GROSSMONT COLLEGE

COURSE OUTLINE OF RECORD

Curriculum Committee Approval: 04/26/2022

GCCCD Governing Board Approval: 06/14/2022

MATHEMATICS 178 – CALCULUS FOR BUSINESS, SOCIAL AND BEHAVIORAL SCIENCES

1. Course Number Course Title Semester Units

MATH 178 Calculus for Business, Social and Behavioral Sciences 4

Semester Hours

4 hours lecture: 64-72 hours 128-144 hours outside-of-class hours 192-216 total hours

2. Course Prerequisites

A "C" grade or higher in Math 108 or Math110 or equivalent or appropriate placement beyond intermediate algebra. *Note: Math 103 is not equivalent to Math 110*

Corequisite

None

Recommended Preparation

A “C” grade or higher or “Pass” in Math 175 or equivalent.

3. Catalog Description

An introduction to matrix algebra, differential and integral calculus with applications specifically designed for business, social and behavioral sciences. Not open to students with credit in Mathematics 180.

4. Course Objectives

The student will:

a. Sketch graphs of relations and functions using horizontal and vertical asymptotes, intercepts, and first and second derivative test to determine intervals of increasing and decreasing, relative extrema, concavity intervals, and points of inflections.

b. Select the proper differentiation techniques and differentiate polynomials rational, and logarithmic functions.

c. Find the derivatives of functions involving constants, sums, differences, products, quotients, and the chain rule.

d. Use derivatives to find rates of change and tangent lines.

e. Use calculus to analyze revenue, cost, and profit.

f. Analyze the marginal cost, profit, and revenue when given the appropriate function

g. Determine maxima and minima in optimization problems using derivatives.

h. Find definite and indefinite integrals by using the general integral formulas, integration by substitution, and other integration techniques

i. Select the proper integration technique and integrate polynomial, rational, and logarithmic functions.

j. Use integration in business and economics applications and the social sciences.

k. Solve systems of linear equations by using matrix methods.

5. Instructional Facilities

Standard classroom.

6. Special Materials Required of Student

Graphing calculator

7. Course Content

a. Coordinate planes and graphs of equations.

b. Functions and their graphs, including exponential and logarithmic functions.

c. Matrix algebra, systems of linear equations.

d. Limits and intuitive definition of derivative.

e. Increments, tangent lines, and rate of change.

f. Rules of differentiation including sum, product, quotient, and chain rule.

g. Applications of differentiation such as marginal analysis, optimization, and curve sketching.

h Implicit differentiation, related rates.

i. The integral, indefinite and definite integrals.

j. Multiple techniques of integration including substitution and integration by parts.

k. Applications of integration in business and economics and the social sciences.

l. Transcendental function, derivatives, and integrals of transcendental functions.

m. Area between curves.

n. Approximating definite integrals as a sum.

o. Introduce contributions from a diverse group of mathematicians relevant to the content of the course.

p. Application problems relevant to current events and students’ lived experiences.

8. Method of Instruction

Employ a variety of teaching methods, including lectures, instructor presented examples, student-led discussions, collaborative learning, think-pair-share, formative assessments (e.g. exit slips), and multimedia presentations. These instructional techniques strive to include students’ lived experiences and different cultural and historical perspectives.

9. Methods of Evaluating Student Performance

1. Homework
2. Independent exploration activities (e.g. economic projects involving marginal cost, marginal revenue, and elasticity)
3. Class participation/problem presentations
4. Quizzes, mid-term of chapter exams, and in-class comprehensive final exam.

10. Outside Class Assignments

a. Homework.

b. Special take-home tests

c. Problem sets.

11. Representative Texts

a. Representative Text(s):

Bittinger, Martin L., David J. Ellenbogen, Scott J. Surgent. *Calculus + Its Applications.* Upper Saddle River, NY: Pearson, 12th edition, 2019.

b. Supplementary texts and workbooks:

None

Addendum: Student Learning Outcomes

Upon completion of this course, our students will be able to do the following:

1. Categorize matrix algebra problems and use appropriate theorems, formulas, and algorithms to solve them.
2. Define and apply the concepts of limits, continuity, derivatives and anti-derivatives to solve a variety of problems.
3. Demonstrate understanding of the geometric relationship between a function, its first and second derivatives and its anti-derivatives.
4. Interpret and analyze information to develop strategies for solving problems in business and behavioral science involving related rates and optimization problems.
5. Communicate the mathematical process and assess the validity of the solution.