

FINITE DISCRETE MATHEMATICS FOR INFORMATION SCIENCE AND ENGINEERING

MATH 2040

Course Description:

A foundations course in discrete mathematics for applied disciplines including information science and computer engineering. Topics include: logic, sets, relations, functions, complexity functions and big-O, congruences, induction and recursive definitions, elementary combinatorics, discrete probability, graphs, trees, vectors, matrices, linear equations, eigenvalues, Markov chains, and linear programming. **3 credits**

Prerequisites:

MATH 1950 or MATH 1930

Overview of Content and Purpose of the Course:

The purpose of this course is to develop mathematical foundations for information science and computer engineering. In addition, applications of mathematical principles to information science and engineering are presented. Student objectives include understanding theoretical underpinnings and applying principles to real-world problems.

Anticipated Audience/Demand:

Specifically designed for some majors in Engineering and Information Technology.

Major Topics:

1) Logic and Sets

- a. Propositional Calculus
- b. Predicates and Quantifiers
- c. Sets and Set Operations
- d. Applications to Information Science and Engineering

2) Relations and Functions

- a. Cartesian Product
- b. Equivalence Relations and Congruences
- c. Complexity Functions and Big-O

3) Induction and Recursion

4) Combinatorics

- a. Fundamental Counting Principle
- b. Combinations and Permutations

5) Discrete Probability

- a. Finite Probability
- b. Conditional Probability
- c. Random Variable and Distributions

6) Graphs and Trees

7) Vectors and Matrices

- a. Matrix Operations and Linear Equations
- b. Determinants and Eigenvalues
- c. Markov Chains

8) Linear Programming

- a. Geometric Approach
- b. Simplex Algorithm

Methods:

The course will be presented by lecture and class discussion.

Student Role:

Classroom attendance, participation, and completion of course requirements.

February 2016