Course Number: MAT 182
Course Title: Calculus II
Credits: 4 Semester Hours
Prerequisites: MAT 181: Calculus I or appropriate placement.

Objectives:

After successful completion of this course a student will be able to demonstrate:

- Basic knowledge of the fundamental concepts behind definite and indefinite integration, i.e. Riemann Sums and the Fundamental Theorem of Calculus.
- Procedural facility with the rules of integral calculus and with techniques for anti-differentiation.
- Basic knowledge of numerical sequences and series including tests for convergence and methods of approximation of sums.
- Basic knowledge of power and Taylor series including test for convergence and methods of approximation of sums.
- An ability to use calculus to solve some basic applied problems.
- An ability to use technological tools to represent some fundamental concepts of calculus and to solve basic problems of application.

Course Description:

Calculus II will introduce students to a variety of new techniques of integration, to some applications of integration, and to sequences and series. Students will be expected both to become proficient with basic skills and to demonstrate an understanding of the underlying principles of the subject. Students should expect to make appropriate use of technology in this course. Knowledge of Calculus I will be assumed, in particular knowledge of the rules and concepts behind differentiation and basic integration. Prerequisite: MAT 181: Calculus I or appropriate placement.

Course Outline:

I. Prerequisite Material (not covered or only briefly reviewed)
   a. Knowledge of functions: algebraic, transcendental, explicit, implicit, and parametric.
   b. An understanding of the concept of limits and continuity.
   c. Facility with the rules for differentiation.
   d. Definition of the definite integral as a limit of Riemann sums.
   e. Facility with basic rules for anti-differentiation.
II. Requisite Material (core subjects necessary to the course)
a. Integration
   i. Definite integral as a limit of Riemann Sums
   ii. Fundamental Theorem of Calculus
   iii. Techniques of Integration
      1. Integration by substitution
      2. Integration by parts
   iv. Applications of Integration
      1. Areas between curves
      2. Volumes by slicing and revolution
   v. Improper Integrals
b. Sequences and series
   i. Basic introduction to sequences and the meaning of their convergence
   ii. Series
      1. Convergence in terms of sequences of partial sums
      2. Geometric series
      3. Convergence tests
      4. Alternating series
c. Power and Taylor series
   i. Center and radius of convergence
   ii. Functions as infinite series
   iii. Approximating functions by Taylor Polynomials
III. Additional Material (topics covered at the discretion of the instructor)
a. Integration
   i. Techniques of Integration
      1. Use of tables of integration
      2. Integration by partial fraction decomposition
      3. Integration by trigonometric substitution
      4. Numerical approximations of the definite integral
   ii. Applications of Integration
      1. Arclength
      2. Work and center of mass
      3. Probability
      4. Economics
b. Differential Equations
   i. Slope fields
   ii. Euler's method
   iii. Separation of variables
   iv. General applications
c. Series
   i. Introduction to Fourier Series
   ii. Errors in series approximations