

## Mathematics 796, Spring 2008 (Section #78865) Topics in Algebraic Combinatorics (3 credits)

**Instructor:** Prof. Jeremy Martin (you can call me “Jeremy”)

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Office: 541 Snow Hall, (785) 864-7114

Office hours: Tue 11:00–12:00 and Wed 2:00–3:00, or by appointment

**Meeting times:** MWF 12:00 – 12:50 PM, 408 Snow Hall

**Course description:** Math 796 will cover fundamental topics in algebraic combinatorics including some or all of the following: partially ordered sets, lattices, matroids, combinatorial optimization, hyperplane arrangements, oriented matroids, and symmetric functions.

**Course website:** <http://www.math.ku.edu/~jmartin/math796/>

**E-mail:** I will periodically send class information (announcements, homework hints, etc.) to all students’ KU e-mail accounts. You are responsible for checking your e-mail regularly so as to receive this information.

**Prerequisites:** Math 724 (Enumerative Combinatorics), or permission of the instructor. In particular, you should be very comfortable with reading and writing proofs and with basic counting techniques, and reasonably comfortable working with generating functions.

**Books.** All of these can be perused in Jeremy’s office. The official textbook is #1 in the list below; however, you may want to substitute #3, whose material is a bit closer to what will be covered in the class. (All the homework assignments will be self-contained.) You should definitely obtain #4 and #5, which are free downloads.

- (1) R.P. Stanley, *Enumerative Combinatorics, vol. I*. Cambridge Univ. Press (Cambridge Stud. Adv. Math., 49), 1997. (Enumeration; posets and lattices; generating functions; lots of exercises)
- (2) R.P. Stanley, *Enumerative Combinatorics, vol. II*. Cambridge Univ. Press (Cambridge Stud. Adv. Math., 62), 1999. (Exponential generating functions; symmetric functions)
- (3) M. Aigner, *Combinatorial Theory*. Springer (Classics in Mathematics), 1997 (reprint of 1979 original). (Enumeration; posets, lattices, and matroids)
- (4) R.P. Stanley, *Hyperplane arrangements*. (Lecture notes, freely available online; link on webpage)
- (5) A. Schrijver, *Combinatorial optimization*. (Lecture notes, freely available online; link on webpage)
- (6) T. Brylawski and J. Oxley, *The Tutte polynomial and its applications*. Chapter 6 of *Matroid applications*, N. White, ed., Cambridge Univ. Press (Encyc. Math. Appl., 40), 1992.
- (7) B. Sagan, *The Symmetric Group*, 2nd edn. Springer (Graduate Texts in Mathematics, 203), 2001. Contains material on symmetric functions.

**Coursework** will consist of problem sets, a midterm exam, and either a final project OR a final exam.

- *Problem sets* will be due every other Friday, starting February 1. I’ll post problems on the website, typically at least a week in advance. You are encouraged to collaborate with other students, but you must write up the problems by yourself and acknowledge all collaborators. Homework is worth 50% of your final grade.
- The *midterm exam* will be in class, probably on Friday, March 14 (the day before spring break). The exam is worth 20% of your final grade.
- You have a choice between a *final project* — reading a research paper or papers, giving a short talk to the class, and writing an expository summary of what you’ve learned — or a *final exam*, which is scheduled for Thursday, May 15, from 10:30 AM–1:00 PM. Please discuss with me whether it would be more suitable for you to do a final project or take the final exam; this depends on your student level, background, and future plans. This is worth 30% of your grade.

**Blatant shill:** Please attend the Combinatorics Seminar, which meets Wednesdays from 3–4 in Snow 408.

**Makeup work:** If, for some legitimate and unavoidable reason, you are unable to turn in a homework assignment on its due date or to attend a scheduled test, midterm or final exam, notify me *in advance* to make appropriate arrangements.

**Incompletes:** A grade of I is a rare occurrence and is reserved for cases in which a student has completed most of the course work at an acceptable level, but is prevented from completing the course due to *extraordinary* circumstances. If you think an I may be warranted, consult me *before* the final exam. Note that a grade of I cannot be made up by taking the course again.

**Drop policy:** According to the Registrar's website, drop periods for Spring 2008 are as follows:

*Through February 7:* You can drop online; the course will be erased from your record.

*February 8 to April 17:* You need my signature to drop, and will receive a grade of WP or WF depending on your coursework up to that point.

*After April 17:* Dropping is no longer permitted.

**Academic honesty and collaboration:** You are required to abide by all KU policies on academic integrity. Cheating, plagiarism or other academic misconduct will result in a failing grade on the assignment in question, and usually further disciplinary sanctions, possibly including a failing grade in the course. For more information, see the official KU policies on issues involving academic honesty, available online at <http://www2.ku.edu/~unigov/usrr.html#art2sect6>

**Students with disabilities:** The KU Office of Disability Resources (22 Strong Hall; 785-864-2620 (V/TTY); <http://www.disability.ku.edu>) coordinates accommodations and services for all students who are eligible. If you have a disability for which you wish to request accommodations, please contact Disability Resources as soon as possible. Please also contact Prof. Martin privately in regard to your needs in this course.

**Intellectual property:** Course materials prepared by the instructor, together with the content of all lectures and review sessions, are the intellectual property of the instructor. Video and audio recording of lectures and review sessions without the consent of the instructor is prohibited. Upon reasonable request, the instructor will usually grant permission to record lectures, on the condition that such recording is used only as a study aid by the student making the recording, and is not modified or distributed in any way.