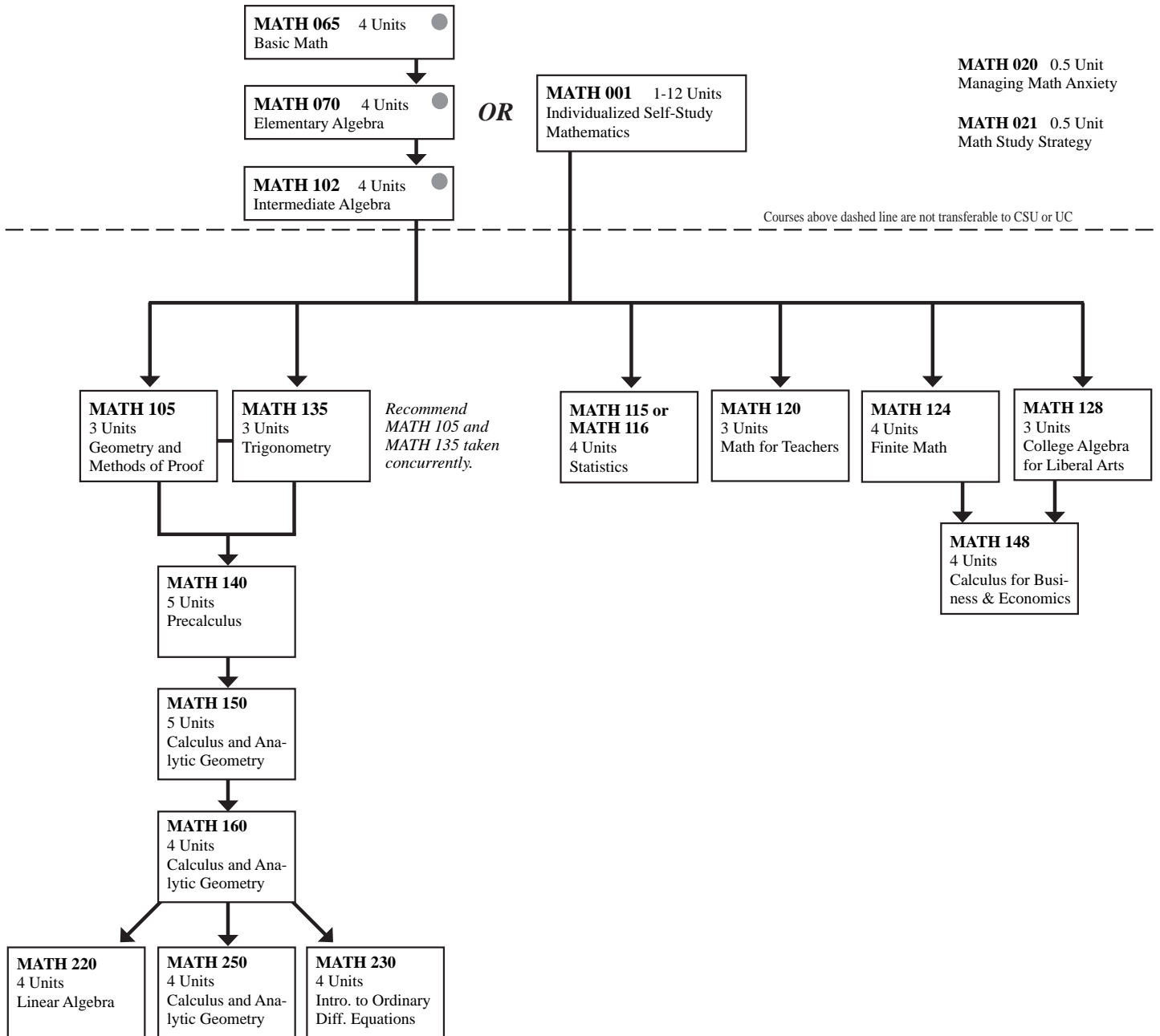


MATHEMATICS COURSE SEQUENCES AND PREREQUISITES

Mathematics, Engineering, Science, and some Business Majors



1. Students are advised to consult a counselor when selecting a Mathematics course.
2. New students are required 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 099 is available for MATH 065, 070, or 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:

