

Date Adopted: July 1, 1998  
Date Reviewed: June 29, 2004, 2011  
Date Revised: January 14, 2008, 2011



# **Alabama Department of Postsecondary Education**

*Representing Alabama's Public Two-Year College System*

*Jefferson State Community College*

## **MTH 126 Calculus II**

### **I. MTH 126 Calculus II - 4 Semester Hours Core Area III, AMTH A116 TMTH**

### **II. Course Description**

This is the second of three courses in the basic calculus sequence. Topics include vectors in the plane and in space, lines and planes in space, applications of integration (such as volume, arc length, work and average value), techniques of integration, infinite series, polar coordinates, and parametric equations.

### **III. Prerequisite**

C or higher in MTH 125 or equivalent.

### **IV. Textbook**

Calculus Early Transcendentals, Single Variable, Anton, Bivens & Davis, 9th Ed.  
Wiley

### **V. Course Objectives**

The objective of this course is to provide an understanding of concepts, develop competent skills, and demonstrate applications in the following areas:

1. Applications of integration
2. Specialized integration techniques
3. Infinite series
4. Polar and parametric representations

## 5. Vectors

This course seeks to build upon the experiences and knowledge from Calculus I while preparing students for Calculus III.

## VI. Course Outline of Topics

A. This course shall include the following topics as a minimum.

1. Application of Integration
  - a. Area of region between two curves
  - b. Volumes of solids of revolution
  - c. Arc length
  - d. Work
  - e. Fluid pressure
2. Techniques Integration
  - a. Integration by parts
  - b. Trigonometric integrals
  - c. Trigonometric substitution
  - d. Partial fractions
3. Indeterminate forms and L'Hospital's Rules
4. Improper integrals
5. Sequences
6. Convergence of divergence of infinite series
  - a. Series and convergence
  - b. The integral test and p-series
  - c. Comparisons of series
  - d. Alternating series
  - e. The ratio and root tests
7. Power series
8. Taylor, Maclaurin series and Binomial series
9. Parametric equations
10. Polar coordinates and polar graphs
11. Area and arc length in polar coordinates
12. Vectors in the plane and space
13. Operations with vectors
14. Lines and planes in space

B. Optional topics may include the following.

1. Moments, center of mass, and centroids
2. Conics

## VII. Evaluation and Assessment

A. College requirements:

Examinations should be given by instructors periodically throughout their courses. Faculty are encouraged to give evaluative work early in the term so that students will have a clear understanding of the progress they are making.

Final examinations will be given in all classes, and all students enrolled for academic credit will take the final examination. (College Handbook, section 3.7)

B. Grading system as stated in the college catalog:

- A - Excellent (90-100)
- B - Good (80-89)
- C - Average (70-79)
- D - Poor (60-69)
- F - Failure (below 60)

C. Evaluation and assessment techniques may include any or all of the following:

1. Recitation
2. Daily assignments
3. Written assignments
4. Computer assignment
5. Projects
6. Participation
7. Homework
8. Exams

To receive a grade of "C" or higher, the student must obtain an average of at least 70% on written test(s) and other evaluation criteria as determined by the instructor.

**\*\* Note: A grade of "C" or higher is required in this course for a student to be eligible for MTH 227 or MTH 237.**

#### VIII. Class Activities

- A. Lecture
- B. Recitation
- C. Discussion
- D. Individual Instruction
- E. Testing

#### IX. General Course Competencies

- A. The student will be able to apply knowledge of applications of the definite integral.
- B. The student will acquire knowledge of how to find volume of a solid of revolution.

- C. The student will be able to apply knowledge of certain techniques of integration.
  - D. The student will acquire knowledge of improper integrals.
  - E. The student will acquire knowledge of infinite series.
  - F. The student will acquire knowledge of polar coordinates and parametric equations.
  - G. The student will acquire knowledge of vectors in two-space and three-space.
  - H. The student will acquire knowledge of three-dimensional series.
- X. Course Objectives Stated In Performance Terms**
- A. The student will apply knowledge of applications of the definite integral by his/her ability to
    - 1. find the length of an arc of a plane function, using the definite integral.
    - 2. find the area of a surface of revolution, using the definite integral.
    - 3. solve work problems, using the definite integral.
  - B. The student will demonstrate knowledge of how to find the volume of a solid of revolution by using the definite integral.
  - C. The student will demonstrate application of knowledge of certain techniques of integration by his/her ability to
    - 1. use the method of parts to integrate given functions.
    - 2. use the appropriate formula to integrate powers of trigonometric functions.
    - 3. use the methods of trigonometric substitution.
    - 4. use the method of partial fractions.
    - 5. use certain miscellaneous substitutions.
    - 6. use Simpson's Rule.
    - 7. work problems involving  $ax^2 + bx + c$ .
  - D. The student will demonstrate knowledge of improper integrals by his/her ability to integrate improper integrals with infinite limits of integration.
  - E. The student will demonstrate knowledge of infinite series by his/her ability to
    - 1. determine for a given sequence
      - a. whether the sequence is increasing or decreasing.
      - b. its lower and upper bounds (if they exist).
      - c. whether the sequence converges or diverges.
    - 2. determine the convergence or divergence of each of the following infinite series:
      - a. constant term.
      - b. geometric.
      - c. harmonic.
      - d. positive term.

- e. alternating.
3. take a given power series and
    - a. determine convergence of the series.
    - b. find the interval of convergence for the series.
    - c. differentiate the series.
    - d. integrate the series.
  4. write the Taylor and Maclaurin series for certain given functions.
- F. The student will demonstrate knowledge of polar coordinates and parametric equations by his/her ability to
1. convert from rectangular to polar coordinates and vice versa.
  2. graph given equations by using rectangular and/or polar coordinates.
  3. solve problems using parametric equations.
- G. The student will demonstrate knowledge of properties of vectors in two-space and three-space by his/her ability to compute, when given two- or three-dimensional vectors, the
1. sum.
  2. difference.
  3. scalar product.
  4. magnitude.
  5. dot product.
  6. cross product (three-dimensional only).
  7. vector projection.
  8. scalar projection.
- H. The student will demonstrate knowledge of three-dimensional space by his/her ability to find, when given sufficient information, the
1. equation of planes.
  2. parametric and symmetric equations of a line.

## **XI. Attendance**

Students are expected to attend all classes for which they are registered. Students who are unable to attend class regularly, regardless of the reason or circumstance, should withdraw from that class before poor attendance interferes with the student's ability to achieve the objectives required in the course. Withdrawal from class can affect eligibility for federal financial aid.

## **XII. Statement on Discrimination/Harassment**

The College and the Alabama State Board of Education are committed to providing both employment and educational environments free of harassment or discrimination related to an individual's race, color, gender, religion, national origin, age, or disability. Such harassment is a violation of State Board of Education policy. Any practice or behavior

that constitutes harassment or discrimination will not be tolerated.

### **XIII. Americans with Disabilities**

The Rehabilitation Act of 1973 (Section 504) and the Americans with Disabilities Act of 1990 state that qualified students with disabilities who meet the essential functions and academic requirements are entitled to reasonable accommodations. It is the student's responsibility to provide appropriate disability documentation to the College. The ADA Accommodations office is located in FSC 300 (205-856-7731).