



# Cape Fear

---

## COMMUNITY COLLEGE

---

### Course Outline for MAT 272 CALCULUS II

#### I. CATALOG DESCRIPTION:

MAT 272 – Calculus II – 4 credits (5 contact hours per week)

This course provides a rigorous treatment of integration and is the second calculus course in a three course sequence. Topics include applications of definite integrals, techniques of integration, indeterminate forms, improper integrals, infinite series, conic sections, parametric equations, polar coordinates, and differential equations. Upon completion, students should be able to use integration and approximation techniques to solve application problems.

#### II. PREREQUISITE: MAT 271

#### III. COREQUISITE: None

#### IV. EXPECTED STUDENT LEARNING OUTCOMES:

Upon completion of the course, students should be able to:

- A. Analyze and solve elementary first order differential equations
- B. Apply integration to find area between two curves, volume of a solid of revolution, surface area of a solid of revolution, and arc length of a curve
- C. Identify the center of mass of a region with constant density
- D. Evaluate the work done by a variable force
- E. Evaluate the force exerted by a fluid
- F. Use appropriate integration techniques to evaluate integrals
- G. Use an appropriate test to evaluate the convergence of an infinite series
- H. Write a nonpolynomial function as a power series
- I. Analyze and evaluate problems involving conic sections
- J. Analyze and evaluate problems involving parametric equations
- K. Analyze and evaluate problems in polar coordinates

#### V. METHODS OF INSTRUCTION:

- A. Lectures in basic concepts and skills
- B. Read text
- C. Class and group discussion of topics
- D. Skill building lab exercises using Maple

#### VI. CONTENT:

- A. Differential Equations: Euler's method, separation of variables, homogeneous, first order linear, and Bernoulli
- B. Application of Integration: Area between curves, volume and surface area of solid of revolution, arc length, fluid force, work, and center of mass
- C. Integration Techniques: Integration by parts, trigonometric integrals, trigonometric substitution, partial fractions, integration tables, L'Hôpital's rule and improper integrals
- D. Infinite Series: Geometric series, telescoping series, integral test, p-series, comparison and limit comparison test, alternating series, ratio tests, Taylor polynomials and series, and power series
- E. Conics, Parametric Equations, and Polar Coordinates: Conic sections, derivatives and integrals of parametric equations, arc length and area in polar coordinates, and polar equations of conic sections

**VII. TYPICAL ASSIGNMENTS:**

- A. In class participation during lecture
- B. Online or textbook homework
- C. Topic projects
- D. Chapter exams
- E. Topic and/or technology labs including analysis and evaluation of course concepts
- F. Comprehensive final exam

**VIII. EVALUATION:**

- A. Methods of Evaluation
  - 1. Objective examinations (for lecture and text reading assignments)
    - a. Typical questions:
      - 1. SOLVE THE DIFFERENTIAL EQUATION  $2 \frac{dy}{dx} + y = 5$
      - 2. Find the rectangular equation and curve represented by the parametric equations  
 $x = 1 + \cos t$  and  $y = 2 \sec t$ .
  - 2. Evaluation of online skill building assignments
  - 3. Five application projects will be assigned during the semester
  - 4. Approximately 10 Maple labs will be used for evaluation
  - 5. A comprehensive final exam will be evaluated based on process and accuracy of solutions
- B. Frequency of Evaluation
  - 1. Periodic tests (about 5 or 6)
  - 2. Online assignments for each chapter
  - 3. Individual projects for each chapter
  - 4. Approximately one Maple lab each week
  - 5. End-of-semester comprehensive exam

**IX. TYPICAL TEXT:** Calculus, 8<sup>th</sup> Edition by Larson, Hostetler, and Edwards, published by Houghton Mifflin 2006.

**X. OTHER SUPPLIES REQUIRED OF STUDENTS:**

- 1. A TI 83 or TI 84 graphing calculator is required.
- 2. A Webassign student access code is required.

Creation date: April 7, 2010  
Revision date: June 29, 2011