

MATH 510 – 17370
Discrete Math

FALL 2007

MON, WED, FRI, CW129, 12:30–1:20

Instructor: Prof. Chris Pinner

Course Home-Page: <http://www.math.ksu.edu/~pinner/math510/>

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Probable Office Hours: MWF 10:30–11:30 or by appt.

Text: *Introductory Combinatorics*, Richard A. Brualdi, fourth edition, Prentice Hall.

Course Description. Combinatorics & graph theory. Topics selected from counting principles, permutations & combinations, the inclusion-exclusion principle, recurrence relations, trees, graph coloring, Eulerian & Hamiltonian circuits, block designs, and Ramsey Theory.

Grading Scheme.

Homework = 150 points.

Midterm 1 = 100 points

Midterm 2 = 100 points

Final Exam = 200 points

Exam 1 (to be confirmed): Wed Sep. 19.

Exam 2 (to be confirmed): Fri Nov. 2.

Final Exam: Mon Dec 10, 4:10-6:00pm, CW129.

Assignments. Weekly homework will be assigned in class and will be due in the homework box 5pm on Friday of the following week. Show all your work. Make sure you include your name and Math 510 on the front. The lowest homework score will be dropped. There will be no late homework or make-up exams. If you have to miss a test for a valid reason then your course grade will be determined from your remaining work (notify me as soon as possible).

General Information. If you have any condition such as a physical or learning disability, which will make it difficult to carry out the work as I have outlined it or which will require academic accommodations, please notify me in the first two weeks of class.

ROUGH COURSE OUTLINE

Ch 1. What is Combinatorics? (2 lectures)

Ch 2. Pigeon Hole Principle (3 lectures)

2.1 Pigeonhole principle: simple form

2.2 Pigeonhole principle: strong form

2.3 A theorem of Ramsey

Ch 3. Permutations & Combinations (5 lectures)

3.1 Two basic counting principles

3.2 Permutations of sets

3.3 Combinations of sets

3.4 Permutations of multisets

3.5 Combinations of multisets

Ch 5. The Binomial Coefficients (5 lectures)

5.1 Pascal's formula

5.2 The binomial theorem

5.3 Identities

5.5 The multinomial theorem

5.6 Newton's binomial theorem

Ch 6. The Inclusion-Exclusion Principle (5 lectures)

6.1 The inclusion-exclusion principle

6.2 Combinations with repetitions

6.3 Derangements

6.4 Permutations with forbidden positions

6.5 Another forbidden position problem

Ch 7. Recurrence Relations & Generating Functions (5 lectures)

7.1 Some number sequences

7.2 Linear homogeneous recurrence relations

7.3 Nonhomogeneous recurrence relations

7.4 Generating functions

7.5 Recurrences & generating functions

Ch 11. Introduction to Graph Theory (5 lectures)

11.1 Basic properties

11.2 Eulerian trails

11.3 Hamilton chains & cycles

11.5 Trees

Ch 9. Matchings in Bipartite Graphs (5 lectures)

9.1 General problem formulation

9.2 Matchings

9.3 Systems of distinct representatives

9.4 Stable marriages

Ch 12. Digraphs & Networks (3 lectures)

12.1 Digraphs

12.2 Networks

Ch 13. More on Graph Theory (3 lectures)

13.2 Plane & planar graphs

13.4 Independence number & clique number