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 _____________

_____ Susan Taylor _________ Date _____________

CCC Form 1, 8/97
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.
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:
   ___ essay exam(s)       ___ reading report(s)
   ___ written homework ___ laboratory report(s)
   ___ term or other paper(s) ___ other (specify)

   Substantial writing assignments are inappropriate for this degree applicable course because:
   X The course is primarily computational in nature
   X The course primarily involves skill demonstrations or problem solving

2. Computational or non-computational problem-solving demonstrations, including:
   ___ exam ___ homework problems
   ___ laboratory reports(s) ___ field work
   ___ quizzes ___ other (specify)

3. Skill demonstrations, including:
   ___ class performance(s) ___ field work
   ___ performance exam(s) ___ other (specify)
4. Objective examinations, including:
   ___ multiple choice    ___ true/false
   ___ completion        ___ other (specify)
   ___ 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:
   ___ essay exam(s)    ___ reading report(s)
   ___ written homework    ___ laboratory report(s)
   ___ term or other paper(s)    ___ other (specify)

2. Computational or non-computational problem-solving demonstrations, including:
   ___ exam                  ___ homework problems
   ___ laboratory report(s)    ___ field work
   ___ quizzes                ___ other (specify)

3. Skill demonstrations, including:
   ___ class performance(s)    ___ field work
   ___ performance exam(s)          ___ other (specify)

4. Objective examinations, including:
   ___ multiple choice    ___ true/false
   ___ completion        ___ other (specify)
   ___ 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.

<table>
<thead>
<tr>
<th>Approximate Time</th>
<th>Major Topics</th>
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<tr>
<td>(in Weeks)</td>
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<tr>
<td>1.0</td>
<td>Algebraic Expressions</td>
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<td>(i) Polynomials</td>
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<td></td>
<td>(ii) Radicals and exponents</td>
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<td>(iii) Rational expressions</td>
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<tr>
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<td>Linear and Quadratic Equations and Inequalities</td>
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<td>(ii) Inequalities</td>
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<td>(iii) Application problems involving linear and</td>
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<td>Functions and Graphs</td>
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<td>(i) Graphs of Functions</td>
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<td>(ii) Transformations of Functions</td>
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<td>(iii) Composition and inverse of functions</td>
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<td>Conic Sections, Polar and Parametric Equations</td>
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<tr>
<td></td>
<td>(i) Conic Sections</td>
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<td>(ii) Polynomial Division and the Factor Theorem</td>
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<td>(iii) Complex Numbers, Nonreal Solutions of</td>
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<td>(iii) Graphs and Inverses of Sine, Cosine and Tangent</td>
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<td>(iv) Identities</td>
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<td>(vi) Equations</td>
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<td>(v) Systems of Inequalities</td>
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<td>(ii) Arithmetic and Geometric Sequences and Series</td>
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<td></td>
<td>(iii) Mathematical Induction</td>
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<td></td>
<td>(iv) Binomial Theorem</td>
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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:

- [X] Study
- [ ] Answer questions
- [ ] Skill practice
- [X] Required reading
- [X] 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.*


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.
Mathematics 180
Course Title & Number

VIII. PREREQUISITES, COREQUISITES, AND ENROLLMENT LIMITATIONS

A. ____________________ PREREQUISITE  ____________________ COREQUISITE

1. Indicate Type
   _____ Standard   _____ 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.)
Mathematics 180
Course Title & Number

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.: