Departmental Syllabus
Math 2730 -- Discrete Mathematics


Prerequisites: Math 2640 with a grade of "C-" or better.

Calculators: A scientific calculator (such as one of the TI-30 models) or a graphing calculator (such as the TI-83, 84, 85, 86 or the TI-Nspire with TI-84 keypad) is required. Calculators with Computer Algebra Systems (CAS), (e.g. the TI-89, TI-92 and TI-Nspire with CAS keypad, or their equivalent), are not allowed in any math classes. On occasion, individual instructors may restrict the use of any type of calculator.

Course Description: Logic, sets, combinations, relations, graphs, and discrete probability.

Student Learning Outcomes: Students should be able to:
- perform standard operations on fundamental discrete structures;
- count the elements of collections combinatorically;
- communicate mathematics using accurate language and notation; and
- identify and carry out appropriate proof strategies.

Topics and sections to be covered:

Chapter 1: Fundamentals
1. Joy
2. Speaking (and Writing) of Mathematics
3. Definition
4. Theorem
5. Proof
6. Counterexample
7. Boolean Algebra

Chapter 2: Collections
8. Lists
9. Factorial
10. Sets I: Introduction, Subsets
11. Quantifiers
12. Sets II: Operations

Chapter 3: Counting and Relations
14. Relations
15. Equivalence Relations
16. Partitions
17. Binomial Coefficients
18. Counting Multisets*
19. Inclusion-Exclusion*

Chapter 4: More Proof
20. Contradiction
21. Smallest Counterexample
22. Induction (Exercise 16 – Fibonacci numbers – is strongly recommended.)

Chapter 5: Functions
24. Functions
25. The Pigeonhole Principle

Chapter 6: Probability
30. Sample Space
31. Events
32. Conditional Probability and Independence
33. Random Variables*
34. Expectation*

Chapter 7: Number Theory
35. Dividing*
36. Greatest Common Divisor (Emphasize the recursive nature of Euclid’s Algorithm.)*
37. Modular Arithmetic*

Chapter 9: Graphs
47. Fundamentals of Graph Theory
48. Subgraphs
49. Connection
50. Trees
51. Eulerian Graphs*
52. Coloring*
53. Planar Graphs*
(28 core sections, 10 optional 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).

If you require an accommodation due to a disability, please make an appointment to see me as soon as possible to discuss arrangements for the accommodations. You will need a Verified Individualized Services and Accommodations (VISA) form from Services for Students with Disabilities.