DISTANCE CALCULUS @ RWU ROGER WILLIAMS UNIVERSITY

COURSE SYLLABUS

Course Title: **Computational Precalculus with Trigonometry**

Abbreviated Title As Appears on Transcript: `Comp Precalc with Trigonometry`

Course Number: DMAT 135

Credit Hours: 4 credits [semester credit hours]

Course Description: A single course on the study of linear, quadratic, polynomial, rational, exponential, logarithmic, and trigonometric functions via algebraic, numerical, graphical, and narrative viewpoints, preparing the student for the Calculus sequence.

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

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:

"The Primitives of Precalculus" by Robert R. Curtis, Ph.D.

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 135 - Computational Precalculus with Trigonometry

1. To identify, manipulate, and understand the algebraic, numerical, and graphical fundamentals of linear functions, including slope, intercepts, linear growth, and intersections of linear plots.
2. To identify, manipulate, and understand the algebraic, numerical, and graphical fundamentals of quadratic functions, including standard form, vertices, factoring, the quadratic formula, and complex numbers.
3. To identify, manipulate, and understand the algebraic, numerical, and graphical fundamentals of polynomial functions, including factoring, roots, polynomial growth, inverse functions, and the Fundamental Theorem of Algebra
4. To identify, manipulate, and understand the algebraic, numerical, and graphical fundamentals of rational polynomial functions, including asymptotes, common roots, solving equations.
5. To identify, manipulate, and understand the algebraic, numerical, and graphical fundamentals of inequalities, including solving inequalities, ranges, systems of inequalities.
6. To identify, manipulate, and understand the algebraic, numerical, and graphical fundamentals of exponential and logarithmic functions, including bases, exponential and logarithmic growth, solving equations involving exponentials and logarithms, and inverse function relations.
7. To identify, manipulate, and understand the algebraic, numerical, and graphical fundamentals of trigonometric functions, including trigonometric ratio definitions, the six trigonometric functions, trigonometric identities, solving trigonometric equations, and applications of trigonometry.
8. To identify, manipulate, and understand the algebraic, numerical, and graphical fundamentals of conic sections, including intersections of planes and cones, the classical conic section types, and transformation of coordinates.

Syllabus Topics Outline for DMAT 135 - Computational Precalculus with Trigonometry

1. Getting Started
   - 1.1. Email and Chat
   - 1.2. Learning About the Course
   - 1.3. Required Computer 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
   - 5.6. Complex Numbers
   - 5.7. Quadratic data sets

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. Fundamental Theorem of Algebra
   - 6.6. 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
   - 7.4. Solving rational polynomial equations numerically and graphically

8. Inequalities, Systems of Equations
   - 8.1. Inequalities of 1 variable
   - 8.2. Inequalities of 2 variables
   - 8.3. System of Equations in 2 variables

9. Introduction to Matrices
   - 9.1. Inverses
   - 9.2. Determinants
   - 9.3. Cramer’s Rule

10. Exponential Functions
    - 10.1. Algebraic definition
    - 10.2. Graphing and Properties of Exponential Functions
    - 10.3. Solving exponential equations numerically and graphically
    - 10.4. Exponential Growth and Applications

10.5. Data sets and exponential functions

11. Logarithmic Functions
    - 11.1. Inverse Functions
    - 11.2. Algebraic Definition
    - 11.3. Graphing and Properties of Logarithmic Functions
    - 11.4. Solving exponential and logarithmic equations algebraically
    - 11.5. Solving logarithmic equations numerically and graphically
    - 11.6. Logarithmic Growth and Applications
    - 11.7. Data sets and logarithmic functions

12. General Inverse Functions
    - 12.1. When do functions have inverses?
    - 12.2. Converting Functions to Numerical Tables & Interpolation
    - 12.3. Computing the Inverse Function Numerically
    - 12.4. Interesting Examples of Algebraic Functions without Algebra Inverses
    - 12.5. Graphical Relationships.
    - 12.6. Applications of Inverse Functions

13. Trigonometry
    - 13.1. Geometry of Right Triangles
    - 13.2. The Unit Circle
    - 13.3. The (Circular) Trigonometric Functions
    - 13.4. Graphing and properties of trigonometric functions: frequency, amplitude, shifting
    - 13.5. Radians and degrees
    - 13.6. Trigonometric identities
    - 13.7. Inverse Trigonometric functions
    - 13.8. Solving Trigonometric equations algebraically
    - 13.9. Solving Trigonometric equations graphically and numerically
    - 13.10. Applications of trigonometry
    - 13.11. Laws of sines and cosines
    - 13.12. DeMoivre's Theorem

14. Analytic Geometry
    - 14.1. The Cone
    - 14.2. Parabolae, Hyperbolae, Ellipsi
    - 14.3. Polar Coordinates
    - 14.4. Parametric Equations and Graphs

15. Sequences and Series
    - 15.1. Sequences
    - 15.2. Summation
    - 15.3. Arithmetic and Geometric Sequences and Series