DISTANCE CALCULUS @ RWU ROGER WILLIAMS UNIVERSITY

COURSE SYLLABUS

Course Title: **Calculus II**

Abbreviated Title As Appears on Transcript: `Calculus II`

Course Number: DMAT 263

Credit Hours: 4 credits [semester credit hours]

Course Description: A second course in the differential and integral calculus for engineering and science with emphasis on computational techniques, graphical analysis, and algebraic methods. Topics include integration theory, algebraic methods of integration, integral functions and transformations, improper and numerical integrals, applications of integration to geometry and physics, double integrals, integration over regions with parametric boundary, splines, barriers, Taylor's Theorem, L'Hopital's Rule, infinite sequences and series.

Prerequisite: Successful completion (C- or higher) of Calculus I or equivalent, or consent of instructor.

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 and oral final examination must be passed at 70% or higher to earn passing grade in course. "B" and "A" grade paths have additional examinations and assignments. See https://www.distancecalculus.com/grades/ for more information.

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Accredited by New England Commission of Higher Education (NECHE).
See https://www.rwu.edu/academics/accreditation/ for more information.

E-Textbook:

Calculus & LiveMath by Robert R. Curtis, Ph.D., adapted from Davis/Porta/Uhl *Calculus&Mathematica* courseware series

Mathematical Software: LiveMath™ Computer Algebra & Graphing System

ADA ACCOMMODATIONS

Roger Williams University has a continuing commitment to providing reasonable accommodations for

students with documented disabilities. Students with disabilities who need accommodations in order to fully participate in this class are urged to contact Student Accessibility Services, as soon as possible, to explore the arrangements needed to be made to assure access. Student Accessibility Services is open Monday through Friday from 8:00AM to 5:00PM Eastern Time; Email: sas@rwu.edu or Voice: 401-254-3841. For more information about SAS, visit https://www.rwu.edu/undergraduate/academics/student-academic-success/student-accessibility-services-sas

COURSE RULES

Academic Honesty	Academic Dishonesty in a Distance course includes copying or relying upon another person's work. Working with other students is good and encouraged, but the work you submit for this course must be genuinely your own work. Private tutors are allowed, but you must notify the instructor that you have obtained a private tutor to aid in your studies. Any documented instance of Academic Dishonesty will be grounds for immediate failure in this course.
Final (and Other) Examinations	A written and oral proctored final exam will occur at the student's location over video with the course professor; The student must score 70% or higher on this final exam to be eligible to earn a passing grade in the course.
Communication	Communication is the key to success in a Distance course. It is the student's responsibility to keep good communication channels with the instructors during the course; failure to participate in the course does not constitute "dropping" the course (Withdrawal from the course must be requested in writing to the instructors before the completion date deadline)
Roger Williams University Policies & Procedures	Roger Williams University has Policies & Procedures that all students must follow, including the Roger Williams University Student Handbook. Student must agree to follow all stated rules governing student conduct listed on the Roger Williams University website, and at the Roger Williams University Course Catalog
Course Completion 1 Year Rule	All Distance Calculus students are afforded 1 Year to finish their course from the Date of Enrollment. Students will be placed in the Academic Semester based upon their Date of Enrollment for academic records purposes. If a student does not finish the course, and does not request a Course Withdrawal for a W, then an "F" grade will be issued.
No Chatbots / AI	Students must pledge to **not** use any Chatbot/AI at all - **period**. Student must pledge to **limit** use of search engines (Google, Bing, etc) to a minimal level. Student must pledge to not engage in dishonest disguise of any Chatbot/AI/Search Engine source of information as student's own honest academic work. Verified chatbot usage will result in an "F" course grade, and will be referred to the Roger Williams University Academic Integrity Committee.

Learning Outcomes for DMAT 263 - Calculus II

1. To understand and compute algebraic integrals using a variety of symbolic techniques, including substitution, integration by parts, iteration methods
2. To understand and compute with the Fundamental Theorem of Calculus
3. To understand and compute solutions to applications problems involving integrals
4. To compute measurements of volumes of geometric objects using integrals (slides, surfaces of rotation
5. To understand and compute with Green's Theorem
6. To understand and compute parametric and Polar function integrals
7. To understand and compute double integrals
8. To understand and compute splines and polynomial approximations
9. To understand and compute with Taylor's Theorem
10. To understand and compute with L'Hopital's Rule and using expansions to compute limits
11. To understand and compute sequences and series
12. To understand and compute convergence or divergence of sequences and series
13. To understand and compute 3D vector analysis, dot product, planes, and cross products

Syllabus Topics Outline for DMAT 263 - Calculus II

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. Integral Functions & Computation
   - 6.1 Integral Functions and Monotonicity
   - 6.2 Integral Functions as Numerical Tabulations with Interpolation
   - 6.3 Computing the Inverse Function Numerically
   - 6.4 Inverse Circular and Hyperbolic Trigonometric Functions & Integrals

7. Measurements via Slicing
   - 7.1 Measuring Area via Slicing
   - 7.2 Measuring Volume via Slicing
   - 7.3 Density and Mass
   - 7.4 Accumulation and Rates
   - 7.5 Arc Length

8. Double Integrals
   - 8.1 Measuring Area and Volume
   - 8.2 Gauss-Green Formula
   - 8.3 Changing Order of Iterated Integrals

9. Integration Techniques
   - 9.1 Separable Differential Equations
   - 9.2 Integration By Parts
   - 9.3 Integration Patterns and Reduction Formulas
   - 9.4 Partial Fractions Technique
   - 9.5 Trigonometric Integrals
   - 9.6 Trigonometric Substitution

10. Taylor's Expansion of a Function
   - 10.1 Splines and Smooth Splines
   - 10.2 Points of Contact
   - 10.3 Application: Landing an Airplane
   - 10.4 Taylor Expansion

10.5 Recognizing Familiar Expansions
10.6 Using Expansions for Approximations
10.7 Derivatives and Integrals of Expansions
10.8 Expansions At Other Points
10.9 Newton's Method
10.10 Calculating Limits: L'Hopital's Rule

11. Sequences and Series
11.1 Sequences of Numbers
11.2 Series of Numbers
11.3 Convergence
11.4 Convergence of Taylor Expansions
11.5 Barriers: Radius of Convergence
11.6 Shared Convergence Intervals for Derivatives and Integrals of Functions
11.7 Applications: Drug Dosing

12. Power Series
12.1 Basic Definition
12.2 Convergence Intervals of Power Series
12.3 Ratio Test and Other Convergence Tests
12.4 Finding Series Convergence Values via Power and Taylor Series

13. Polar Coordinates
13.1 Basic Graphing
13.2 Recognizable Curves
13.3 Differentiation and Integration in Polar Coordinates

14. Vector Analysis
14.1 Vector Arithmetic
14.2 Dot Product, Cross Product
14.3 Planes
14.4 Partial Derivatives
14.5 Tangent Planes