MTH 231 : DISCRETE MATHEMATICS

Transcript title

Discrete Mathematics

Credits

4

Grading mode

Standard letter grades

Total contact hours

40

Lecture hours

40

Prerequisites

MTH 112Z or higher (except MTH 211, MTH 212, MTH 213, MTH 244, and STAT 243Z) or minimum placement Math Level 22.

Course Description

Examines applied, real-world and theoretical mathematical implications of the mathematical concepts elementary logic and set theory, functions, direct proof techniques, contradiction and contraposition, mathematical induction and recursion, elementary combinatorics, basic graph theory, minimal spanning trees. Expands and explores symbolic, numerical, and graphical representations of mathematical concepts. Emphasizes solving problems symbolically, numerically, and graphically and understanding the connections among these methods in interpreting and analyzing results.

Course learning outcomes

1. Apply basic set operations.
2. Negate compound and quantified statements and form contrapositives.
3. Construct a direct proof (from definitions) of simple statements.
4. Apply the Principle of Mathematical Induction.
5. Construct indirect proofs by contraposition and contradiction.
6. Construct explanations for solutions to counting problems.
7. Utilize one or more algorithm for finding a shortest path or a minimal spanning tree in a connected graph.

Content outline

1. Logic and arguments:
    a. Logical form and logical equivalence
    b. Conditional statements
    c. Valid and invalid arguments
    d. Predicates and quantified statements
    e. Arguments with quantified statements
2. Proofs:
    a. Direct proofs
    b. Indirect proofs by contraposition and contradiction
    c. Proofs by induction and strong induction
3. Set theory:
    a. Definitions in set theory
    b. Properties of sets and set operations
4. Sequences and recursion:
    a. Sequences -Recursive definitions
    b. Solving recurrence relations
5. Counting and probability:
    a. Probability trees
    b. Multiplication rule
    c. Addition rule
    d. Combinations and permutations
6. Graphs:
    a. Definitions
    b. Paths and circuits
    c. Trees and spanning trees

Required materials

A textbook is required.

General education/Related instruction lists

- Mathematics