MTH 125
Calculus I

I. MTH 125 Calculus I - 4 Semester Hours

II. Course Description

This is the first of three courses in the basic calculus sequence taken primarily by students in science, engineering, and mathematics. Topics include the limit of a function; the derivative of algebraic, trigonometric, exponential, and logarithmic functions; and the definite integral and its basic applications to area problems. Applications of the derivative are covered in detail, including approximations of error using differentials, maximum and minimum problems, and curve sketching using calculus.

III. Prerequisite

A minimum prerequisite of high school Algebra I, Geometry, Algebra II, and Trigonometry with an appropriate mathematics placement score. An alternative to this is that the student should successfully pass with a C or higher in MTH 113 or MTH 115.

IV. Textbook

Due to the varied selection of quality college level textbooks, each college will select the textbook needed to meet the requirements of this course.

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 continuity of functions
2. differentiation
3. antidifferentiation
4. basic integration

This course seeks to lay a foundation in these areas upon which subsequent calculus courses can build.
VI. Course Outline of Topics

A. This course shall include the following topics as a minimum.
   1. An introduction to limits
   2. Properties of limits
   3. Techniques for evaluating limits
   4. Continuity and one-sided limits
   5. Infinite limits
   6. The derivative and tangent line problem
   7. Basic differentiation rules and rates of change
   8. Product and quotient rules and higher order derivatives
   9. The chain rule
  10. Implicit differentiation
  11. Related rates
  12. Extrema on an interval
  13. Rolle’s Theorem and the Mean Value Theorem
  14. Increasing and decreasing functions and the first derivative test
  15. Concavity and the second derivative test
  16. Limits at infinity
  17. A summary of curve sketching
  18. Optimization problems
  19. Newton’s Method
  20. Differentials
  21. Basic applications of the derivative
  22. Antiderivatives and indefinite integration
  23. Basic area problems
  24. Reimann sums and definite integrals
  25. The Fundamental Theorem of calculus
  26. Integration by substitution
  27. Numerical integration
  28. The natural logarithmic function and differentiation
  29. The natural logarithmic function and integration
  30. Inverse functions
  31. Exponential functions: differentiation and integration
  32. Bases other than e and applications
  33. Separable differential equations
  34. Applications of separable differential equations
  35. Inverse trigonometric functions and differentiation
  36. Inverse trig functions: integration and completing the square
  37. Hyperbolic functions

B. Optional topics may include the following.
   1. Homogenous differential equations
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. **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.