JEFFERSON COLLEGE
COURSE SYLLABUS

MTH161
CALCULUS FOR BUSINESS AND THE SOCIAL SCIENCES
3 Credit Hours

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by
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Arts & Science Education
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MTH161 CALCULUS FOR BUSINESS AND THE SOCIAL SCIENCES

I. CATALOG DESCRIPTION

Prerequisite: COMPASS College Algebra score of at least 46, or a COMPASS Trigonometry score of at least 31, or College Algebra ASSET score of at least 40, or MTH134 with a grade of C or better.

3 semester hours credit

Calculus for Business and the Social Sciences is an intuitive approach to that part of the calculus that deals with instantaneous rate of change and area under a curve. This course will not serve as a substitute for MTH 180. Calculus for Business and the Social Sciences will meet the mathematics requirement for the Associate of Arts degree. Students cannot apply both MTH161 and MTH185 toward graduation. (F,S)

II. GENERAL COURSE OBJECTIVES

Upon completion of this course the student will be able to:

A. Demonstrate proficiency in the basic skills of algebra needed in calculus.
B. Demonstrate proficiency in working with the basic concepts of Descartes' analytic geometry.
C. Demonstrate proficiency in working with compound interest formulas.
D. Understand the concept of the limit of a function.
E. Have an in-depth understanding of the process of differentiation.
F. Have an in-depth understanding of the derivative as a rate of change.
G. Recognize and determine marginals as rates of change.
H. Determine cost, profit, and/or revenue functions knowing marginals.
I. Determine minimum average cost.
J. Determine production levels over which profit or revenue is increasing.
K. Determine production levels over which cost is decreasing.
L. Determine production level that produces a maximum profit.
M. Determine production level that produces a minimum cost.
N. Determine price per unit necessary to maximize revenue.
O. Determine price per unit necessary to maximize profit.
P. Have a mathematical understanding of the Law of Diminishing Returns.
Q. Determine price elasticity of demand.
R. Use implicit differentiation to determine rates of change.
S. Have an in-depth understanding of the basic properties of integration.
T. Use integration for marginal analysis.
U. Have an in-depth understanding of the properties of definite integrals.
V. Use integration to determine consumer and producer surplus.
W. Demonstrate proficiency in integrating by substitution and by parts.

III. COURSE OUTLINE

A. Algebra Reference
B. Linear Functions
C. Nonlinear Functions
D. The Derivative
E. Calculating the Derivative
F. Graphs and the Derivative
G. Applications of the Derivative
H. Integration
I. Further Techniques and Applications of Integration
IV. UNIT OBJECTIVES

A. Algebra Reference
   1. Polynomials
   2. Factoring
   3. Rational Expressions
   4. Equations
   5. Inequalities
   6. Exponents
   7. Radicals

B. Linear Functions
   1. Slopes and Equations of Lines
   2. Linear Functions and Applications
   3. The Least Squares Line

C. Nonlinear Functions
   1. Properties of Functions
   2. Quadratic Functions; Translation and Reflection
   3. Polynomial and Rational Functions
   4. Exponential Functions
   5. Logarithmic Functions
   6. Applications: Mathematics of Finance

D. The Derivative
   1. Limits
   2. Continuity
   3. Rates of Change
   4. Definition of the Derivative
   5. Graphical Differentiation

E. Calculating the Derivative
   1. Techniques for Finding Derivatives
   2. Derivatives of Products and Quotients
   3. The Chain Rule
   4. Derivatives of Exponential Functions
   5. Derivatives of Logarithmic Functions

F. Graphs and the Derivative
   1. Increasing and Decreasing Functions
   2. Relative Extrema
   3. Higher Derivatives, Concavity, and the Second Derivative Test
   4. Curve Sketching
G. Applications of the Derivative
   1. Absolute Extrema
   2. Applications of Extrema
   3. Economic Lot Size, Economic Order Quantity and Elasticity of Demand
   4. Implicit Differentiation
   5. Related Rates
   6. Differentials: Linear Approximation

H. Integration
   1. Antiderivatives
   2. Substitution
   3. Area and the Definate Integral
   4. The Fundamental Theorem
   5. Area Between Two Curves
   6. Numerical Integration

I. Further Techniques and Applications of Integration
   1. Integration by Parts
   2. Volume and Average Value
   3. Continuous Money Flow

V. METHOD OF INSTRUCTION
   A. Lecture
   B. Group Exercises
   C. Class Discussion
   D. Reading Textbook
   E. On-line Assignments

VI. REQUIRED TEXTBOOK (WITH PUBLICATION INFORMATION)


VII. REQUIRED MATERIALS (STUDENT)

   Graphing Calculator
VIII. METHOD OF EVALUATION (STUDENT)

A. Homework

B. Unannounced Quizzes

C. On-line Quizzes

D. Class Participation

E. Unit Examination

F. Comprehensive Final Exam