Dr. Leslie Uhazy ext. 6415

#### Administrative Assistant:

Wendy Cios ext. 6415

#### Clerical Assistant III:

Suzanne Olson ext. 6415

#### Department Chair:

Tooraj Gordi ext. 6019

#### Lab Technician:

*position vacant* ext. 6881

#### Faculty:

Dr. Paul Ahad ext. 6954

Debra Anderson ext. 6745

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

Dezdemonia Ginosian ext. 6971

Tooraj Gordi ext. 6019

Dr. Cindy Hendrix ext. 6744

Dr. Igor Marder ext. 6238

Dr. Ryoichi Osawa ext. 6291

Kenan Shahla ext. 6759

Michael Tran ext. 6595

Eugenie Trow ext. 6425

Pavinee Villapando ext. 6129

Nancy Wendt ext. 6420

#### Adjunct Faculty:

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

V.M. 2080

Randy Ades 2160

Jose Alvarado 2534

John Asatryan 2633

Michael Bellavia 2992

Pakawan Berry 2238

Steve Brown 2351

David Butzke 2372

Daniel Byrne 2230

Larry Dale 2381

Timothy Ferguson 2207

Monette Fowler 2603

Larry Gorden

Burton Gray	2293
Robert Haynes	2318
Norman Hines	2356
Dr. William Kitto	2948
Mario Martinez-Quijada	2368
Andrew Mashhour	2306
Michael McMillan	2499
Jose Menjivar	2393
Lyudmila Michael	2159
Hasmik Mkrtchyan	2047
Sam Pearsall	2298
Udani Ranasinghe	2195
Peter Robles	2236
Dr. Nash Saleh	2131
Timothy Schroeder	2690
John Thurston	2249
Mike Wallace	2008
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

#### Mathematics

An associate degree with a major in Mathematics is available. A minimum of 29 units is required. Students who intend to transfer are strongly encouraged to complete either the Intersegmental General Education Transfer Curriculum (IGETC) or the California State University General Education – Breadth (CSU GE) requirements. (See Graduation/Associate Degree Requirements and Transfer Information.)

<b>Required Courses: (29 units)</b>	<b>units</b>
MATH 150, Calc. & Analytic Geom.	5
MATH 160, Calc. & Analytic Geom.	4
MATH 220, Linear Algebra	4
MATH 230, Differential Equations	4
MATH 250, Calc. & Analytic Geom.	4
PHYS 110, General Physics	4
PHYS 120, General Physics or PHYS 211, General Physics	4

#### 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 Intersegmental 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.

<b>Required Courses:</b>	<b>units</b>
*MATH 150, Calculus and Analytic Geometry	5
MATH 160, Calculus and Analytic Geometry	4
MATH 250, Calculus and Analytic Geometry	4

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

<b>Required Electives A:</b>	<b>units</b>
MATH 220, Linear Algebra	4
MATH 230, Introduction to Ordinary Differential Equations	4

<b>Required Electives B:</b>	<b>units</b>
*PHYS 110, General Physics	4
MATH 116, Introduction to Statistics Using R or MATH 115, Statistics	4

\*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*

<b>First Semester</b>	<b>units</b>
CSU GE requirement Area A2	3

CSU GE requirement Area C1	3
CSU GE requirement Area C2	3
CSU GE requirement Area D	3
CSU GE requirement Area E	3
<b>Total 15</b>	<b>units</b>

**Second Semester**

MATH 150, Calculus and Analytic Geometry (CSU GE B4)	5
CSU GE requirement Area B1/B3	3-4
CSU GE requirement Area A1	3
CSU GE requirement Area D	3
<b>Total 14-15</b>	<b>units</b>

**Third Semester**

MATH 160, Calculus and Analytic Geometry	4
Required Elective List A	4
CSU GE requirement Area A3	3
CSU GE requirement Area C	3
CSU GE requirement Area D	3
<b>Total 17</b>	<b>units</b>

**Fourth Semester**

MATH 250, Calculus and Analytic Geometry	4
Required Elective List B	4-5
CSU GE requirement Area B2/B3	3-4
*CSU Transferable Electives	0-3
<b>Total 13-14</b>	<b>units</b>

**CSU GE or IGETC Pattern 37-39  
CSU Transferable Elective Units to reach Degree Total 60**

\*Electives should be taken from other courses within the discipline.

