Course Syllabus: Discrete Mathematics I

Instructor Information:

Instructor: Ainsley Thorne

Contact: athorne@mitmail.com

Office Hours: Mon: 9am-10am, Thurs: 2pm-3pm

Course Description:

Discrete Mathematics is fundamental to computer science and provides the mathematical foundation for many areas of study including algorithms, logic, and combinatorics. This course explores discrete structures and their applications in solving real-world problems, emphasizing rigorous reasoning and problem-solving techniques.

Learning Outcomes:

By the end of this course, students should be able to:

1. Apply fundamental concepts of sets, relations, and functions to solve problems in various domains.
2. Demonstrate proficiency in combinatorial reasoning and discrete probability to analyze and solve counting problems.
3. Utilize graph theory to model and analyze real-world networks and relationships.
4. Construct and present formal mathematical proofs using logical reasoning and proof techniques.
5. Apply discrete mathematics principles to algorithm design and computational problem-solving.

Prerequisites:

Basic understanding of algebra and a readiness to engage in abstract mathematical reasoning are recommended.

Textbook:

Recommended Texts:

- "Discrete Mathematics and Its Applications" by Kenneth H. Rosen

Topics Covered:

1. Sets, Relations, and Functions
   - Set theory fundamentals
   - Types of relations (e.g., reflexive, symmetric, transitive)

- Function properties and operations

2. Combinatorics and Discrete Probability
   - Counting principles (permutations, combinations)
   - Binomial coefficients and Pascal's triangle
   - Basics of discrete probability

3. Graph Theory
   - Graph representations and terminology
   - Connectivity and paths
   - Trees and spanning trees

4. Logic
   - Propositional and predicate logic
   - Truth tables and logical equivalences
   - Formal proofs and logical reasoning

5. Algorithms and Applications
   - Algorithm design techniques (greedy algorithms, dynamic programming)
   - Applications in computer science and beyond

Assessments:

Assignments/Quizzes: 40% of final grade

Midterm Exam: 30% of final grade

Final Exam: 30% of final grade

Grading Policy:

Grades will be calculated based on a cumulative percentage score derived from assignments, quizzes, midterm exam, and final exam. Specific weights are as follows: Assignments/Quizzes (40%), Midterm Exam (30%), Final Exam (30%).

Course Policies:

Attendance: Regular attendance is expected. Attendance may be factored into participation grades.

Late Submissions: Late assignments will be penalized per the policy.

Academic Integrity: Plagiarism or cheating will result in consequences. Students are expected to adhere to the Code of Conduct.

Accommodations: Students with disabilities requiring accommodations should contact the Dean's office to make arrangements.

Disclaimer: Course content and schedule are subject to change at the discretion of the instructor.