

Departmental Syllabus **Math 2730 -- Discrete Mathematics**

Textbook: Mathematics: A Discrete Introduction (Second Edition), by Edward Scheinerman

Prerequisites: MATH 2450 or 2530 or 2630 or 2640 with a grade of "C" or better, or mathematics proficiency level of 40.

Calculators: Graphing calculator required; TI-83, 84, 85, or 86 recommended. (NOTE: On occasion, individual instructors may restrict the use of any type of calculator).

Course Description: Logic, sets, combinations, relations, networks and algebraic structures.

Topics and sections to be covered:

Chapter 1: Fundamentals

1. Joy
2. Definition
3. Theorem
4. Proof
5. Counterexample
6. Boolean Algebra

Chapter 2: Collections

7. Lists
8. Factorial
9. Sets I: Introduction, Subsets
10. Quantifiers
11. Sets II: Operations

Chapter 3: Counting and Relations

13. Relations
14. Equivalence Relations
15. Partitions
16. Binomial Coefficients
17. Counting Multisets*
18. Inclusion-Exclusion*

Chapter 4: More Proof

19. Contradiction
20. Smallest Counterexample

21. Induction (Exercise 8 – Fibonacci numbers – is strongly recommended.)

Chapter 5: Functions

- 23. Functions
- 24. The Pigeonhole Principle

Chapter 6: Probability

- 29. Sample Space
- 30. Events
- 31. Conditional Probability and Independence
- 32. Random Variables
- 33. Expectation

Chapter 7: Number Theory

- 34. Dividing
- 35. Greater Common Divisor (Emphasize the recursive nature of Euclid's Algorithm.)
- 36. Modular Arithmetic

Chapter 9: Graphs

- 46. Fundamentals of Graph Theory
- 47. Subgraphs
- 48. Connection
- 49. Trees
- 50. Eulerian Graphs*
- 51. Coloring*

(32 core sections, 4 recommended sections)

(The selection of topics was chosen in consultation with the Computer Science / Software Engineering Department). Starred sections represent optional sections, which may be done in a given semester at the discretion of instructor(s).