Study of theoretical bases of set theory, logic, techniques of proof, number systems, functions, relations, algorithms, graph theory, counting, permutations, combinations, binomial coefficients, recurrence relations, induction and recursion, and trees.

Prerequisite: MAT 161 or permission of instructor.

COURSE OBJECTIVES:
S: Use discrete set theory to illustrate fundamental properties of discrete mappings.
L: Use basic logic connectives in analyzing discrete arguments and forms of proof.
C: Use combinatorial counting techniques on discrete sets and their partitions.
A: Apply finite algebra techniques in understanding discrete structures and algorithms.

EVALUATION METHOD:
Homework: Students are expected to spend up to two hours of study per class hour, to keep a notebook of regularly assigned homework, and to show this work on request. Completion of regular homework will earn up to two "bonus points" for each of four units in the course, to be factored into the Final Exam score.
Note well: The successful student will attempt all of the assigned homework exercises and will seek help for any problems as they are encountered.

Quizzes: Informal quizzes and reviews will be given for each unit, but they will not be used as a factor in grading. [Option: Up to fifteen quizzes may be handed in for bonus points to be factored into final grade.]

Graded work: Each unit will have a "take-home exam" component consisting of selected graded-work problems, with variable (up to five) "bonus points" to be added to individual unit exam scores.
WORK NOT COMPLETED ON TIME OR NOT READABLE WILL REDUCE EXAM SCORES.

Exams: Four one-hour exams will be given on the following schedule: No make-up exams will be given. Sep 25; Oct 16; Nov 8; Dec 8.
Also, a comprehensive two-hour final exam will be given during the week of Dec 19, 2006.

Course grade: The three highest of the four unit exam grades and twice the grade on the final exam will determine the course grade. [This has the effect of counting the final in place of the lowest exam.] Letter grades will be assigned according to the following intervals:

\[
\begin{array}{cccccccccccc}
<60 | 60-62 | 63-65 | 66-67 | 68-69 | 70-76 | 77-79 | 80-82 | 83-86 | 87-89 | 90-92 | \geq 92 \\
F | D- | D | D+ | C- | C | C+ | B- | B | B+ | A- | A \\
\end{array}
\]

Exception: Students who achieve a total of 372 or more points on all four unit exams, with all work being completed on time, will be given an A for the course without taking the final.

ATTENDANCE POLICY: Regular attendance in class is expected. A daily record will be compiled but will not be used as a factor in grading.

Note: Campus Book Store has used copies of this old edition.
MAT251 Discrete Mathematics - Topical outline - Fall 2006


Foundations: Logic and Proof, Sets, and Functions, Chapter 1

1.1 Logic
1.2 Prepositional Equivalences
1.3 Predicates and Quantifiers
* 1.5 Methods of Proof
1.6; 1.7 Sets and Set Operations
1.8 Functions

Review of Chapter 1

Unit One Exam Sep 25

Integers, Matrices, Mathematical Reasoning, and Induction, Ch 2, and 3.1-3.3

2.4 The Integers and Division
2.5 Integers and Algorithms
2.6 Applications of Number Theory
2.7 Matrices
3.1 Proof Strategy
3.2 Sequences and Summations
3.3 Mathematical Induction [and Strong Induction]

Review of Chapter 2, and 3.1 - 3.3

Unit Two Exam Oct 16

Recursion, Counting and Discrete Probability, 3.4-3.5, Chapter 4, and 5.1

3.4 Recursive Definitions
3.5 Recursive Algorithms
4.1 The Basics of Counting
4.2 The Pigeonhole Principle
4.3 Permutations and Combinations
4.4 Binomial Coefficients
4.5 Generalized Permutations and Combinations
5.1 An Introduction to Discrete Probability

Review of 3.4 - 3.5, Chapter 4, and 5.1

Unit Three Exam Nov 8

Advanced Counting Techniques, Relations, Graphs, and Trees, Chapters 6, 7, 8.1, and 9.1

6.1 Recurrence Relations
6.2 Solving Recurrence Relations
6.5 Inclusion - Exclusion
6.6 Applications of Inclusion - Exclusion
7.1 Relations and Their Properties
7.3 Representing Relations
7.5 Equivalence Relations
8.1 Introduction to Graphs
9.1 Introduction to Trees

Review of Chapter 6, 7, 8.1, and 9.1

Unit Four Exam Dec 8

Review for Final

Final Exam