MATH 0012 - COLLEGE ALGEBRA

SECTION A

1. Division: Sciences & Mathematics
2. Course Discipline: MATH
3. Course Number: 0012
4. Course Title: COLLEGE ALGEBRA
5. First semester this new version/new course will be offered: SUMMER 2013

SECTION B General Course Information

1.Units: 4.0 **Variable Units:** N/A
2.This Course is: Degree-Applicable Credit - Transferable
3A. Cross-List: **3B. Formerly:**

Course Format and Duration

4. Standard Term Hours per Week		5. Standard Term Total Semester Hours	
Lecture/Discussion:	4	Lecture/Discussion:	72
Lab:		Lab:	
Activity:		Activity:	
By Arrangement:		By Arrangement:	
Total Hours per Week:	4	**Total Hours :**	72

6. Minimum hours per week of independent work done outside the class: 8

Course Preparation - (Supplemental form B required)

7a. Prerequisite(s): (Course and/or other preparation/experience that is REQUIRED to be completed previous to enrollment in this course.)

Completion of MATH D with grade of "C" or better, or placement by matriculation assessment process

7b. Co-requisite(s): (Courses and/or other preparation that is REQUIRED to be taken concurrently with this course.)

7c. Advisory: (MINIMUM preparation RECOMMENDED in order to be succesful in this course. Also known as "Course Advisory".)

Catalog Description And Other Catalog Information:

8. Repeatability: **Not Repeatable**

Please note: Repeatability does not refer to repeating courses because of substandard grades or a lapse of time since the student took the course. A course may be repeated only if the course content differs each time it is offered and the student who repeats it is gaining an expanded educational experience as stipulated in Title V.

- ☐ Skills or proficiencies are enhanced by supervised repetition and practice within class periods.
- ☐ Active participatory experience in individual study or group assignments is the basic means by which learning objectives are attained.
- ☐ Course content differs each time it is offered.

Explanation for above repeatability selection:

9a. Grading Option: Standard Grade

9b. Catalog Description:

Study of algebra topics beyond MATH D; including functions, graphs, logarithms, systems of equations, matrices, analytic geometry sequences, mathematical induction, and introduction to counting techniques.

Course Outline Information

10. Course Objectives: (Performance objectives for all credit courses must indicate that students will learn critical thinking and will be able to apply concepts at college level.Performance objectives must be related to items listed in Section 11.)

Through homework assignments, quizzes, exams, projects and classroom discussions, the student will:
1. solve equations, including linear, quadratic, polynomial, rational, logarithmic, exponential, absolute value and equations with radicals;
2. simplify algebraic expressions using the order of operations, properties of exponents/radicals, and mechanics of fractions;
3. solve word problems leading to equations from outcome Number 1;
4. graph the solution to a system of linear or non-linear inequalities;
5. graph functions and equations and have the ability to discuss and find intercepts, vertices, and asymptotes (examples of functions: linear, quadratic, polynomial, rational, logarithmic, exponential, radical);
6. solve systems of equations using substitution, elimination
Cramer's Rule or matrices;
7. identify and graph conic sections, labeling the center, vertices, foci, directrices, and asymptotes when applicable;
8. perform binomial expansion using Pascal's Triangle or combinatorics; and
9.identify terms and find finite or infinite sums of arithmetic and geometric sequences and series.

11. Course Content Outline: (Provides a comprehensive, sequential outline of the course content, including all major subject matter and the specific body of knowledge covered.)

I. Basic Concepts of Algebra
A. Exponents and Radicals
B. Polynomials, Factoring, Special Products
C. Fractional Expressions
D. Linear and Quadratic Equations
E. Linear, Non-Linear and Absolute Value Inequalities
F. Problem Solving/Word Problems
G. Complex Numbers
II. Functions and Graphs
A. Definition of Function and Evaluation of Functions
B. Graphing of Functions
1. Zeros, or Roots, and Intercepts of Functions
2. Asymptotes of Functions
3. Shifting and Reflection of Functions
4. Symmetry
C. Combination and Composition of Functions
D. Inverse Function
E. Conic Sections
III. Logarithms, Exponential and Logarithmic Functions
A. Review of Exponents and Logarithms
B. Solving Equations with Exponentials and Logarithms
C. Graphing Exponential and Logarithmic Functions
D. Word Problems with Logarithmic and Exponential Equations
IV. Systems of Equations and Matrices
A. Solving Systems of Equations
1. Substitution
2. Elimination
B. Introduction to Matrices
1. Algebra of matrices
2. Elementary row operations
3. Inverse of a square matrix
C. Matrices as a Method of Solving a System of Equations
1. Elementary row operations
2. Inverse matrices
3. Cramer's Rule
V. Binomial Expansion and Combinatorics
A. Expand Binomial
1. Pascal's triangle
2. Combinations
VI. Sequences and Mathematical Induction
A. Arithmetic Sequences
1. Terms
2. Sums
B. Geometric Sequences
1. Terms
2. Sums (finite and infinite)
C. Introduction to Mathematical Induction

12. Typical Out-of-Class Assignments: (Credit courses **require** two hours of independent work outside of class for each lecture hour, less lab/activity classes. List type of assignments including library assignments.)

a. Reading Assignments: (Submit at least 2 examples.)

