

Math 4410 syllabus, Fall 2010

The textbook is *A Course in Combinatorics*, Second Edition, by J.H. van Lint and R.M. Wilson. We will cover about 1/4 of the book.

The easiest way to contact me outside of class is via e-mail: adf55@cornell.edu I also have a math department e-mail: froh@math.cornell.edu The latter is forwarded to the former, so I'll get any e-mail sent to either address.

My office is Malott 581. My office hours are 1:30-2:20 pm on Mondays and 12:30-1:20 pm on Tuesdays and Thursdays. The TA for this course is Yash Lodha. His office hours are from 10 am-noon on Wednesdays in Malott 218.

There will be twelve homework assignments, with one due most Thursdays. Most homework assignments have five problems taken from the book. You are required to do four of the problems, unless specified otherwise. You can choose which four you wish to do.

The problems in the book tend to be fairly challenging. There are hints in the back of the book to point you in the right direction. You can freely follow the hints or ignore them.

Each student in this course is expected to abide by the Cornell University Code of Academic Integrity. Any work submitted by a student in this course for academic credit will be the student's own work. You may work on homework individually or in groups. Regardless of how you solve the problems, however, each student must write-up his own solutions in his own words, rather than copying off of someone else.

Late homework will not be accepted for credit. A homework assignment is considered late if I don't have it by the time I leave for the day on the day it is due. Homework is intended to be turned in during class, and if you skip class on a day that homework is due and try to turn it in later that day, you take a serious risk of being unable to do so and having the homework count as late.

Your lowest two homework scores will be dropped. A completed late homework will be eligible to be dropped. If a homework is late, then it does not matter how late it is, except that no further late homeworks will be accepted after the final. A homework assignment that is never turned in will not be dropped.

If you must be absent on a day when homework is due, you can turn it in early or give it to someone else to bring to class. In case of unexpected reasons to miss class that could not be planned ahead of time, you can turn in the assignment later and use your drop.

There will be three exams. This includes two mid-terms, both on Thursdays. There will also be a final during finals week, which will basically be treated as a third mid-term. Exams will not be cumulative in the sense that all problems will include material dealt with after the previous exam, though it is the nature of mathematics that material covered after the first mid-term may require you to understand material covered earlier. It is the nature of this course that we jump around from one topic to another, so that the later material depends on earlier material less than in most mathematics courses.

Calculators and other electronic devices are not allowed on exams. As with

most upper level math courses, a calculator wouldn't be terribly useful anyway, except perhaps as a way of storing notes. You may use such electronic devices for help with homework if you like, but they will never be necessary and typically won't be useful.

If you have to miss an exam, let me know as soon as possible, ideally before the exam. If you have a legitimate reason to be absent, we can work something out.

If you want something regraded, you must turn it back in and ask for a regrade within a week of the first time I attempted to return it graded. Write a note on a separate sheet of paper explaining what you did and why you think you deserve more points than you were given. Points will only be added in case of grader error.

You must show your work on homework and exams. The correct answer with no justification may not get much credit.

The final course grades will be curved, after adding everything together. Homeworks will count for 34% of your grade, while each exam will count for 22%.

Schedule and homework assignments:

Homework #1 (due September 2):

Chapter 1 B, C, F, G, I

Homework #2 (due September 9):

Chapter 2 A, B, D (both), E

There are two separate problems that the book labels 2D, on pages 18 and 22 respectively. Both are assigned as separate problems on this assignment.

Newer printings of the book seem to fix this numbering problem. The last three problems assigned start with "Here is a variation", "A *graceful labeling* of a tree", and "Suppose a tree G has exactly", respectively. That should uniquely identify the problems in whatever printing of the book you get.

Homework #3 (due September 16):

Chapter 3 C, D, E, H, J

Homework #4 (due September 23):

Chapter 4 B, D, E, F

Additional problem: Suppose that a graph has 10 vertices, but does not have any clique on five vertices. What is the maximum number of triangles that the graph could have?

First exam: September 23

The first exam will cover chapters 1-4.

Homework #5 (due October 7):

Chapter 5 A, C, D, E, G

Homework #6 (due October 14):
Chapter 6 A, B, C, D, E

Homework #7 (due October 21):
Chapter 7 A, B, C, D, F

Homework #8 (due October 28):
Chapter 8 B, C, D

You are required to do all three of the problems for this assignment. If I assigned all four and told you to pick three, these are the three you would pick, anyway.

Second exam: October 28

The second exam will cover chapters 5-8.

Homework #9 (due November 11):
Chapter 10 A, B, C, F, G

Homework #10 (due November 18):
Chapter 13 A, C, D, F, K

Problem F asks you to show something in two different ways. You may pick either way and only show it one way.

Problem K is incorrect as stated in the book. $S(n, n - 2)$ should read $S(n + 2, n)$. In other words, the entire problem should read as

Problem 13K. Prove that $\sum_{n=1}^{\infty} S(n + 2, n)x^n = \frac{x(1+2x)}{(1-x)^5}$.

Homework #11 (due December 2):
Chapter 14 G, H, I, J, N

Homework #12 (never due):
Chapter 15 A, D, E

The statement of (15.2) in the book is incorrect. The sum should start at $s = 0$, not at $s = 1$.

You do not have to turn this assignment in. Rather, it is merely some suggested problems to prepare for the final. We will only cover part of chapter 15, and how much we cover will depend in part on how much time we have.

Final exam: December 14

The final exam will cover chapters 10, 13, 14, and part of 15. How much of chapter 15 is covered will be explained on the last day of class; it will basically consist of whatever there is time to cover in class. The officially slotted final exam time is 7-9:30 pm.

The room has not yet been determined. It will be determined at some point during the semester, and likely posted at <http://registrar.sas.cornell.edu/Sched/finals.html>. At the time this syllabus was posted, that link gave the final exam room assignments for Spring 2010.