**Transfer**

Students planning to continue studies at a four-year college or university after AVC should visit the Transfer Resource Center and consult with a counselor as soon as possible. Additional information on official transfer articulation agreements from AVC to many CSU/UC campuses can be found at the following Web site: [www.assist.org](http://www.assist.org)

**Prerequisite Completion**

If a course is listed as a prerequisite for another course, that prerequisite course must be completed with a satisfactory grade in order to enroll in the next course. According to Title 5, Section 55200(d), a satisfactory grade is a grade of "A," "B," "C" or "P". Classes in which the Pass/No Pass option is available are indicated with an asterisk (\*) before the course title. See "Pass/No Pass Option" in the catalog for full explanation.

**Mathematics Courses**

**MATH 001 INDIVIDUALIZED SELF-STUDY MATHEMATICS**

1-12 units

3-36 hours weekly

*Advisory: AVC Math Assessment Test.*

(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 the basic skills courses from Arithmetic to Intermediate Algebra in a supervised environment for the motivated student. These courses include MATH 065 (C, D, E, and F), MATH 070 (C, D, E, and F), and MATH 102 (C, D, E, and F). Students may choose from single unit courses: MATH 065C, 065D, 065E, 065F, 070C, 070D, 070E, 070F, 102C, 102D, 102E, 102F and 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. Grading for MATH 065C through 070F is P (for pass ) and NP (for no-pass). Students will earn letter grades A, B, C, D, or F in Math 102C through 102F. Letter grade I (incomplete) will not apply to Math 001 sequence.

**MATH 020 MANAGING MATH ANXIETY**

.5 unit

9 hours total

*Advisory: Eligibility for ENGL 097 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 and MATH 070. **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 097 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 099.

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 assessment) 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 assessment) or Completion of MATH 070.

**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 GEOMETRY AND METHODS OF PROOF**

3 units

3 hours weekly

**Prerequisite:** Eligibility for MATH 105 (AVC assessment) or Completion for MATH 102.

**Advisory:** Eligibility for READ 099.

Using Euclidean geometry as a paradigm of deductive systems, 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. The deduction of geometric concepts and theorems important in later courses will emphasize the anatomy of a deductive system and basic direct proof. This experience will then be extended to non-geometric systems, where students will be introduced to some basic analytical methods of proving familiar mathematical statements about numbers, sets, and functions. (CSU, 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 Assessment).

**Advisory:** Eligibility for College Level Reading.

This course will cover the common traditional statistical methods taught in a beginning course using the statistical software R. Course will include statistical reporting of results using R-markdown authoring in the R-Studio program. 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. (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. Topics covered included problem-solving skills, the structure of the real number systems, other numeration systems, basic number theory, set theory, and use of manipulatives. Additionally, students will look at the Common Core State Standards and how these standards are applied in the content covered in class. (CSU, AVC)

**MATH 124 FINITE MATH**

4 units

4 hours weekly

**Prerequisite:** Completion of ENGL 099 and 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 assessment) 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 Assessment).**Advisory:** Concurrent enrollment in MATH 105, Eligibility for ENGL 101/ENGL 101SL 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**

5 units

5 hours weekly

**Prerequisite:** Completion of MATH 105 and MATH 135, or Eligibility for MATH 140 (AVC Assessment).**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 or MATH 124.

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 Assessment).**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. (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) (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  $\mathbb{R}^2$ , 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)