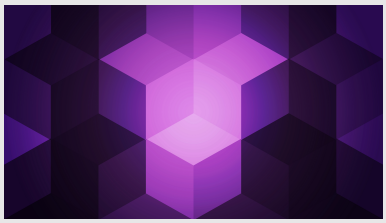

Discrete Mathematics

MAT 481

Professor

D. Bradley

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207-581-3955

https://umaine.edu/mathematics/david-bradley/

Class Meetings

Mon., Wed. & Fri. thru Dec. 8

9:00 a.m. – 9:50 a.m.

Neville Hall, Room 204

Office Hours

Days, times, and location

to be determined

https://tinyurl.com/ProfBradley-OfficeHour

Mandated Policy Declarations

Web Link to Required Syllabus Information

Overview

Discrete mathematics is the branch of mathematics that deals with countable sets. Since the objects studied in discrete mathematics can be enumerated (i.e. counted), the subject touches on a wide variety of disciplines, including logic, finite set theory, enumerative combinatorics, graph theory, the calculus of finite differences, and theoretical computer science. This course provides an opportunity to become acquainted with some of the tools and techniques for tackling problems in these areas.

Reference Material

Course Notes: Will be made available in Brightspace.

Textbook: Not required. However, the following references may be helpful.

- Victor Kac and Pokman Cheung, *Quantum Calculus*, Springer, 2002.
- Warren P. Johnson *An Introduction to q-analysis*, Amer. Math. Soc., 2010.
- Ronald L. Graham, Donald E. Knuth, and Oren Patashnik, *Concrete Mathematics* (2nd ed.) Addison-Wesley, 1994.

Course Goals

- Hone skills needed to read, write, and evaluate proofs.
- Develop fluency in the language of logic, set theory, and finite mathematics.
- Reinforce concepts acquired in prior mathematics courses.
- Strengthen problem-solving skills.
- Acquire appropriate taste in posing new problems.
- Develop the facility to investigate independent lines of inquiry.

Learning Objectives

Specific objectives will depend on topics covered. But among other things, you may learn to

- determine if a binary relation is reflexive, symmetric, or transitive.
- use mathematical induction to establish properties of combinatorial objects such as sequences, permutations, and trees.
- use the pigeonhole principle to prove the existence of objects with specified properties.
- calculate the permanent of a square matrix.
- use permanents to count restricted permutations and successful assignments.
- represent a graph using an adjacency matrix.
- calculate the chromatic polynomial of a graph.
- model discrete phenomena with recurrence equations, and amass a body of techniques for solving them.

Content

Topics may include binary relations, recurrence equations, generating series, special number sequences, analysis of algorithms, calculus of finite differences, summation, q-calculus, partitions, enumeration, permanents, binomial coefficient identities, graph theory and chromatic polynomials.

Assessment

Grades will be based on in-class participation and assigned work.

Expectations

Regular attendance and active participation during class meetings is expected. Although an occasional request for a moderate extension on the deadline for submitted work will ordinarily be granted, I regret being unable to accept multiple submissions of late work, especially as the end of the semester approaches.