# Course Outline

## Course Abbreviation & Number:
MATH 2633

## Course Title:
Calculus III

## Credit Hours:
4 semester hours

### Prerequisites:
- Math 2432 with a grade of C or better

### Co-requisites:
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### Course Description:
This course includes the study of vectors, solid analytical geometry, partial derivatives, multiple integrals, line integrals, and applications.

### Expected Educational Results:
As a result of completing this course, the student will be able to:
1. Find equations of lines and planes in three dimensions.
2. Find arc length, curvature, and the moving trihedral for vector functions and space curves.
3. Calculate and apply partial derivatives.
4. Calculate and apply double and triple integrals.
5. Calculate line integrals.

### Course Content:

#### I. Vectors and the Geometry of Space
- A. Three-Dimensional Coordinate Systems
- B. Vectors
- C. Dot Product
- D. Cross Product
- E. Equations of Lines and Planes
- F. Functions and Surfaces
- G. Cylindrical and Spherical Coordinates

#### II. Vector Functions
- A. Space Curves
- B. Derivatives and Integrals of Vector Functions
- C. Arc Length and Curvature
- D. Velocity and Acceleration
- E. Parametric Surfaces

#### III. Partial Derivatives
A. Functions of Several Variables
B. Limits and Continuity
C. Partial Derivatives
D. Tangent Planes and Linear Approximations
E. Chain Rule
F. Directional Derivative and the Gradient Vector
G. Maximum and Minimum Values
H. Lagrange Multipliers

IV. Multiple Integrals
   A. Double Integrals
   B. Iterated Integrals
   C. Polar Coordinates
   D. Applications
   E. Surface Area
   F. Triple Integrals
   G. Cylindrical and Spherical Coordinates

V. Vector Calculus
   A. Vector Fields
   B. Line Integrals

Assessment of Outcome Objectives

I. Course Grade
   Grades from some combination of the following will be used to determine each student’s final course grade: class participation, homework assignments, tests, quizzes, projects, and exams. Exams/tests may be multiple choice, some combination of multiple choice and short answer or essay, or purely essay and/or short answer. Individual instructors may determine the relative weightings of each component in determining the grade for the course, and must state the weightings to be used in determining student grades in the course syllabus. A comprehensive final examination is required which must count at least one-fifth and no more than one-third of the course grade.

II. Departmental Assessment
   A. This course will be assessed in the spring semester on a yearly assessment cycle. Questions assessing student mastery of outcomes for this course will be included in the final exam for this course. Each instructor must include these questions in the final exam. Each instructor is responsible for reviewing and tabulating the results of these outcome assessment questions and transmitting them to the Calculus Curriculum Committee. Individual instructors should use feedback from assessment in their classes.
to review and evaluate their own teaching practices.

B. The construction of the outcome assessment questions will be the responsibility of the college-wide Calculus Curriculum Committee.

Use of Assessment Findings:

III. Use of the Assessment Findings
The Calculus Curriculum Committee will meet in the summer term after the spring assessment to review the course and to evaluate the results. The review of the course outcome assessment findings will provide information on success in achieving the desired outcomes for this course on a college-wide basis. If fewer than 70% of the students receive at least 75% on questions measuring any particular educational outcome, the committee will examine teaching practices related to that outcome, the assessment instrument, and the desired learning outcomes to determine which, if any, of these need modifying. The committee will share its findings and recommendations with all faculty teaching this course, and may make changes to the desired educational outcomes, teaching practices, or assessment instrument as appropriate.

Last Revised:

February 2013