

**EL CAMINO COLLEGE
COURSE OUTLINE OF RECORD**

I. COURSE DESCRIPTION

Course Title and Number: Mathematics 180

Descriptive Title: Precalculus

Discipline: Mathematics Division: Mathematical Sciences

Hours Lecture: 5 Hours Laboratory: Course Units: 5

Weeks: 18 X 9 6 Other

Grading Method: Letter X CR/NCR Both No Grade

Associate Degree Credit X Non-Degree Credit Non-Credit

Transfer CSU: No Yes X Effective Date: Prior to 7/92

Transfer UC: No Yes X UC Approval Date: Prior to 7/92

Pending

Prerequisite, Corequisite, Recommended Preparation, Enrollment
Limitation (Specify):

Prerequisite: Mathematics 170 with a minimum grade of C

Catalog Description:

This course includes a study of algebraic, exponential, logarithmic and trigonometric functions; an introduction to the algebra of matrices; sequences and series; an introduction to analytic geometry; and applications.

Originator: Boxer, Nelson, Vedder Submittal Date: December, 1978

BOARD APPROVAL DATE:

Reviewed and/or Revised by:

Susan Taylor

Date Fall 1999

Susan Taylor

Date November, 2001

II. COURSE OBJECTIVES AND METHODS OF EVALUATION

A. Course Objectives (List the major objectives stated as student outcomes in behaviorally measurable terms.)

1. Manipulate and simplify complex numbers and algebraic expressions at the Precalculus level.
2. Factor polynomials and find the zeroes of polynomial functions using polynomial division and the Factor Theorem.
3. Solve algebraic, exponential, logarithmic and trigonometric equations, and equations with absolute value.
4. Solve quadratic and rational inequalities and inequalities with absolute value.
5. Graph algebraic, exponential, logarithmic and trigonometric functions.
6. Solve systems of equations and inequalities.
7. Solve problems using matrices and determinants.
8. Evaluate trigonometric functions and their inverses.
9. Solve problems and verify trigonometric identities using the sum, difference, double-angle and half-angle formulas.
10. Sketch functions in polar and parametric form.
11. Solve problems involving arithmetic and geometric sequences and series.
12. Solve application problems at the Precalculus level.
13. Use Mathematical Induction to write proofs.
14. Use technology (graphing or scientific calculators and/or computer software) to solve problems.

B. Methods of Evaluation - **Associate Degree Credit Course**

Students in this course will be graded, at minimum, in at least one of the following four categories. Please check the appropriate responses. The course must have a minimum of one response in category 1, 2, or 3.

1. Substantial writing assignments, including:
- | | |
|-------------------------------------------------|-----------------------------------------------|
| <input type="checkbox"/> essay exam(s) | <input type="checkbox"/> reading report(s) |
| <input type="checkbox"/> written homework | <input type="checkbox"/> laboratory report(s) |
| <input type="checkbox"/> term or other paper(s) | <input type="checkbox"/> other (specify) |

Substantial writing assignments are inappropriate for this degree applicable course because: <input checked="" type="checkbox"/> The course is primarily computational in nature <input checked="" type="checkbox"/> The course primarily involves skill demonstrations or problem solving

2. Computational or non-computational problem-solving demonstrations, including:
- | | |
|------------------------------------------------|-------------------------------------------------------|
| <input checked="" type="checkbox"/> exam | <input checked="" type="checkbox"/> homework problems |
| <input type="checkbox"/> laboratory reports(s) | <input type="checkbox"/> field work |
| <input checked="" type="checkbox"/> quizzes | <input type="checkbox"/> other (specify) |
3. Skill demonstrations, including:
- | | |
|-----------------------------------------------|------------------------------------------|
| <input type="checkbox"/> class performance(s) | <input type="checkbox"/> field work |
| <input type="checkbox"/> performance exam(s) | <input type="checkbox"/> other (specify) |

4. Objective examinations, including:
- | | |
|------------------------------------------|------------------------------------------|
| <input type="checkbox"/> multiple choice | <input type="checkbox"/> true/false |
| <input type="checkbox"/> completion | <input type="checkbox"/> other (specify) |
| <input type="checkbox"/> matching items | |

C. Methods of Evaluation - **Non-Degree Credit Course**

Students will be graded, at minimum, in at least one of the following four categories. Please check the appropriate responses. The course must have a minimum of one response in category 1, 2, or 3.

