

Revised Course Proposal
MAT 2110G: Brief Calculus with Applications

1. Catalog Description

- a. Course level: MAT 2110G
- b. Title: Brief Calculus with Applications
- c. Credit: 3-0-3
- d. Term to be offered: F, S
- e. Short Title: Brief Calc w/App
- f. Course Description: Differentiation and integration of polynomial, rational, exponential and logarithmic functions, with applications to business and social science.
- g. Prerequisites: MAT 1271 with C or better, or satisfactory placement by department guidelines.
- h. The course is writing active.

2. Student Learning Objectives

- a. *List student learning objectives that are designed to help students achieve one or more of the established goals of general education and university-wide assessment.*

In completing this course, students will be able to:

- i. read, interpret and solve word problems. (*critical thinking, writing*)
 - ii. write solutions using correct technical notation and grammar. (*writing, critical thinking*)
 - iii. apply the theory of limits, derivatives and integrals to business and social science applications. (*critical thinking*)
 - iv. apply scientific concepts related to derivatives, integrals, functions, and relations (e.g. rate of spread of epidemics, marginal rates, rate of growth, rate of decline, ability to interpret complicated graphs and relations among data). (*critical thinking, citizenship*)
- b. *Indicate additional student learning objectives, if any, that are designed to help students achieve the goals of the course and/or a particular discipline or program.*

Upon successful completion of this course, students will:

- i. be prepared for more advanced courses requiring mathematical knowledge.
- ii. appreciate the importance of mathematics and its applications in both business and the social sciences.

3. Course Outline

The following is a sample syllabus. The textbook has a variety of topics that allows each instructor and class to tailor the course to their specific interests.

Weeks 1-3

The Derivative

- functions and their graphs
- linear functions
- definition of the derivative
- elementary rules of differentiation
- derivative as a rate of change

Weeks 4-6

Applications of the Derivatives

- curve sketching
- marginal cost, revenue, and profit
- optimization problems
 - inventory control
 - pricing
 - maximization of revenue and profit
 - maximization of cost

Week 7

Techniques of Differentiation

- product rule
- quotient rule
- chain rule

Weeks 8-10

Exponential and Logarithmic Functions

- elementary properties
- differentiation
- applications
 - growth
 - decay
 - interest
 - logistic equations
 - exponential models for advertising and population growth

Weeks 11-13

Integration

- antidifferentiation
- area and Riemann sums
- Fundamental Theorem of Calculus
- applications
 - area between curves applications
 - average value of a function
 - future value
 - total change
 - money streams

Weeks 14-15 Functions of Several Variables

- partial derivatives
- maxima and minima of functions of several variables

4. Evaluation of Student Learning

- a. Evaluation may include 3{4 tests, quizzes, group problem solving, and a final exam.
- b. This course satisfies the criteria for a writing active course through the emphasis on correct mathematical writing required when the student supplies complete reasoning as part of the solutions to problems.

5. Rationale

- a. The course develops critical thinking skills and the ability to apply mathematics. It will be placed in the Mathematics segment of the general education program.
- b. This course has always been taught at the 2000 level, since the skills and concepts covered in the course require a more than minimal level of mathematical maturity. It is a course which builds on students' skills in algebra and geometry, with a prerequisite of MAT 1271 or its equivalent.
- c. This course is a revision of MAT 2110C and should maintain the same curriculum identification number as MAT 2110C. This course does not duplicate any other course.
- d. MAT 2110G is required in the following majors or programs: all majors in the School of Business; economics; economics with international studies; and industrial technology.

6. Implementation

- a. The course will be taught by faculty members in the Department of Mathematics.
- b. The text to be used is Brief Calculus and its Applications, 8th ed., Goldstein, Lay, and Schneider; Prentice-Hall, Englewood Cliffs, NJ, 1999.
- c. There are no additional costs to the student.
- d. Term to be first offered: Spring 2001.

7. Community College Transfer

A community college course may be judged equivalent to this course.

- 8. Date Approved by the Department:** 4/10/00
- 9. Date Approved by the College Curriculum Committee:** 4/21/00
- 10. Date Approved by CAA:** 10/19/00

Department Contact Person: Claire Krukenberg

Campus Phone: 2028