

Math 343 – Combinatorics (Spring 2009)

Instructor: Kevin Woods, King 220B, Kevin.Woods@oberlin.edu

Class: MWF 1:30-2:20, King 121.

Office Hours:

Monday 11am-12pm, Tuesday 1:30-3pm, Wednesday 9:30-10:30am, Friday 2:30-3:30pm. Also, feel free to stop by any time my door is open (but be understanding if I say I am too busy), or you can make an appointment via email.

Required Textbook:

Enumerative Combinatorics Through Guided Discovery, by Kenneth Bogart. The only place to get this is (free!) online:

http://www.math.dartmouth.edu/archive/kpbogart/public_html/ComboNotes3-20-05.pdf

We will tentatively cover Section 1.2; Chapters 3, 4, 5, and 6; and Appendix C. If we have time, we'll explore some more topics. You will want to bring printout of the section we're currently covering to class, or a laptop with a copy is also fine.

Course Outline:

You'll notice when you look at this book that it consists of less theorem/proof text and more problems. This will basically be a class on "counting things" in cool and progressively harder ways. Unlike several other upper level math classes, we're not building up to major theorems; rather, the core of the class is developing different tools for counting, and the best way to learn to use those tools is by working problems. So the class will have a large interactive component, with you working problems and presenting solutions to the class.

Other Recommended Books (all on reserve):

Brualdi, *Introductory Combinatorics*. *A nice, easy-to-read book that covers much of what we'll do.*

Bogart, *Introductory Combinatorics*. *Another good survey book, especially for generating functions.*

Wilf, *generatingfunctionology*. *A great book for all things generating function.*

Stanley, *Enumerative Combinatorics*, volume 1. *The bible. Harder to read, but dense with information and with problems.*

Aigner, *A Course in Enumeration*. *Another hard book, but explains things well.*

Stanton and White, *Constructive Combinatorics*. *Very readable, though doesn't cover many of the things we'll do. Chapter 3 has lots of nice bijections, and Chapter 4 covers involutions, a topic I hope we can hit at the end of the semester.*

Blackboard:

<http://bb.oberlin.edu>. I will post homework, reading, and other announcements on Blackboard.

Grading:

Presentations and participation (40%),

Two Take-Home Midterms (20% each),

Final Exam (20%).

Presentations and participation (40%).

Much of the class period will be spent on student presentations. We will generally work through each chapter in order (harder problems may sit around unsolved for awhile, but we'll get them!).

Everyone should come to class each day prepared to present **at least one problem**. I'll do a combination of calling on specific people and asking for volunteers.

When one person is presenting, every student in the class has a responsibility. Ask yourself, “Is this presentation correct, and is it clear?” Your notes from class will be your primary source for the material, so it is important that they be good.

Two things go without saying (yet I’m saying them anyway). Firstly, all of this must take place in an atmosphere of respect and encouragement: we have to create an environment where it is ok to tell someone that you think they are wrong or unclear without offending them. Secondly, you cannot participate if you are not here and here on time. I understand that you may have to miss a class or two. Excessive absences or lateness will hurt this portion of your grade.

Take-home midterms (20% each).

Tentatively due Monday, March 16 and Monday, April 27. These will be open book, and you’ll get several days to work on them. I’ll give you more information as the time approaches.

Final Exam (20%).

Wednesday, May 13, 9-11am. The final exam will cover the entire course. It will be closed book, but you will be able to use something like an 8.5x11 sheet with notes.

Working, and working together:

You will get out of this class what you put in it (cliché, but especially true in this class). To me, this means doing the following day-to-day:

- Attempt every problem before it is presented on the board (you will probably not solve every single one ahead of time, but the more work you put into that, the better at combinatorics you will become).
- You’re required to come every day with a problem ready to nicely present. More than one is great! If you’re having problems, please stop by: I’m happy to help.
- Actively listen when someone is presenting. You should be asking yourself, “Is their presentation correct and clear?” If it isn’t, we should discuss it as a class afterwards.
- Look back at your notes after class and fixing them so that you have a careful solution to the problems that you will be able to comprehend later (say, exam time). To encourage this, some questions on the midterm exams will be problems that have been presented in class.
- Math goes much easier with someone else around to bounce ideas off of. I strongly encourage you to work together! This will help you keep up with the material and to have a problem ready to present each day.

Honor Code:

I encourage you to work together (except for the midterms and final). You may use outside textbooks and sources to **review** previous material. I’ve put several books on reserve, and I’m happy to help you find the material in these and other texts. You **may not** look for solutions to problems you are currently working on. We’re effectively creating our own text with theorems and our own proofs, so it would be cheating to read one someone else has already written!

Disabilities:

If you have a disability of any sort that may affect your performance in this class, please consult with me and with Jane Boomer in the Office of Disability Services. All requests for accommodation must go through that office.