

MATH 226 – DISCRETE MATHEMATICS

1. Course Description:

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2. Topics Covered

- **Propositional calculus**

- Logic of compound statements; truth tables
- Conditional statements; contrapositive
- Valid and invalid arguments
- Digital logic circuits
- Number systems and circuits for addition.

- **Predicate calculus**

- Models of a given signature
- Quantifiers
- Proofs
- Divisibility of integers
- Proofs by contradiction and contraposition
- Euclidean algorithm.

- **Sets**

- Basic set operations; Venn diagrams; Cartesian product
- Cardinality; pigeonhole principle
- Russell's paradox and halting problem
- Boolean algebra, including applications to digital logic design
- Minimization of circuits
- Sequences and summation
- Mathematical induction.

- **Counting**

- Product rule; addition rule; principle of inclusion and exclusion
- Permutations
- Combinations
- Binomial theorem
- Finite probability space; probability measure; events
- Conditional probability; independence; Bayes' theorem.

- **Recursion and recurrence relations**

- Recursion
- Solution of linear, first and second order, recurrence relations

Use of recursion to analyze algorithms.

