Syllabus

Section E1: MWF 1:00 – 1:50 p.m., Noyes Lab 217

Text: Kenneth H. Rosen, Discrete Mathematics and Its Applications, McGraw-Hill, 7th edition.

Office hours: Monday 3:00 – 4:00 p.m. (258/269 CAB). Office: 243 CAB. Email: lmattos@illinois.edu

Prerequisites: Chapter 1 of the book. In general, we do no assume prior study, but mathematical maturity.

Resources: Electronic mail is a medium for announcements and questions. The course webpage also can help.

Exams: there are three midterms (evening 90 min exams, 100 points each) plus a final exam (200 points). The dates for the midterms are **February 17th, March 24th and April 21st**.

Final exam: 8:00 – 11:00 a.m., Tuesday, May 9.

Homework: weekly problem sets (5 to 10 problems). All of them will have the same weight at the end. The due dates will be normally Wednesdays before class. The 8 highest homework grades out of 9 count.

Homework Expectations: all assignments being turned in must be clear, legible and well-organized. All work must be shown and well-explained; a final answer without supporting work and explanation may be worth nothing. All assignments must be turned in order. Failure to abide by the homework expectations may result in the homework not being accepted or only receiving partial credit. If two homework have identical solutions to a problem, both works are discarded.

Typing Homework: For each homework, additional 2 points will be added for typing it (no need to type pictures).

Requirements: homework has 160 points (plus up to 16 points in total for typing the assignments), tests 300 points, final exam 200 points and participation in class activities up to 20 points. The total maximum is 696 points. The homework provides practice finding proofs and writing proofs; writing up the solutions is among the most effective ways of keeping up with the material in the course. The threshold for A+ is 620 points, for A is 590 points, for A- is 560 points, for B+ is 510 points, for B is 460 points, for B- is 410 points, for C+ is 360 points, for C is 310 points, for C- is 260 points, for D- is 160 points.

LIST OF TOPICS:

Chapter 2. Basic Structures
- Sets
- Set operations
- Functions

Chapter 2. Algorithms
- Algorithms: definition and examples
- The growth of functions
- Complexity of algorithms

Chapter 5. Induction
- Mathematical Induction
- Strong Induction and Well-Ordering

Chapter 6. Counting
- The Basics of Counting
- The Pigeonhole Principle
- Permutations and Combinations
- Binomial Coefficients and Identities
- Generalized Permutations and Combinations

Chapter 7. Discrete Probability
- An Introduction to Discrete Probability
- Probability Theory
- Bayes' Theorem
- Expected Value and Variance

Chapter 8. Advanced Counting
- Applications of Recurrence Relations
- Solving Linear Recurrence Relations
- Inclusion-exclusion
- Applications of Inclusion-exclusion

Chapter 9. Relations
- Relations and Their Properties
- Representing Relations
- Equivalence Relations

Chapter 10. Graphs
- Graphs and Graph Models
- Graph Terminology and Special Types of Graphs
- Representing Graphs and Graph Isomorphism
- Connectivity
- Euler and Hamilton Paths
- Shortest-Path Problems
- Planar Graphs
- Graph Coloring

Chapter 11. Trees
- Introduction to Trees
- Applications of Trees
- Tree Traversal
- Spanning Trees