

# MTH 231 : DISCRETE MATHEMATICS

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## Transcript title

Discrete Mathematics

## Credits

4

## Grading mode

Standard letter grades

## Total contact hours

40

## Lecture hours

40

## Recommended preparation

MTH 112 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

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

## Required materials

A textbook is required.

## General education/Related instruction lists

- Mathematics