ROWAN UNIVERSITY
Department of Mathematics

Syllabus
MATH 03150 – Discrete Mathematics

CATALOG DESCRIPTION:

- This course provides a survey of discrete mathematics topics appropriate as an introduction for students of mathematics and computer science. Topics included are logic, sets, relations, functions, recursion, combinatorics, graphs, and modular arithmetic. Emphasis is placed on exploration and computation in these areas.

OBJECTIVES

- Upon successful completion of this course, students will be able to:
    - Use correct set theoretic terminology and notation, including set-builder notation.
    - Perform operations on sets, such as unions, intersections, and complements.
    - Construct truth tables for logical statements.
    - Apply counting principles to solve counting problems in combinatorics.
    - Perform computations modulo a positive integer.

CONTENT

- **Logic**
    - Logical Propositions and Operators
    - Truth Tables
    - Equivalence
    - Laws of Logic
    - Predicate Logic and Quantifiers
- **Sets**
    - Notation
    - Operations on Sets
    - Venn Diagrams
    - Set Equality
    - Cardinality
- **Combinatorics**
    - Basic Counting Techniques
    - Permutations and Combinations
    - Pigeonhole Principle
    - Counting with Bijections
- **Recursion**
    - Recursive Sequences
    - Finding Closed Forms
- **Relations and Functions**
    - Properties of Relations
    - Modular Arithmetic
    - Properties of Functions
    - Composition of Functions
    - Inverse Functions
- **Graph Theory**
    - Properties of Graphs
    - Isomorphisms

    - Connectivity
    - Taking Walks
    - Eulerian and Hamiltonian Networks
    - Network Flow and Path Optimization
    - Planar Graphs and Coloring
- **Number Bases**
    - Binary, decimal, hexadecimal, etc.
    - Conversion between bases
    - Arithmetic in different bases

SUGGESTED TEXTS:

- Levin, *Discrete Mathematics: An Open Introduction*, 3rd or 4th edition, online
- Schneiderman, *Mathematics: A Discrete Introduction*, Cengage
- Rosen, *Discrete Mathematics and Its Applications*, McGraw Hill
- Hammack, *Discrete Math Elements*, online
- Dossey, *Discrete Mathematics*, Addison-Wesley

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