

MA530 Syllabus

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MA 530 – Fall 2010
Discrete Mathematics I
Text: “A Course in Combinatorics”
by J. H. van Lint and R. M. Wilson
Meetings: 5:30–8:20pm Wednesdays, SH202

Since the advent of the digital computer, discrete mathematics has emerged from its vulgar beginnings as recreational mathematics to become a vibrant, widely applied and important part of mathematics. In recent decades, what seemed like a “bag of tricks” has congealed into a deep and powerful theory. Our intent is to sample a few of the most interesting and important topics in combinatorics, but we will give more than cursory attention to the questions we encounter. Indeed, in view of the maturity of the participants, we will have time to delve deeply into a variety of combinatorial topics of interest.

Each student in the course shall maintain a portfolio of his or her work. In the course of the semester, s/he will complete (and perhaps refine) solutions to thirty problems from the text and from class. In addition, each student will complete a project on a topic chosen from a prepared list and will have the option to give an oral presentation on this project. In this way, the student will benefit from both a general survey of topics in discrete mathematics and an in-depth research experience concerning a topic of personal interest.

TERM SCHEDULE

Here is a rough outline of what we will cover in the 14 Wednesday evening meetings:

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|------------------|---|-------------|
| Part I: | Graphs and Applications
Chapters 1–8 | (4 weeks) |
| Part II: | Combinatorial Enumeration
Chapters 10, 13–15 | (3 weeks) |
| Part III: | Combinatorial Designs and Applications
Chapters 17–20, 23–25 | (4 weeks) |
| Part IV: | Topics in Graph Theory [as time permits]
Chapters 33–37 | (< 4 weeks) |

WORKLOAD

Each student is expected to attend and participate in every scheduled class meeting.

Each week, a number of exercises will be assigned for students to complete on their own or in groups. Most weeks, five exercises will be assigned for credit. These are to be completed individually and submitted the following Wednesday for course credit.

Before Wednesday, December 8, each student will submit a project on a topic chosen from a prescribed list. This project will involve reading research papers and/or advanced monographs and must contain some detailed proofs. Extra credit will be given for students who give oral presentations on their work.

We will have a one-hour midterm exam on Wednesday, October 27. There will be a comprehensive take home exam due on Wednesday, December 15.

Your grade will be based on the four activities listed above.

INFORMATION ON THE WEB

The course web page is

<http://www.wpi.edu/~martin/TEACHING/current.html>

ACADEMIC HONESTY

Each student is expected to familiarize him/herself with WPI's Academic Honesty policies which can be found at

<http://www.wpi.edu/offices/policies/honesty>

All acts of fabrication, plagiarism, cheating, and facilitation will be prosecuted according to the university's policy. If you are ever unsure as to whether your intended actions are considered academically honest or not, please see me.

STUDENTS WITH DISABILITIES

Students with disabilities who believe that they may need accommodations in this class are encouraged to contact the Disability Services Office (DSO) as soon as possible to ensure that such accommodations are implemented in a timely fashion. The DSO is located in Daniels Hall, (508) 831-5235.

If you are eligible for course adaptations or accommodations because of a disability (whether or not you choose to use these accommodations), or if you have medical information that I should know about please make an appointment with me immediately.

RESOURCES:

- *“Graph Theory with Applications”* by J. A. Bondy and U. S. R. Murty (Elsevier, 1976)
- *“Graph Theory” (2nd ed.)* by R. Diestel (Springer GTM #173, 2000)
- *“Enumerative Combinatorics, Vol. I”* by R. P. Stanley (Cambridge, 1997)
- *“Generatingfunctionology”* by H. S. Wilf (Academic Press, 1994)
- *“Designs, Graphs, Codes and their Links”* by P. J. Cameron and J. H. van Lint (Cambridge, 1991)
- *“Combinatorics: Topics, Techniques, Algorithms”* by P. J. Cameron (Cambridge, 1994)
- *“Discrete Mathematics”* by N. L. Biggs (Oxford, 1985)