DISTANCE CALCULUS @ RWU ROGER WILLIAMS UNIVERSITY

## COURSE SYLLABUS

**Course Title:** **Computational Discrete Mathematics**

Abbreviated Title As Appears on Transcript: `Comp Discrete Math`

Course Number: DMAT 225

Credit Hours: 4 credits [semester credit hours]

Course Description: A single course on discrete mathematics with emphasis on the connections to computer science. Topics include sets, functions, mathematical induction, sequences, recurrence relations, logic, proofs, and introductions to combinatorics and number theory.

Prerequisite: Successful completion (C- or higher) of Precalculus with Trigonometry 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:

*Computational Discrete Mathematics* by Skiena/Pemmaraju
*Discrete Mathematics and Its Applications* by Kenneth Rosen, 7th

Mathematical Software: *LiveMath*, Sage, and/or Mathematica Computer Algebra & Graphing Systems

## 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

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| **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 225 - Computational Discrete Mathematics**

1. To develop understanding and ability in symbolic logic
2. To understand and formulate basic mathematical proofs
3. To understand and formulate mathematical conjecture and algorithmic experimentation
4. To understand and compute the core concepts of Set Theory
5. To develop understanding of introductory Number Theory and Cryptography
6. To understand and formulate induction and recursion proofs and computations
7. To understand and compute with the Principals of Counting and Recurrence Relations
8. To develop understanding of introductory Graph and Tree Theory

Syllabus Topics Outline for DMAT 225 - Computational Discrete Mathematics

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

2. Logical Reasoning
   - 2.1. Propositional Logic
   - 2.2. Equivalences
   - 2.3. Inference
   - 2.4. Introduction to Proofs
   - 2.5. Proof Methods and Strategies
   - 2.6. Conjecture and Experimentation

3. Set Theory
   - 3.1. Sets and Set Operations
   - 3.2. Functions
   - 3.3. Sequences and Summations
   - 3.4. Matrices

4. Algorithms
   - 4.1. Introduction
   - 4.2. Growth of Functions
   - 4.3. Complexity of Algorithms

5. Number Theory
   - 5.1. Modular Arithmetic
   - 5.2. Divisibility
   - 5.3. Primes
   - 5.4. Greatest Common Divisors
   - 5.5. Congruences
   - 5.6. Cryptography

6. Recursion
   - 6.1. Danger in Recursion in Programming
   - 6.2. Induction
   - 6.3. Recursion and Algorithms

7. Counting
   - 7.1. Basics of Counting
   - 7.2. Pigeonhole Principle
   - 7.3. Permutations
   - 7.4. Combinations
   - 7.5. Recurrence Relations
   - 7.6. Divide-and-Conquer Algorithms

8. Relations
   - 8.1. Properties of Relations
   - 8.2. Closure
   - 8.3. Equivalence

9. Graph Theory
   - 9.1. Graphs and Graph Models
   - 9.2. Generating Graphs
   - 9.3. Representing Graphs and Graph Isomorphism
   - 9.4. Connectivity
   - 9.5. Euler and Hamilton Paths
   - 9.6. Graph Coloring
   - 9.7. Trees