MATH 227 — Combinatorics

Syllabus and Course Procedures   Spring 2013

Instructor   Brian D. Jones
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Office Hrs
   Mon 1-2
   Tue 9-11
   Wed 1-2
   Fri 8-9

Text Materials   Applied Combinatorics, 2nd ed., by Fred S. Roberts and Barry Tesman, CRC Press (2009).

Course Material   The following is a rough section list and approximate order. Some sections may be omitted or abbreviated to accommodate our tight time schedule, and some sections may not require written homework.

Chapter 1 What is Combinatorics?
- 1.1, 1.2 (1 day)

Chapter 2 Basic Rules of Combinatorics
- 2.1, 2.2 (1 day)
- 2.3, 2.4 (1 day)
- 2.5, 2.6, 2.7 (1 day)
- 2.8, 2.9 (1 day)
- 2.10 (1 day)
- 2.11, 2.13 (1 day)
- 2.14 (1 day)
- 2.19 (1 day)

Chapter 3 Introduction to Graph Theory
- 3.1 (1 day)
- 3.2 (1 day)
- 3.3 (2 days)
- 3.4 (1 day)(*)
- 3.5 (3 days)
- 3.7 (1 day)
- 3.8 (1 day)

Chapter 5 Generating Functions and Their Applications
- 5.1 (1 day)
- 5.2 (1 day)
- 5.3 (1 day)
- 5.4 (1 day)
- 5.5 (1 day)
- 5.6 (1 day)(*)

Chapter 6 Recurrence Relations
- 6.1 (1 day)
- 6.2 (1 day)
- 6.3 (2 day)
- 6.4.1,4 (1 day)(*)

Chapter 7 The Principle of Inclusion and Exclusion
- 7.1 (1 day)
- 7.2 (1 day)

Chapter 13 Optimization Problems for Graphs and Networks
- 13.1 (1 day)
- 13.2 (1 day)
- 13.3 (2 days)

Chapter 9 Combinatorial Designs
- 9.1 (1 day)
- 9.2 (1 day)

(*) may be omitted for timeliness

Course Grade   Your course grade will be determined using a weighted average* as follows:

Reading Exercises	6 %	
Homework Assignments**	26 %	
Discrete Math Paper	12 %	
Midterm Exam 1		
In-Class Portion	7 %	Wednesday, February 20
Take-Home Portion	9 %	February 20-22
Midterm Exam 2		
In-Class Portion	7 %	Wednesday, April 17
Take-Home Portion	9 %	April 17-19
Final Exam	24 %	Tuesday, May 7, 8:30 - 11:30 am

* Grading scale is *approximately*: A (90-100), B (80-90), C (70-80), D (60-70), F (below 60)
** I will drop your lowest homework score before calculating your final course average

Reading Exercises   Readings in the text over a certain topic are to be done before the class period at which the topic is discussed. To motivate and reward a student in keeping up with the readings I will assign usually one small exercise or question for a student to address while they are doing the reading. The student then will submit a brief write-up of the reading exercise at the beginning of the relevant class period. The reading exercises will be posted either on the course web page or via email. Because all of us get bogged down, sometimes text readings understandably take lower priority to exam preparation, paper writing, etc. Therefore, you will only need to submit 80% of the reading exercises, and so you can afford to blow off 20% of the reading exercises. I estimate there will be about 25 reading exercises.

Written Homework Assignments   Homework exercises will be assigned and collected frequently (typically at least one assignment per week.) You are encouraged to discuss problem concepts and solution techniques with your fellow students, but your final homework reports must be your own work. Homework solutions should be legible and presented in a logical fashion, with problem number clearly indicated. Messy work that is difficult to follow may receive no credit. Although this is a mathematics course, you should often accompany your mathematical work with explanations and ideas written in complete sentences. Excellent performance on written homework is the most important indicator of success in this course. The payback from hours of hard work on homework assignments will be a deeper understanding of combinatorics and, ultimately, the likelihood of a high grade in the course.

Discrete Math Paper   You will write one mathematical paper in this course. Did he say mathematical paper? Yes — expressing your ideas in writing is important in any discipline, including mathematics. The discrete mathematical paper will entail a detailed exposition of some mathematical concept, problem, or in-class activity, or a combination of these. More details will be provided in the early weeks of the semester.

Midterm Exams   There will be two midterm examinations. Each exam will consist of two parts — an in-class portion and a take-home portion. The in-class portion will focus on knowledge and conceptual understanding, with some problem-solving. The extra time afforded by the take-home portion allows for more challenging and extensive problem-solving.

Final Exam   The final exam will be a three-hour in-class exam covering the material for the entire course.

Class Attendance and Participation   You are expected to attend every class — as with all courses, it is very difficult to catch up if you miss a class. I don't keep formal attendance records but with only eight to ten people in the class, we definitely miss a student when they are absent. The most effective way to learn is to actively participate in classroom lectures, activities, and discussions. Though attendance and participation are not formally calculated into your course grade, these will be taken into account in borderline grading decisions.

Mathematical Software and Technology   There is no formal technology-based component of the course, but some of our calculations will be aided and accelerated by algebraic software like Maple, and I will sometimes present in class some simple Maple programs. For the day-to-day calculations you'll use for combinatorial problems, a simple hand calculator capable of handling computations with transcendental functions will often suffice.

Late Policy   All assignments must be turned in at the beginning of the class period on the assigned due date, unless specified otherwise by the instructor. No credit will be given to unexcused late papers. If you have a conflict due to illness or sports, e-mail me right away.

Academic Honesty   Any work you submit for credit in this course must result directly from your own understanding, thoughts, and ideas. Presenting the work of others as your own in strictly prohibited.

Disabilities   If you have any disability and therefore may have need for some type of accommodation in order to participate fully in this class, please feel free to discuss your concerns in private with Erin Salva, Coordinator of Disability Services (phone 5145).