFFERENTIAL EQUATIONS
4 units
4 hours weekly
Prerequisite: Completion of MATH 160.
Advisory: Completion of MATH 220 and MATH 250, and Eligibility for College Level Reading.
This is an introduction course in solving numerous types of ordinary differential equations including first order linear and nonlinear equations, higher order linear equations, systems of linear equations, and the associated initial value problems. In addition to the standard methods, the Laplace transform, power series method, and matrix method are covered. Applications of differential equations in physics, chemistry, economics and social sciences will be studied throughout the course. (CSU, UC, AVC)

MATH 250  CALCULUS AND ANALYTIC GEOMETRY
4 units
4 hours weekly
Prerequisite: Completion of MATH 160.
Advisory: Eligibility for College Level Reading.
This course is a continuation of MATH 160. Includes vector theory and the geometry of 3-dimensional space, vector-valued functions, functions of several variables, partial differentiation, multiple integration and vector analysis. (CSU, UC, AVC)