

**COURSE SYLLABUS**

**Course Title: Applied Calculus**

Abbreviated Title  
As Appears on Transcript **Applied Calculus**

Course Number: **DMAT 203**

Credit Hours: **3 credits [semester credit hours]**

Course Description: A single course in differential and integral calculus for non-STEM majors with emphasis on computational techniques and graphical analysis. Topics include a study of the algebraic and numerical aspects of linear, quadratic, polynomial, exponential, and logarithmic functions, function growth, derivative analysis and optimization, integration, applications to economics, partial derivatives and higher dimensional optimization, and the Fundamental Theorem of Calculus.

Prerequisite: Successful completion of 3 years high school mathematics (C- or higher) or instructor consent.

Course Workload: 3 semester credit hours • 3 student work hours per credit hour • 14 week Carnegie semester = 126 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.

Course Professor: Robert R. Curtis, Ph.D. <[rcurtis@rwu.edu](mailto:rcurtis@rwu.edu)>, <[robert@distancecalculus.com](mailto:robert@distancecalculus.com)>

Roger Williams University, Extension School, 1 Empire Plaza, Providence, RI, USA 02903.

Roger Williams University, 1 Old Ferry Road, Bristol, RI 02809.

Accredited by New England Commission of Higher Education (NECHE).

See <https://www.rwu.edu/academics/accreditation/> for more information.

E-Textbook:

“Business 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](mailto: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 203 - Applied Calculus

1. To identify, manipulate, and understand the algebraic, numerical, and graphical fundamentals of linear, polynomial, exponential, logarithmic, and rational polynomial functions
2. To understand and compute numerical, and graphical limits at finite and infinite values
3. To understand and compute the fundamental concept of the derivative
4. To understand and compute various measurements of growth of a function
5. To algebraically compute derivatives of common functions using summation, product, quotient, and chain rules for derivatives
7. To understand and compute optimization of functions using derivatives, finding critical values
8. To understand and compute the second derivative
9. To understand and calculate numerically and graphically the core concepts of the integral for applications to signed area measurements;
10. To compute numerically, algebraically, and graphically integrals of a variety of functions;
11. To algebraically compute integrals of basic polynomial and exponential functions, with an introduction to the algebraic substitution technique;
12. To use the tools of differential and integral calculus in various applications in business and finance
13. To understand and compute the Fundamental Theorem of Calculus
14. To understand and compute partial derivatives of multivariable functions, to begin study of optimization in higher dimensions.
15. To utilize computer algebra and graphing software to amplify traditional manual computation techniques.

## Syllabus Topics Outline for DMAT 203 - Applied Calculus

1. Getting Started
  - 1.1 Email and Chat
  - 1.2 Learning About the Course
  - 1.3 Required Hardware
  - 1.4 Software Fundamentals
2. The Big Picture
  - 2.1 Solving (easy) equations in 1 variable.
  - 2.2 What if you can't solve for x?
  - 2.3 Finding solutions numerically
  - 2.4 Finding solutions graphically
  - 2.5 Solving equations of more than 1 variable
3. Functions
  - 3.1 Function notation
  - 3.2 Data sets
  - 3.3 Graphing functions
  - 3.4 Data sets and smooth curves
  - 3.5 Domain and Range
  - 3.6 Algebraic combinations of functions

4. Linear Functions
  - 4.1 Algebraic definition
  - 4.2 Slope
  - 4.3 Graphing linear functions by hand
  - 4.4 Properties of linear functions
  - 4.5 Linear data sets
  
5. Quadratic Functions
  - 5.1 Algebraic definition
  - 5.2 Graphing and Properties of Quadratic Functions
  - 5.3 Solving quadratic equations algebraically: Factoring
  - 5.4 Solving quadratic equations algebraically: Quadratic formula
  - 5.5 Solving quadratic equations numerically and graphically
  
6. Power and Polynomial Functions
  - 6.1 Algebraic definition
  - 6.2 Graphing and Properties of Polynomial Functions
  - 6.3 Solving polynomial equations algebraically: factoring
  - 6.4 Solving polynomial equations numerically and graphically
  - 6.5 Radicals and fractional exponents
  
