

**MOREHOUSE COLLEGE
DEPARTMENT OF MATHEMATICS**

**CALCULUS II
MATH 162**

Prerequisite: Calculus I (Math 161, formerly Math 251) with a grade of “C” or better

Text: Calculus, First Ed., by Jon Rogawski (W.H. Freeman, 2008)

Coverage: Chapters 7, 8, 9, 11, and 12

COURSE OUTLINE

CHAPTER 7. Exponential Functions

- 7.1 Derivative of $f(x)=b^x$ and the Number e
- 7.2 Inverse Functions
- 7.3 Logarithms and their Derivatives
- 7.4 Exponential Growth and Decay
- 7.5 Compound Interest and Present Value
- 7.6 Models Involving $y' = k(y-b)$
- 7.7 L'Hôpital's Rule
- 7.8 Inverse Trigonometric Functions
- 7.9 Hyperbolic Functions

CHAPTER 8. Techniques of Integration

- 8.1 Numerical Integration
- 8.2 Integration by Parts
- 8.3 Trigonometric Integrals
- 8.4 Trigonometric Substitution
- 8.5 The Method of Partial Fractions
- 8.6 Improper Integrals

CHAPTER 9. Further Applications of the Integral and Taylor Polynomials

- 9.1 Arc Length and Surface Area
- 9.2 Fluid Pressure and Force
- 9.3 Center of Mass
- 9.4 Taylor Polynomials

CHAPTER 11. Infinite Series

- 11.1 Sequences
- 11.2 Summing an Infinite Series
- 11.3 Convergence of Series with Positive Terms
- 11.4 Absolute and Conditional Convergence
- 11.5 The Ratio and Root Tests
- 11.6 Power Series
- 11.7 Taylor Series

CHAPTER 12. Parametric Equations, Polar Coordinates, and Conic Sections

- 12.1 Parametric Equations
- 12.2 Arc Length and Speed
- 12.3 Polar Coordinates
- 12.4 Area and Arc Length in Polar Coordinates

BEHAVIORAL OBJECTIVES

After successfully completing this course, the students should be able to perform the following tasks:

The Transcendental Functions

- Compute the derivative of logarithmic and exponential functions
- Compute derivatives using logarithmic differentiation
- Compute derivatives involving the inverse trigonometric functions
- Evaluate integrals yielding trigonometric and inverse trigonometric functions
- Discuss derivatives and antiderivatives of the hyperbolic functions

Techniques of Integration

- Discuss and use the technique of integration by parts
- Compute antiderivatives involving trigonometric functions
- Find antiderivatives of rational functions using partial fractions
- Find antiderivatives of functions using trigonometric substitutions
- Find integrals using miscellaneous substitutions
- Carry out numerical integration schemes

Further Applications of the Integral

- Find the centroid of a region
- Compute the fluid pressure of water

Polar Coordinates; Parametric Equations

- Locate points in a plane using the polar coordinates
- Graph equations in polar coordinates
- Find area bounded by polar curves
- Obtain the graph of a parametric curve as well as tangents to the graph
- Compute arc lengths, surface areas, and centroids involving parametric curves

Sequences; Indeterminate Forms; Improper Integrals

- Determine whether the limit of a sequence exists
- Discuss properties of bounded and monotonic sequences
- Discuss indeterminate forms
- State and use L'Hospital's rules
- Recognize and evaluate improper integrals

Infinite Series

- Discuss properties of convergent and divergent series
- Discuss and use the comparison, integral, ratio, and root tests for determining convergence of series
- Determine if a convergent series is absolutely or conditionally convergent
- Determine whether an alternating series diverges, converges absolutely, or converges conditionally
- Find the interval and radius of convergence of a power series
- Discuss the properties of Taylor Polynomials, Taylor Series, and power series
- Expand functions in power series