



El Camino College  
COURSE OUTLINE OF RECORD – Official

<b>Subject:</b>	MATH
<b>Course Number:</b>	187
<b>Descriptive Title:</b>	Transition to Calculus I
<b>Division:</b>	Mathematical Sciences
<b>Department:</b>	Mathematics
<b>Course Disciplines:</b>	Mathematical Sciences
<b>Catalog Description:</b>	This course provides the algebraic and trigonometric preparation needed for success in Calculus I (Math 190). The content of the course mirrors that of Math 190 and can be taken prior to or alongside it. Students will learn graphing, simplifying expressions, solving equations, modeling in a way that directly relates to how these skills are used in Math 190. Algebra and trigonometry are both covered throughout the class, providing a more integrated understanding of them. An active learning approach will be used, where students are able to engage with the material in class.
<b>Prerequisite:</b>	AB 1705 Placement - AB 1705 allows students with a high school GPA of less than or equal to 2.6 OR who did not pass high school Trigonometry, Precalculus, or Calculus with a C or better to enroll in this course.
<b>Co-requisite:</b>	
<b>Recommended Preparation:</b>	Students may enroll in Math 190 concurrently with Math 187, but it is not required. Math 187 can be taken as a standalone course.
<b>Enrollment Limitation:</b>	
<b>Hours Lecture (per week):</b>	4
<b>Hours Laboratory (per week):</b>	0
<b>Outside Study Hours:</b>	8
<b>Total Course Hours:</b>	72
<b>Course Units:</b>	4
<b>Grading Method:</b>	Letter Grade and Pass/No Pass
<b>Credit Status:</b>	Credit, degree applicable
<b>Transfer CSU:</b>	No
<b>Effective Date:</b>	
<b>Transfer UC:</b>	No
<b>Effective Date:</b>	
<b>General Education ECC:</b>	
<b>Term:</b>	
<b>Other:</b>	
<b>CSU GE:</b>	
<b>Term:</b>	
<b>Other:</b>	

	<b>IGETC:</b>
	<b>Term:</b>
	<b>Other:</b>
	<b>CalGETC:</b>
	<b>Term:</b>
	<b>Other:</b>
<b>Student Learning Outcomes:</b>	<p><b>SLO #1 UNDERSTANDING CONCEPTS</b></p> <p>Students will explain and demonstrate precalculus concepts by solving equations and inequalities involving algebraic, exponential, logarithmic, trigonometric, and absolute value expressions.</p> <p><b>SLO #2 SOLVING PROBLEMS</b></p> <p>Students will demonstrate competency by setting up modeling problems in preparation for related rates, optimization, and solving applications involving business and science.</p> <p><b>SLO #3 GRAPHS</b></p> <p>Students will create, interpret and analyze the graphs of polynomial, piecewise, radical, rational, exponential, logarithmic, and trigonometric functions.</p> <p><b>SLO #4 PROOFS AND LIMIT PREPARATION</b></p> <p>Students will use identities to simplify more complex trigonometric expressions and use various methods to simplify algebraic expressions in preparation for limits in calculus.</p>
<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>1. Graph basic functions (linear, quadratic, radical, absolute value, piecewise, reciprocal, natural exponential, natural logarithmic, and trigonometric) with the appropriate domain, range, and asymptotes.</li> <li>2. Simplify algebraic and trigonometric expressions related to calculus including complex fractions, difference quotients, and rationalizing numerators.</li> <li>3. Solve algebraic equations (linear, quadratic, radical, rational, exponential, and logarithmic) and trigonometric equations.</li> <li>4. Set up and solve problems involving modeling (geometric formulas, similar triangles, and right triangle trigonometry).</li> <li>5. Graph polynomial and rational functions, including intercepts, asymptotes, and the proper end-behavior.</li> <li>6. Use trigonometric identities to rewrite and simplify expressions.</li> <li>7. Solve quadratic and rational inequalities.</li> </ol>
<b>Major Topics:</b>	<p><b>I. ALGEBRA PREPARATION FOR LIMITS IN CALCULUS (13 hours, lecture)</b></p> <p>A. Learning strategies for STEM mathematics.</p>

B. Equation of a line.

C. Inequalities and interval notation.

D. Graphs of basic function families (linear, quadratic, radical, absolute value, reciprocal ( $1/x$ ), natural exponential, and natural logarithmic) and their properties (asymptotes, domain, and range).

E. Basic functions and their inverses.

F. Factoring (GCF, factoring trinomials, and factoring formulas) and rationalization.

G. Methods for simplifying algebraic expressions and complex fractions.

H. Average rate of change and the difference quotient.

## **II. TRIGONOMETRY PREPARATION FOR LIMITS IN CALCULUS (6 hours, lecture)**

A. Radian measure and the unit circle.

B. Graphs of trigonometric functions and their properties (asymptotes, domain, and range).

C. Inverse trigonometric functions and their graphs.

## **III. ALGEBRA PREPARATION FOR DERIVATIVES AND THEIR APPLICATIONS (13 hours, lecture)**

A. Properties of exponents and converting between radicals and rational exponents.

B. In preparation for the product, quotient, and chain rules – Simplification of complex algebraic expressions and function composition.