7. Rational Polynomial Functions
  - 7.1 Algebraic definition
  - 7.2 Graphing and Properties of Rational Polynomial Functions
  - 7.3 Solving rational polynomial equations algebraically: factoring
  
8. Exponential Functions
  - 8.1 Algebraic definition
  - 8.2 Graphing and Properties of Exponential Functions
  - 8.3 Solving exponential equations numerically and graphically
  - 8.4 Exponential Growth and Applications
  - 8.5 Data sets and exponential functions
  
9. Logarithmic Functions
  - 9.1 Inverse Functions
  - 9.2 Algebraic Definition
  - 9.3 Graphing and Properties of Logarithmic Functions
  - 9.4 Solving exponential and logarithmic equations algebraically
  - 9.5 Solving logarithmic equations numerically and graphically
  - 9.6 Logarithmic Growth and Applications
  - 9.7 Data sets and logarithmic functions
  
10. General Inverse Functions
  - 10.1 When do functions have inverses?

- 10.2 Converting Functions to Numerical Tables & Interpolation
- 10.3 Computing the Inverse Function Numerically
- 10.4 Interesting Examples of Algebraic Functions without Algebraic Inverses
- 10.5 Graphical Relationships
- 10.6 Applications of Inverse Functions
  
- 11. Growth: Preparing for the Derivative
  - 11.1 Growth of Linear Functions
  - 11.2 Growth of Power Functions
  - 11.3 Growth of Exponential Functions
  - 11.4 Dominance of Growth of Functions
  - 11.5 Percentage Growth of Functions
  - 11.6 Global Scale: Infinite Limits
  - 11.7 Data Functions and Interpolation
  - 11.8 Approximation of Functions by Linear Functions
  
- 12. Exponential Functions and Natural Logarithms
  - 12.1  $e$  = Euler's Number
  - 12.2 Natural Logarithm
  - 12.3 Growth Analysis
  - 12.4 Applications: Carbon Dating
  - 12.5 Percentage Growth and Steady Growth of Exponential Functions
  - 12.6 Data Functions and Logarithmic Analysis
  - 12.7 Applications: Compound Growth Rates
  - 12.8 Applications: World Population
  - 12.9 Applications: Growth and Half-Life Decay
  
- 13. The Derivative of Polynomial, Exponential, Logarithmic, and Fractional Powers
  - 13.1 Instantaneous Growth Rates
  - 13.2 Definition of the Derivative
  - 13.3 Computing the Derivative Graphically
  - 13.4 Computing the Derivative Algebraically
  - 13.5 Computing the Derivative Numerically
  - 13.6 Average Growth Rate vs. Instantaneous Growth Rate
  - 13.7 Applications of the Derivative: Spread of Disease
  - 13.8 Finding Maxima and Minima of Functions
  - 13.9 Relating a Function and Its Derivative
  
- 14. Computing Derivatives
  - 14.1 Sum, Difference, Product, Quotient Rule
  - 14.2 Chain Rule
  - 14.3 Instantaneous Percentage Growth
  - 14.4 Growth Dominance
  
- 15. Using Derivatives

- 15.1 Finding Maxima and Minima
- 15.2 Finding Good Representative Plots
- 15.3 The Second Derivative
  
- 16. Integration
  - 16.1 Measuring Area Under a Curve
  - 16.2 Definition of the Integral
  - 16.3 Properties of Integrals, Symmetry
  - 16.4 Integrals of Data Functions
  - 16.5 Numerical Methods: Rectangles, Trapezoids
  - 16.6 Undefined Integrals
  - 16.7 Numerical Calculation of Integrals
  
- 17. Fundamental Theorem of Calculus
  - 17.1 Derivative of an Integral
  - 17.2 Integral of a Derivative
  - 17.3 Fundamental Formula
  - 17.4 Properties of Integrals
  - 17.5 Indefinite Integrals and Antiderivatives
  - 17.6 u-Substitution
  
- 18. Higher Dimensions
  - 18.1 Multivariable Functions
  - 18.2 Partial Derivatives
  - 18.3 Tangent Planes
  - 18.4 Optimization