

## COURSE SYLLABUS

Course: Calculus II  
Number: Math 166  
Units: 4 Credits

**Course Description:** This is a second course in the main Calculus sequence for math and science majors. Topics include a continuing study of integral calculus: antiderivatives; the definite integral with applications from geometry and physics; logarithmic, exponential, and inverse trigonometric functions; techniques of integration, indeterminate forms, L'Hopital's Rule, improper integrals, infinite sequences and series, Taylor series, and polar coordinates.

**Prerequisites:** MATH 165 (Calculus I) or equivalent.

Detailed Syllabus:

### 0. Getting Started

1. Email and Chat
2. Learning About the Course
3. Fundamentals of LiveMath Maker

### 1. Integration

1. Measuring Area Under a Curve
2. Definition of the Integral
3. Properties of Integrals, Symmetry
4. Integrals of Data Functions
5. Numerical Methods: Rectangles, Trapezoids
6. Undefined Integrals
7. Numerical Calculation of Integrals

### 2. Fundamental Theorem of Calculus

1. Derivative of an Integral
2. Integral of a Derivative
3. Fundamental Formula
4. Distance, Velocity, and Acceleration
5. Improper Integrals
6. More Properties of Integrals
7. Applications: Measure Accumulation Totals
8. Indefinite Integrals and Antiderivatives

### 3. Computing Integrals

1. Algebraic Antiderivatives
2. Integrals of Standard Functions

3. Transforming Integrals: u-substitution
  4. Measuring Area under Parametric Curves
  5. Integrals of Polar Functions
4. Measurements via Slicing
    1. Measuring Area via Slicing
    2. Measuring Volume via Slicing
    3. Density and Mass
    4. Accumulation
    5. Arc Length
5. Double Integrals
    1. Measuring Area
    2. Gauss-Green Formula
    3. Measuring Volume with Double Integrals
6. Integration Techniques
    1. Separable Differential Equations
    2. Integration By Parts
    3. DeMoivre's Theorem
    4. Integration Patterns
    5. Partial Fractions Technique
    6. Trigonometric Integrals
    7. Trigonometric Substitution
7. Taylor's Expansion of a Function
    1. Splines and Smooth Splines
    2. Points of Contact
    3. Application: Landing an Airplane
    4. Taylor Expansion
    5. Recognizing Familiar Expansions
    6. Using Expansions for Approximations
    7. Derivatives and Integrals of Expansions
    8. Expansions At Other Points
    9. Newton's Method
    10. Calculating Limits: L'Hopital's Rule
    11. Expansions and Solving Differential Equations
8. Sequences and Series
    1. Sequences of Numbers
    2. Series of Numbers
    3. Convergence
    4. Convergence of Taylor Expansions
    5. Barriers: Radius of Convergence
    6. Shared Convergence Intervals for Derivatives and Integrals of Functions
    7. Applications: Drug Dosing
9. Power Series
    1. Basic Definition
    2. Solutions of Differential Equations

3. Convergence Intervals of Power Series
4. Ratio Test

10. Polar Coordinates

1. Basic Graphing
2. Recognizable Curves
3. Differentiation and Integration in Polar Coordinates