COURSE ABBREVIATION     MATH 2633
CREDIT HOURS            4
COURSE TITLE            Calculus III
PREREQUISITES           Math 2432 with a grade of C or better

CATALOG 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.

GENERAL EDUCATION OUTCOMES
I. This course addresses the general education outcome relating to communication by providing additional support as follows:
   A. Students improve their listening skills by taking part in general class discussions and in small group activities.
   B. Students improve their reading skills by reading and discussing the text and other materials. Reading mathematics requires skills somewhat different from those used in reading materials for other courses in that students are expected to read highly technical material.
   C. Unit tests, examinations, and other assignments provide opportunities for students to practice and improve mathematical writing skills. Mathematics has a specialized vocabulary that students are expected to use correctly.

II. This course addresses the general education outcome of demonstrating effective individual and group problem-solving and critical-thinking skills as follows:
   A. Students must apply mathematical concepts to non-template problems and situations.
   B. In applications, students must analyze problems, often through the use of multiple representations, develop or select an appropriate mathematical model, utilize the model, and interpret results.
III. This course addresses the general education outcome of using mathematical concepts to interpret, understand, and communicate quantitative data as follows:
   A. Students must demonstrate proficiency in problem-solving skills including applications of vectors, partial derivatives and multiple integrals.
   B. Students must write functions to describe real-world situations and interpret information from both the graph of the function and from the partial derivatives or the multiple integral.

IV. This course addresses the general education outcome of locating, organizing, and analyzing information through appropriate computer applications (including hand-held graphing calculators). As a result of taking this course, the student should be able to use technology to:
   A. create three dimensional graphs
   B. calculate double and triple integrals
   C. use partial derivatives to find extrema for functions of two or more variables.

V. This course addresses the general education outcome of using scientific inquiry by using techniques of Calculus including integration or differentiation to apply scientific inquiry to problem solving.

COURSE CONTENT
1. Vectors
2. Partial Derivatives
3. Multiple Integrals
4. Line Integrals

ENTRY LEVEL COMPETENCIES
Upon entering this course the student should be able to do the following:
1. Investigate limits using algebraic, graphical, and numerical techniques.
2. Investigate derivatives using the definition, differentiation techniques, and graphs.
3. Apply the derivative as a rate of change, optimize functions, use Newton's Method, and sketch curves.
4. Define the definite integral and approximate definite integrals using Riemann sums.
5. State and apply the Fundamental Theorem of Calculus.
6. Graph and use parametric equations.
7. Evaluate integrals using techniques of integration.
8. Use integrals to solve application problems.
9. Solve separable differential equations and apply to elementary applications.
10. Differentiate and integrate algebraic, trigonometric, exponential, logarithmic, and inverse trigonometric functions. Differentiate implicit functions.
11. Investigate the convergence of series and apply series to approximate functions and definite integrals.
12. Apply polar representations including graphs, derivatives, and areas.
ASSESSMENT OF EXPECTED EDUCATIONAL RESULTS

I. COURSE GRADE

The course grade will be determined by the individual instructor using a variety of evaluation methods. A portion of the course grade will be determined through the use of frequent assessment using such means as tests, quizzes, projects, or homework as developed by the instructor. Some of these methods will require the student to demonstrate ability in problem solving and critical thinking as evidenced by explaining and interpreting solutions. A comprehensive final examination is required which must count at least one-fifth and no more than one-third of the course grade.

II. COLLEGE WIDE ASSESSMENT

This course will be assessed according to the college wide/mathematics department schedule. The assessment instrument will include a set of appropriate questions to be a portion of the final exam for all students taking the course. An out of class project may be an assessment instrument as well.

III. USE OF ASSESSMENT FINDINGS

The Calculus Committee or a special assessment committee appointed by the Chair of the Math, Computer Science, and Engineering Executive Committee, will accumulate and analyze the results of the assessment and determine implications for curriculum changes. The committee will prepare a report for the Academic Group summarizing its finding.

Approved Date: January 2008
Effective Date: January 2008
Reviewed by Committee: January 2009