



El Camino College

COURSE OUTLINE OF RECORD - Official

I. GENERAL COURSE INFORMATION

Subject and Number: Mathematics 165
Descriptive Title: Calculus for Business and Social Sciences

Course Disciplines: Mathematics

Division: Mathematical Sciences

Catalog Description: This course consists of an introduction to differential and integral calculus with business and social science applications to include polynomial, rational, exponential and logarithmic functions and their graphs; multi-variable calculus to include partial differentiation, optimization, and introduction to differential equations.

Note: UC limitations apply.

Conditions of Enrollment:

Prerequisite
Mathematics 130 or
Mathematics 180
with a minimum grade of C in prerequisite
or
Qualification by testing (El Camino College Mathematics Placement Test) and assessment

Course Length: Full Term Other (Specify number of weeks):
Hours Lecture: 5.00 hours per week TBA
Hours Laboratory: 0 hours per week TBA
Course Units: 5.00

Grading Method: Letter
Credit Status: Associate Degree Credit

Transfer CSU: Effective Date: 12/15/2014
Transfer UC: Effective Date: Fall 2015

General Education:
El Camino College:

4B – Language and Rationality – Communication and Analytical Thinking
Term: Fall 2015 Other:

6 – Mathematics Competency
Term: Other:

CSU GE:

B4 - Mathematics/Quantitative Thinking

Term: Fall 2015

Other:

IGETC:

2A - Mathematical Concepts and Quantitative Reasoning

Term:

Other:

II. OUTCOMES AND OBJECTIVES

A. COURSE STUDENT LEARNING OUTCOMES (The course student learning outcomes are listed below, along with a representative assessment method for each. Student learning outcomes are not subject to review, revision or approval by the College Curriculum Committee)

Compute and Interpret Derivatives

Determine limits, classify types of continuity of functions, use

1. derivatives to find increments, rates of change and tangent lines, and compute first and second derivatives of functions including partial derivatives.

Compute and Interpret Integrals

2. Evaluate integrals and improper integrals using a variety of methods, including substitution and by parts.

Sketch Graphs of Functions

3. Identify the intercepts, asymptotes, relative extrema, inflection points, and concavity, and use this information to sketch graphs of functions.

Solve Application Problems Using Calculus

4. Use single-variable and multi-variable calculus methods to solve application problems in business and economics, including marginal revenue, marginal profit and marginal cost.

The above SLOs were the most recent available SLOs at the time of course review. For the most current SLO statements, visit the El Camino College SLO webpage at <http://www.elcamino.edu/academics/slo/>.

B. Course Student Learning Objectives (The major learning objective for students enrolled in this course are listed below, along with a representative assessment method for each)

1. Evaluate limits and determine the continuity of functions.

Quizzes

2. Determine the derivative of functions using the limit definition of the derivative, and use derivatives to find increments, tangent lines and rates of change.

Quizzes

3. Determine the derivative of algebraic, exponential and logarithmic functions using basic rules of differentiation, including the power rule, the product rule, the quotient rule, and the chain rule.

Objective Exams

4. Determine higher order derivatives and derivatives using implicit differentiation.

Objective Exams

5. Graph functions using the first and second derivative tests, including asymptotes.
Objective Exams
6. Solve optimization and other application problems, including marginal revenue, marginal cost and marginal profit.
Objective Exams
7. Evaluate indefinite integrals by using the basic rules of integration, including substitution and by parts, as well as improper integrals.
Objective Exams
8. Use the Fundamental Theorem of Calculus to determine areas between curves.
Objective Exams
9. Apply integral calculus to business and economics models.
Objective Exams
10. Compute and interpret partial derivatives and apply these skills to application problems.
Objective Exams
11. Solve differential equations using separation of variables.
Quizzes

III. OUTLINE OF SUBJECT MATTER (Topics are detailed enough to enable a qualified instructor to determine the major areas that should be covered as well as ensure consistency from instructor to instructor and semester to semester.)

Lecture or Lab	Approximate Hours	Topic Number	Major Topic
Lecture	20	I	LIMITS AND DIFFERENTIATION A. Limits of functions B. Continuity of functions C. The derivative and the slope of the curve at a point D. Rules of differentiation, including power, product, quotient and chain rules. E. Rates of change, increments and tangent lines F. Higher order derivatives G. Implicit differentiation H. Derivatives of exponential and logarithmic functions
Lecture	25	II	APPLICATIONS OF DERIVATIVES A. Curve sketching using the first and second derivative tests, including asymptotes B. Optimization problems in business and economics C. Elasticity of demand D. Differentials and marginal analysis, including marginal profit, marginal cost and marginal revenue E. Exponential growth and decay models
Lecture	20	III	INTEGRATION A. Antiderivatives B. Definite integrals

			C. The Fundamental Theorem of Calculus D. Area bounded by two curves E. Techniques of integration, including substitution and by parts
Lecture	10	IV	APPLICATIONS OF INTEGRATION A. Approximating definite integrals as a sum B. Surpluses and application of models in business and economics C. Improper integrals D. Introduction to differential equations
Lecture	15	V	MULTIVARIABLE CALCULUS A. Functions of several variables B. Partial derivatives C. Marginal productivity of labor and capital D. Optimization problems E. Lagrange multipliers F. Least squares regression analysis
Total Lecture Hours		90	
Total Laboratory Hours		0	
Total Hours		90	

IV. PRIMARY METHOD OF EVALUATION AND SAMPLE ASSIGNMENTS

A. PRIMARY METHOD OF EVALUATION:

Problem solving demonstrations (computational or non-computational)

B. TYPICAL ASSIGNMENT USING PRIMARY METHOD OF EVALUATION:

Find the slope of the tangent line to the graph of the following function $f(x) = x^3 + 2x$ at the point $(3, f(3))$.

C. COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:

1. A business sells 2000 units of a product per month at a price of \$10 each. It can sell 250 more items per month for each \$0.25 reduction in price. What price per unit will maximize the monthly revenue?
2. A professional athlete signs a three-year contract in which the earning can be modeled by $c = 300,000 + 125,000t$ where t is the number of years since the start of the contract.
 - (a) Determine the actual value of the athlete's contract.
 - (b) Assuming an annual inflation rate of 3%, determine the present value of the contract.

D. OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:

Other exams

Homework Problems

V. INSTRUCTIONAL METHODS

Lecture

Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.

VI. WORK OUTSIDE OF CLASS

Study

Answer questions

Skill practice

Required reading

Problem solving activities

Estimated Independent Study Hours per Week: 10

VII. TEXTS AND MATERIALS

A. UP-TO-DATE REPRESENTATIVE TEXTBOOKS

Soo Tan. Applied Calculus for the Managerial, Life, and Social Sciences. 9 ed. Cengage, 2014.

B. ALTERNATIVE TEXTBOOKS

Ron Larson. Calculus: An Applied Approach. 9th ed. Cengage, 2013.

C. REQUIRED SUPPLEMENTARY READINGS

D. OTHER REQUIRED MATERIALS

Scientific Calculator

VIII. CONDITIONS OF ENROLLMENT

A. Requisites (Course and Non-Course Prerequisites and Corequisites)

Requisites	Category and Justification
Course Prerequisite Mathematics-130 or	Sequential
Course Prerequisite Mathematics-180 or	Sequential
Non-Course Prerequisite	The math placement exam is a diagnostic test that assesses a student's skills in mathematics. Scores are set as benchmarks for entry into specific levels. If a student does not meet the score for placement into Math 165, then the student does not have the skills necessary to perform at this level.

B. Requisite Skills

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Requisite Skills

a. Perform operations on functions, including evaluation, addition, subtraction, multiplication, division, and composition. (Mathematics 130 and Mathematics 180) MATH 130 -
Solve linear and nonlinear inequalities.
MATH 180 -
Determine the inverse of a function (polynomial, algebraic, rational, exponential, logarithmic, trigonometric) and analyze it in terms of critical features.
MATH 130 -
Determine the composition of functions and the inverse of one-to-one functions.

b. Analyze a function, determining its domain, range, and its inverse function, if it exists. (Mathematics 130 and Mathematics 180) MATH 180 -
Analyze functions (including polynomial, algebraic, rational, exponential, logarithmic, trigonometric) for critical features, including: intercepts, asymptotes, domain, range, and average rate of change.
MATH 130 -
Determine the domain, range, and graph (with transformations) of the following: polynomial, rational, exponential and logarithmic functions.
MATH 180 -
Determine functions (including polynomial, rational, exponential, logarithmic, trigonometric) that model data.
MATH 130 -
Analyze the graph of a function and determine the domain, range, extrema, and average rate of change.

c. Graph quadratic, cubic, exponential, logarithmic and rational functions. (Mathematics 130 and Mathematics 180) MATH 180 -
Graph relations (including polynomial, rational, exponential, logarithmic, trigonometric functions and conics), using transformations (shifting, stretching, reflection).
MATH 130 -
Solve problems using a scientific (or graphing) calculator and/or computer algebra systems.
MATH 180 -
Use technology (graphing, scientific calculators or computer software) to solve problems.

d. Solve polynomial, radical, rational, exponential, and logarithmic equations. (Mathematics 130 and Mathematics 180) MATH 130 -
Solve polynomial, rational, radical, exponential, and logarithmic equations, and solve formulas for a variable.
MATH 180 -
Solve equations involving polynomial, rational, exponential, logarithmic, trigonometric functions.
MATH 130 -
Solve college level application problems from the mathematics of finance including compound interest, present value, and annuity.
MATH 180 -
Solve application problems using the topics of the course.

C. Recommended Preparations (Course and Non-Course)

Recommended Preparation	Category and Justification
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D. Recommended Skills

Recommended Skills

E. Enrollment Limitations

Enrollment Limitations and Category	Enrollment Limitations Impact
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Course created by Anna Hockamn on 09/27/2014.

BOARD APPROVAL DATE: 12/15/2014

LAST BOARD APPROVAL DATE: 12/14/2015

Last Reviewed and/or Revised by Megan Granich on 08/27/2015

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