1. Reading and writing assignments, including:
- | | |
|-------------------------------------------------|-----------------------------------------------|
| <input type="checkbox"/> essay exam(s) | <input type="checkbox"/> reading report(s) |
| <input type="checkbox"/> written homework | <input type="checkbox"/> laboratory report(s) |
| <input type="checkbox"/> term or other paper(s) | <input type="checkbox"/> other (specify) |
2. Computational or non-computational problem-solving demonstrations, including:
- | | |
|------------------------------------------------|--------------------------------------------|
| <input type="checkbox"/> exam | <input type="checkbox"/> homework problems |
| <input type="checkbox"/> laboratory reports(s) | <input type="checkbox"/> field work |
| <input type="checkbox"/> quizzes | <input type="checkbox"/> other (specify) |
3. Skill demonstrations, including:
- | | |
|-----------------------------------------------|------------------------------------------|
| <input type="checkbox"/> class performance(s) | <input type="checkbox"/> field work |
| <input type="checkbox"/> performance exam(s) | <input type="checkbox"/> other (specify) |
4. Objective examinations, including:
- | | |
|------------------------------------------|------------------------------------------|
| <input type="checkbox"/> multiple choice | <input type="checkbox"/> true/false |
| <input type="checkbox"/> completion | <input type="checkbox"/> other (specify) |
| <input type="checkbox"/> matching items | |

D. Methods of Evaluation - **Non-Credit Course**

Indicate methods used for determining whether stated objectives have been met.

III. OUTLINE OF SUBJECT MATTER

The outline of topics should be detailed enough to enable an instructor to determine the major areas of knowledge and activities that should be covered so that the course may have consistency from instructor to instructor and semester to semester.

<u>Approximate Time</u> (in Weeks)	<u>Major Topics</u>
1.0	<u>Algebraic Expressions</u> (i) Polynomials (ii) Radicals and exponents (iii) Rational expressions
1.0	<u>Linear and Quadratic Equations and Inequalities</u> (i) Linear and quadratic equations (ii) Inequalities (iii) Application problems involving linear and quadratic equations
1.0	<u>Functions and Graphs</u> (i) Graphs of Functions (ii) Transformations of Functions (iii) Composition and inverse of functions
2.0	<u>Conic Sections, Polar and Parametric Equations</u> (i) Conic Sections (ii) Polar Equations (iii) Parametric Equations
2.0	<u>Polynomial and Rational Functions</u> (i) Polynomial Functions and their Graphs (ii) Polynomial Division and the Factor Theorem (iii) Complex Numbers, Nonreal Solutions of Polynomial Equations and the Fundamental Theorem of Algebra (iv) Rational Functions and their Graphs
2.0	<u>Exponential and Logarithmic Functions</u> (i) Graphing and Properties (ii) Equations and Applications

Approximate Time (in Weeks)	Major Topics
3.0	<u>Trigonometric Functions</u> (i) The Unit Circle (ii) Trigonometric Functions (iii) Graphs and Inverses of Sine, Cosine and Tangent (iv) Identities (v) Addition, Double-Angle and Half-Angle Formulas for Sine and Cosine (vi) Equations
2.0	<u>Matrices and Systems of Equations</u> (i) Systems of equations (ii) Algebra of Matrices (iii) Matrix Equations (iv) Determinants (v) Systems of Inequalities (vi) Partial Fraction Decomposition
3.0	<u>Sequences, Series and Mathematical Induction</u> (i) Sequences and Series (ii) Arithmetic and Geometric Sequences and Series (iii) Mathematical Induction (iv) Binomial Theorem
1.0	<u>Final Exam</u>
Total	18 weeks

IV. READING AND WRITING ASSIGNMENTS OR, IF MORE APPROPRIATE, ASSIGNMENTS REQUIRING COMPUTATION, PROBLEM-SOLVING, OR SKILL DEMONSTRATION
Three hours of work per week, including class time, are required for each unit of credit.

