FINITE DISCRETE MATHEMATICS FOR INFORMATION SCIENCE AND ENGINEERING MATH 2040

1.0

1.1 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.

1.2 For whom course is intended: Specifically designed for some majors in Engineering and Information Technology.

1.3 Prerequisite: MATH 1950 or MATH 1930

1.4 Unusual circumstances of the course: None

2.0 Objectives

2.1 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.

3.0 Content and Organization

3.1 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

4.0 Teaching Methodology

4.1 **Methods of Instruction:** The course will be presented by lecture and class discussion.

4.2 **Student role in the course:** Classroom attendance and participation. Completion of course requirements.

4.3 **Contact Hours:** 3

5.0 Evaluation

5.1 Evaluation will be based on examination results and outside projects including homework.

5.2 Approximate grading weights are 30% for final examination, 40% for regularly scheduled tests, and 30% for homework.

5.3 **Grading Scale**

97-100 = A+	93-96 = A	90-92 = A-
87-89 = B+	83-86 = B	80-82 = B-
77-79 = C+	73-76 = C	70-72 = C-

67-69 = D+ 63-66 = D 60-62 = D- 0-59 = F

6.0 Resource Material

6.1 Possible Texts:

1) *Discrete Mathematics*, by K. Rosen, 5th Ed., McGraw-Hill, 2002.

6.2 Other suggested readings:

1) *Finite Mathematics*, by Lipschutz and Schiller, Schaum's Outline Series, 2nd Ed., McGraw-Hill, 1997.

2) *Linear Algebra*, by S. Lipschutz, Schaum's Outline Series, 3rd Ed., McGraw-Hill, 2001.

6.3 Other sources: WEB sites:

www.mhhe.com/rosen
www.ams.org

6.4 Current bibliography of resources for student's information:

1) *Discrete Mathematics*, by Lipschutz, Schaum's Outline Series, 2nd Ed., McGraw-Hill, 1997.

2) *Finite Mathematics*, by Mizrahi and Sullivan, 8th Ed., John Wiley, 1999.

3) *Discrete and Combinatorial Mathematics*, by R.P. Grimaldi, Addison-Wesley, 4th Ed., 1999.

4) *Discrete Matematics with Applications*, by H.F. Mattson, Wiley, 1993.

5) *Applications of Discrete Mathematics*, by J.G. Michaels and K. Rosen, McGraw-Hill, 1991.

6) *Introductory Linear Algebra*, by B. Kolman, 6th Ed., Prentice-Hall, 1997.

7) *Linear Algebra and Its Applications*, by D. Lay, 2nd Ed., Addison-Wesley, 2000.