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Alabama
Department of
Postsecondary Education

Representing Alabama's Public Two-Year College System

Jefferson State Community College

**MTH 120
Calculus and Its Applications**

I. MTH 120 Calculus and Its Applications - 3 Semester Hours

Core Area III, Code A

II. Course Description

This course is intended to give a broad overview of calculus and is primarily taken by students majoring in Commerce and Business Administration. It includes differentiation and integration of algebraic, exponential, and logarithmic functions and applications to business and economics. The course should include functions of several variables, partial derivatives (including applications), Lagrange Multipliers, L'Hopital's Rule, and multiple integration (including applications).

III. Prerequisite

A minimum prerequisite of high school Algebra I, Geometry, and Algebra II with an appropriate mathematics placement score. An alternative to this is that the student should successfully pass with a C or higher in MTH 112.

IV. Textbook

Calculus, For the Managerial, Life, and Social Sciences, Tan 10th Ed.
Brooks/Cole, Cengage Learning, 2011.

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. limits and rates of change
2. introductory differential and integral calculus
3. optimization of single and multi-variable functions
4. the calculus of exponential and logarithmic functions

VI. Course Outline of Topics

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

1. Limits
2. Continuity
3. The derivative
4. Differentiation
5. Product and Quotient Rule
6. Chain rule
7. Exponential/logarithmic functions
8. Marginal functions in economics
9. Applications of 1st derivative
10. L'Hopital's Rule
11. Application of 2nd derivative
12. Curve Sketching
13. Optimization
14. Linear Programming
15. Antiderivatives
16. Integration by substitution
17. Fundamental theorem
18. Evaluating definite integrals
19. Area between 2 curves
20. Applications
21. Functions of several variables
22. Partial derivatives
23. Lagrange Multipliers
24. Maximum / Minimum of several variables
25. Multiple integration

VII. Evaluation and Assessment

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

Exams

Projects

Homework

Computer assignment

Participation

Grades will be given based upon A = 90 – 100%, B = 80 – 89%, C = 70 – 79%, D = 60 – 69%, and F = below 60%.

VIII. CLASS ACTIVITIES

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

IX. GENERAL COURSE COMPETENCIES

- A. The student will acquire knowledge of the basic concepts of differential calculus.
- B. The student will acquire knowledge of the basic concepts of integral calculus.
- C. The student will be able to use concepts of differential and integral calculus in problem solving.

X. COURSE OBJECTIVES STATED IN PERFORMANCE TERMS

- A. The student will demonstrate knowledge of the basic concepts of differential calculus by his/her ability to
 - 1. find the limit of given functions.
 - 2. find the points of discontinuity.
 - 3. find the derivative of given functions by using the appropriate differentiation rules.
 - 4. find the derivative of given functions by using the technique of implicit differentiation.
 - 5. find the partial derivatives of a given function.
 - 6. find the higher-order derivative of a given function.
- B. The student will demonstrate knowledge of the basic concepts of integral calculus by his/her ability to
 - 1. find the integral of given functions by using the following techniques of integration:
 - a. power rule
 - b. u-substitution
 - c. by parts
 - d. integral tables
 - 2. find the value of a definite integral.
 - 3. use the technique of numerical integration.
- D. The student will demonstrate his/her ability to use concepts of differential and integral calculus to solve a variety of problems including, but not limited to, the following:
 - 1. tangents and normals
 - 2. curve sketching
 - 3. minima and maxima
 - 4. related rates
 - 5. differentials
 - 6. area
 - 7. growth and decay
 - 8. consumers' and producers' surplus

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.

IX. 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.

X. 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).