1. In the text read about real world applications of parabolas. Note the significance of the placement of the focus and the importance of the length of the focal diameter.
2. Using mathematical journals found in the library, research the applications of and patterns found in Pascal's Triangle and prepare a presentation about your findings to the class.

b. Writing, Problem Solving or Performance: (Submit at least 2 examples)

1. Find all zeros for a given 5th degree polynomial using the Rational Zeros Theorem, synthetic division, and other relevant theorems. Use your results to sketch a graph of the function.

2. After the release of radioactive material into the atmosphere from a nuclear power plant at Chernobyl (Ukraine) in 1986, the hay in Austria was contaminated by iodine 131 (half-life 8 days). If is is safe to feed the hay to cows when 10% of the iodine 131 remains, how long did the farmers need to wait to use the hay?

c. Other (Term projects, research papers, porfolios, etc.)

13. Required Materials:

a. All textbooks, resources and other materials used in this course are college level?

- ☑ Yes
- ☐ No

b. Representative college-level textbooks (for degree applicable courses) or other print materials:

Book 1:

Author:	Sullivan
Title:	College Algebra
Publisher:	Pearson/Prentice Hall
Date of Publication:	2012
Edition:	9th

c. Other materials and/or supplies required of students:

Methods of Instruction

14.Check all Instructional methods used to present course content:

- ☑ Lecture
- ☑ Discussion Semminar
- ☑ Lab
- ☑ Directed Study
- ☑ Activity
- ☑ Distance Education (requires supplemental form)
- ☐ Work Experience
- ☐ Tutoring

Other:

Give detailed examples of teaching methodology that relate to the course performance objectives:

Example 1: In class, small group collaborative learning activity - Students will compare how different types of functions can be used in modeling data sets from business, science, and nature. They will then choose the most appropriate model in each case, and make predictions based on the chosen models.

Example 2: Interactive lecture format is used to develop the concept of sequences. To help students understand the commonalities and differences between arithmetic and geometric sequences, the instructor will illustrate the concepts both graphically and algebraically. Students will participate verbally and will work several examples.

Example 3: After reading about the orbits of planets, students will use an elliptical model to find the equation of the path of the Earth about the sun.

15. Methods of Assessing Student Learning
15a. Methods of Evaluation:

- ☐ Essay Exam
- ☑ Objective Exam
- ☑ Projects
- ☑ Class Discussion
- ☑ Reports
- ☑ Problem Solving Exam
- ☐ Skill Demonstration
- ☐ Other

15b. (All courses must provide for measurement of student performance in terms of stated student performance objectives, Area 10, and culminate in a formal recorded grade based on uniform standards. Submit at least 2 examples.)

Example 1: Find the real and complex roots of a given polynomial equation. This question is graded based on the clarity, appropriate mathematical vocabulary, the correctness of the method used and of the roots found.

Example 2: Solve a system of equations by applying elementary row operations to reduce a matrix to Row-Echelon Form. This question is graded based on the clarity, appropriate mathematical vocabulary, and the correctness of the solutions found.

Example 3: Given an arithmetic or geometric sequence, find the nth partial sum of it. This question is graded based on the clarity, appropriate mathematical vocabulary, the use of the correct formula, and the correct sum of the sequence.

SECTION C

1. Program Information:

- ☑ In an approved program
- ☐ Part of a new program
- ☐ Not part of an approved program

2. TOP Code Information

Program Title: Mathematics, General 170100

3. Course SAM Code:

- ☐ A - Apprenticeship Course
- ☐ B - Advanced Occupational
- ☐ C - Clearly Occupational
- ☐ D - Possibly Occupational
- ☑ E - Non-Occupational

4. Faculty Discipline Assignment(s):

Mathematics

Comments:

SECTION D

General Education Information:

1. College Associate Degree GE Applicability:

Communication & Analytic Thinking
Math Competency

2. CSU GE Applicability:

B-4 Mathematics/Quantitative Reasoning

3. IGETC Applicability:

2: Mathematical Concepts & Quantitative Reasoning

4. C-ID :

SECTION E

1. Articulation Information: (Required for Transferable Courses Only)

- ☑ CSU Transferable
- ☑ UC Transferable
- ☐ CSU/UC Major Requirement.

If CSU/UC major requirement, list campus and major. (Note: Must be lower division)

2. List at least one community college and its comparable course. If requesting CSU and/or UC transferability also list a CSU/UC campus and comparable lower division course

College of the Desert (Math 10)
Cuesta College (Math 32)
CSU, Sacramento (Math 11)
UC Santa Cruz (Math 2)

SECTION F

Planning and Resources: Please address the areas below:

1. Evidence of Need or Potential: recommendations of advisory committee, connection to existing or planned degrees/certificates, or regional/national developments, transfer university requirements.

One of the possible prerequisites for the calculus series for math, science, and engineering majors.

2. Appropriateness to Mission: connection to basic skills, transfer, career technical education, or lifelong learning; relationsh

Transfer-level mathematics class.

3. Place in Program/Department: relationship to student learning outcomes identified by program, connection to general education, or articulation with other institutions.

Meets GE applicability for Math Competency and Communication and Analytical Thinking. Course includes all four Math program SLO's (Equations and Expressions, Visual Models, Applied Problems, and Communication.)

4. Availability of Faculty and Facilities: minimum qualifications to teach course, special training for instructors, or long-term physical impact of course.

All math faculty members meet the minimum qualifications to teach this course. No special training is required.

5. Potential Impact on Resources: impact on library, computer support, transportation, equipment, or other needs

No additional resources are needed since we have the classroom space and technology already available.

SECTION G

1. Maximum Class Size (recommended): 35

2. If recommended class size is not standard, then provide rationale: