COURSE SYLLABUS

Course: Calculus II
Number: Math 214
Credit-Hours: 4 credits [semester credit hours]

Course Description: Covers the integral calculus of algebraic and transcendental functions and its applications. Topics include elementary differential equations, computation of areas, volumes, work and other physical quantities, integration techniques, improper integrals, and infinite series.

Prerequisites: Successful completion (C- or higher) of MATH 213 (Calculus I) or equivalent.

Course Workload: 4 semester credit hours • 3 student work hours per credit hour • 14 week Carnegie semester = 168 hours student course workload average

Examination Requirements: Proctored written final examination must be passed at 60% or higher to earn passing grade in course. "B" and "A" grade paths have additional examinations. See http://www.distancecalculus.com/grades/ for more information.

Course Professor: Robert R. Curtis, Ph.D. <robert@distancecalculus.com>

University Information: Roger Williams University, University College, 1 Empire Plaza, Providence, RI, USA 02903. Accredited by New England Commission of Higher Education (NECHE). See https://www.rwu.edu/academics/accreditations for more information.

E-Textbook: "Calculus&LiveMath" by Davis/Porta/Uhl et al. / Curtis
Mathematics Software: LiveMath™ Computer Algebra & Graphing System

Detailed Syllabus

1. Getting Started
    - 1.1. Email and Chat
    - 1.2. Learning About the Course
    - 1.3. Required Hardware
    - 1.4. Software Fundamentals

2. Integration
    - 2.1. Measuring Area Under a Curve
    - 2.2. Definition of the Integral
    - 2.3. Properties of Integrals, Symmetry
    - 2.4. Integrals of Data Functions
    - 2.5. Numerical Methods: Rectangles, Trapezoids
    - 2.6. Undefined Integrals
    - 2.7. Numerical Calculation of Integrals

3. Fundamental Theorem of Calculus
    - 3.1. Derivative of an Integral
    - 3.2. Integral of a Derivative
    - 3.3. Fundamental Formula
    - 3.4. Distance, Velocity, and Acceleration
    - 3.5. Improper Integrals
    - 3.6. More Properties of Integrals
    - 3.7. Applications: Measure Accumulation Totals
    - 3.8. Indefinite Integrals and Antiderivatives

4. Measurements via Slicing
    - 4.1. Measuring Area via Slicing
    - 4.2. Measuring Volume via Slicing
    - 4.3. Density and Mass
    - 4.4. Accumulation of Rates
    - 4.5. Arc Length

5. Computing Integrals
    - 5.1. Algebraic Antiderivatives
    - 5.2. Integrals of Standard Functions: Polynomial, Exponential, Trigonometric, Logarithmic
    - 5.3. Transforming Integrals: u-substitution
    - 5.4. Measuring Area under Parametric Curves
    - 5.5. Integrals of Polar Functions

6. Measurements via Slicing
    - 6.1. Measuring Area via Slicing
    - 6.2. Measuring Volume via Slicing
    - 6.3. Density and Mass
    - 6.4. Accumulation and Rates
    - 6.5. Arc Length

7. Double Integrals
    - 7.1. Measuring Area and Volume
    - 7.2. Gauss-Green Formula
    - 7.3. Changing Order of Iterated Integrals

8. Integration Techniques
    - 8.1. Separable Differential Equations
    - 8.2. Integration By Parts
    - 8.3. DeMoivre's Theorem
    - 8.4. Integration Patterns and Reduction Formulas
    - 8.5. Partial Fractions Technique
    - 8.6. Trigonometric Integrals
    - 8.7. Trigonometric Substitution
    - 8.8. Integration via Differentiation Technique

9. Taylor's Expansion of a Function
    - 9.1. Splines and Smooth Splines
    - 9.2. Points of Contact
    - 9.3. Application: Landing an Airplane
    - 9.4. Taylor Expansion
    - 9.5. Recognizing Familiar Expansions
    - 9.6. Using Expansions for Approximations
    - 9.7. Derivatives and Integrals of Expansions
    - 9.8. Expansions At Other Points
    - 9.9. Newton's Method
    - 9.10. Calculating Limits: L'Hopital's Rule
    - 9.11. Expansions and Solving Differential Equations
    - 9.12. Complex Exponentials
    - 9.13. Euler, Midpoint, Runge-Kutta Integral Estimates

10. Sequences and Series
    - 10.1. Sequences of Numbers
    - 10.2. Series of Numbers
    - 10.3. Convergence
    - 10.4. Convergence of Taylor Expansions
    - 10.5. Barriers: Radius of Convergence
    - 10.6. Shared Convergence Intervals for Derivatives and Integrals of Functions
    - 10.7. Applications: Drug Dosing
11. Power Series
    - 11.1. Basic Definition
    - 11.2. Solutions of Differential Equations
    - 11.3. Convergence Intervals of Power Series
    - 11.4. Ratio Test
    - 11.5. Finding Series Convergence Values via Power and Taylor Series

12. Polar Coordinates
    - 12.1. Basic Graphing
    - 12.2. Recognizable Curves
    - 12.3. Differentiation and Integration in Polar Coordinates

13. Vector Analysis
    - 13.1. Vector Arithmetic
    - 13.2. Dot Product, Cross Product
    - 13.3. Planes