A. Provide a representative example of an assignment.

Read the section of the text corresponding to Trigonometric Equations; do the exercises specified in the syllabus. A sample exercise is:

Find all primary solutions of the following trigonometric equation. Use a calculator and round all answers to four decimal places:

$$12 \sin^2 x - \sin x - 6 = 0$$

B. Two hours work outside of class are required for each hour of lecture or equivalent. Each student in this course will be required to perform the following outside of regular class time:

- Study
- Answer questions
- Skill practice
- Required reading
- Problem solving activity or exercise
- Written work (essays/compositions/report/analysis/research)
- Journal (reaction and evaluation of class, done on a continuing basis throughout the semester)
- Observation of or participation in an activity related to course content (e.g. play, museum, concert, debate, meeting)
- Course is lab only - minimum required hours satisfied by scheduled lab time
- Other (specify)

V. COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS

Cite a minimum of two specific assignments that demonstrate college-level critical thinking. (Required for degree applicable courses only.)

Read the sections of the text corresponding to Quadratic Functions and Mathematical Induction; then do the exercises at the end of those two sections listed in the course syllabus. The following are two sample exercises:

- (a) An object is projected vertically upward from the ground at an initial velocity of 192 feet per second. If air resistance is neglected, its distance $s(t)$ in feet above the ground after t seconds is given by: $s(t) = 192t - 16t^2$. Find the maximum height the object will rise.
- (b) Prove by Mathematical Induction that the sum of the first n even integers is $n(n+1)$.

VI. PLANNED INSTRUCTIONAL ACTIVITIES
(e.g., lecture, media, field trips)

Lecture, discussion, individual assistance, calculator activities,
computer-aided instruction

VII. APPROPRIATE TEXTS AND MATERIALS

For degree applicable courses the adopted texts and/or educational
materials have been certified to be primarily college level:

YES X

NO _____

- A. Required Texts (title, author, publisher, date)
If multiple selection is offered, only representative texts need
be listed.*

Precalculus, third edition, James Stewart,
Brooks/Cole, 1998.

- B. Required Supplementary Readings

- C. Other Required Materials

Graphing or scientific calculator

*A complete list of required and recommended materials is maintained
in the Division Office.

VIII. PREREQUISITES, COREQUISITES, AND ENROLLMENT LIMITATIONS

A. X PREREQUISITE _____ COREQUISITE

1. Indicate Type

_____ Standard X Sequential _____ Health and Safety
_____ Computational/Communication Skills _____ Non-Course

2. Standard Requisite:

Identify three UC/CSU campuses that offer the equivalent pre/corequisite course with the equivalent target course and list the number and title of each.

University Name: _____ Catalog Year _____

Equivalent Target Course: _____

Equivalent Requisite Course: _____

University Name: _____ Catalog Year _____

Equivalent Target Course: _____

Equivalent Requisite Course: _____

University Name: _____ Catalog Year _____

Equivalent Target Course: _____

Equivalent Requisite Course: _____

3. Entrance Skills/Knowledge:

List the **required** skills an/or knowledge without which a student would be **highly unlikely to receive a grade of A, B, C, or Credit** (or for Health and Safety, would **endanger self or others**) in the Target Course.

- a. Solve problems involving right triangle trigonometry.
- b. Solve trigonometric equations and problems requiring the Laws of Sines and Cosines.
- c. Solve basic application problems using trigonometry.

(Add additional Skills/Knowledge as needed.)

B. ENROLLMENT LIMITATIONS

1. Indicate the category that describes the Enrollment Limitation for this course.

Band/Orchestra
 Theater
 Speech
 Chorus
 Journalism
 Dance
 Intercollegiate Athletics
 Honors Course
 Blocks of Courses
 Other (Specify)

2. List Degree and/or Certificate requirements that are met by this course:

3. List all other El Camino College courses satisfying the requirements listed in Section B.2.: