Effective Fall 2001
Effective Fall 2004, with revisions

Revised Course Proposal
MAT 1441G: Calculus and Analytic Geometry I

1. **Catalog Description**
   a. Course level: MAT 1441G
   b. Title: Calculus and Analytic Geometry I
   c. Credit: 5-0-5
   d. Term to be offered: F, S
   e. Short Title: Calc I
   f. Course Description: Limits, continuity, and derivatives for functions of one variable, applications of the derivative, the definite integral, applications of the integral.
   g. Prerequisites: Placement by department guidelines, or C or better in both MAT 1330 and MAT 1400.
   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)*
   ii. write solutions using correct technical notation and grammar. *(critical thinking, writing)*
   iii. apply the theory of limits and derivatives. *(critical thinking)*
   iv. apply scientific concepts related to derivatives, 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)*
   v. apply scientific concepts related to integration (area, statistical averaging, work, distribution of pressure on a surface). *(critical thinking)*

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 calculus.

ii. be prepared to study probability and statistics from a mathematical point of view.

iii. appreciate the importance of mathematics and its applications to the sciences.

3. **Course Outline**

Weeks 1-3 **Limits and Rates of Change**

- definition of limit
- right hand limits
- left hand limits
- limits tending to infinity
- limits of secant lines

Weeks 4-6 **Derivatives and Related Rates**

- definition of derivative
- product rule
- quotient rule
- chain rule
- related rates

Weeks 7-9 **The Mean Value Theorem, Interpreting Graphs**

- Rolle's Theorem
- Mean Value Theorem
- first derivative test
- second derivative test
- graphing

Weeks 10-12 **Methods of Integration**

- antiderivative
- definition of sigma notation
- Riemann sum
- areas
- definite integral
- Fundamental Lemma of Calculus
- Fundamental Theorem of Calculus
- indefinite integral

Weeks 13-15 **Applications of Integration**

- areas
- hydrostatic pressure
- work

4. **Evaluation of Student Learning**

   a. Evaluation may include daily homework, weekly quizzes, problem sets, 4-5 in class examinations, 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. The course is o_ered at the 1000 level and is an introductory course in calculus. This is the standard university course in calculus offered to freshmen majoring in fields which require a strong mathematical foundation.

   c. This course is a revision of MAT 1441C and should maintain the same curriculum identification number as MAT 1441C. This course does not duplicate any other course, but when MAT 1440 is taken after MAT 1330 and MAT 1430, it can be a substitute for MAT 1441G.

   d. MAT 1441G is required in the following majors and programs: biology, chemistry, geology, mathematics, physics, mathematics minor, mathematics minor for teacher certification, and pre-engineering; and is strongly recommended in economics.

6. **Implementation**

   a. The course will be taught by faculty members in the Department of Mathematics.

   b. The text to be used is *Calculus*, third edition, by James Stewart; Brooks/Cole, 1995.

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

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