C. Graphs and properties of exponential and logarithmic functions, including the Laws of Logarithms.

D. Solving a variety of algebraic equations – including equations comprised of linear, quadratic, rational, radical, exponential and logarithmic expressions.

E. Applications in preparation for related rates – Including the distance formula, Pythagorean theorem, geometric formulas for area and volume, similar triangles, and mathematical modeling of phenomena in business and science.

## **IV. TRIGONOMETRY PREPARATION FOR DERIVATIVES AND THEIR APPLICATIONS (5 hours, lecture)**

A. Trigonometric identities (reciprocal, ratio, and Pythagorean).

B. Function composition – In particular with trigonometric functions.

C. Right triangle trigonometry.

D. Solving equations comprised of trigonometric functions.

**V. ALGEBRA PREPARATION FOR GRAPHING, OPTIMIZATION, AND ANTIDERIVATIVES (12 hours, lecture)**

A. Solving quadratic and rational inequalities.

B. Graphical behavior of general polynomial and rational functions – including finding any intercepts, asymptotes, and analyzing end behavior.

C. Geometry and modeling problems related to optimization – including distance, perimeter, area, volume, and basic physics.

**VI. TRIGONOMETRY PREPARATION FOR GRAPHING, OPTIMIZATION, AND ANTIDERIVATIVES (9 hours, lecture)**

A. Trigonometric identities including sum/difference, double angle, half angle (and power-reduction) identities.

B. Using identities to simplify more complex trigonometric expressions and solve equations containing trigonometric functions.

C. Applications of right triangle trigonometry.

**VII. ALGEBRA PREPARATION FOR INTEGRATION AND OTHER TOPICS (9 hours, lecture)**

A. Sigma summation notation.

B. Solving equations and inequalities containing absolute values.

C. Manipulating algebraic expressions in preparation for antiderivatives.

D. Revisiting function composition in preparation for substitution methods. Includes algebraic and graphical review of function transformations.

E. Simplifying more complex algebraic expressions using variable substitutions.

F. Review of basic graphs, factoring, and simplifying algebraic expressions.

**VIII. TRIGONOMETRY PREPARATION FOR INTEGRATION AND OTHER TOPICS (5 hours, lecture)**

A. Revisiting trigonometric function composition and transformations – including analysis of amplitude, reflection, period and phase shift.

B. Review of the unit circle, and the graphs and properties of trigonometric functions.

**Total Lecture Hours:** 72

<b>Total Laboratory Hours:</b>	0
<b>Total Hours:</b>	72
<b>A.1. Primary Methods of Evaluation (Part 1 - CCN courses only):</b>	n/a
<b>Primary Method of Evaluation:</b>	2) Problem solving demonstrations (computational or non-computational)
<b>Typical Assignment Using Primary Method of Evaluation:</b>	Find the composition $f(g(h(x)))$ when $f(x) = \sin x$ , $g(x) = \cos x$ , and $h(x) = 1 - x^2$ .
<b>Critical Thinking Assignment 1:</b>	Consider the rational function below. Find all asymptotes and intercepts. Then graph the function. $r(x) = \frac{3x^2 - 12x + 13}{x^2 - 4x + 4}$
<b>Critical Thinking Assignment 2:</b>	Two ships leave port at the same time. One sails south at 15 mph, and the other sails east at 20 mph. Find a function that models the distance $D$ between the two ships in terms of the time $t$ (in hours) elapsed since their departure.
<b>Other Evaluation Methods:</b>	Homework Problems, Objective Exam, Quizzes, Written Homework
<b>If Other:</b>	
<b>Instructional Methods:</b>	Demonstration, Discussion, Group Activities, Lecture, Other (specify)
<b>If other:</b>	Active Learning or having the students actively engage with the material in class (as recommended by the AB 1705 literature).
<b>Work Outside of Class:</b>	Answer questions, Problem solving activity, Skill practice, Study
<b>If Other:</b>	
<b>Up-To-Date Representative Texts:</b>	Precalculus: Mathematics for Calculus, 8th Edition, Stewart, Redlin, and Watson, Cengage 2023.
<b>Alternative Texts:</b>	
<b>Required Supplementary Readings:</b>	None
<b>Other Required Materials:</b>	None
<b>Requisite</b>	
<b>Category</b>	
<b>Requisite course:</b>	None. AB 1705 allows students to place into this course if they have a high school GPA of 2.6 or less, or have not passed high school trigonometry, precalculus, or calculus with a C or better.
<b>Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).</b>	None
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<b>Enrollment Limitations and Category:</b>	
<b>Enrollment Limitations Impact:</b>	
<b>Course Created by:</b>	Matthew Mata
<b>Date:</b>	11/04/2024
<b>Original Board Approval Date:</b>	04/28/2025
<b>Effective Term:</b>	FA 2025