Math 524 – Combinatorics I

Fall 2013, TuTh 1:30– 2:45 PM, 331 Dabney Hall
Instructor: Seth Sullivant, office: SAS Hall 3114, email: smsulli2@ncsu.edu, Phone: 919-513-7445
Office Hours: Tu 3:00–4:00 PM, W 2:00-3:00 PM, or by appointment
Prerequisites: No official prerequisites but "Mathematical Maturity" is a must. Linear algebra at the level of MA 405 will be very helpful.
Recommended Text: DJA Welsh, Matroid Theory, Dover, ISBN: 0486474399
Course Website: http://www4.ncsu.edu/~smsulli2/MA416_Spring2013/MA416.html
Course Description: Combinatorics is the part of mathematics concerned with discrete structures and finite sets. Anytime we need to answer the question "how many ways are there to do X?" we are usually solving a combinatorial problem. These discrete structures arise in more than just counting problems, and combinatorial reasoning pervades modern mathematics. This is the first course of a year-long series on combinatorics. The first semester will be on algebraic and enumerative combinatorics and the second semester will focus on geometric combinatorics. Main topics for the fall semester are:

- Fundamental Counting Problems and Techniques including "Balls in Boxes", Binomial and Multinomial Coefficients, Generating Functions, Partitions, Permutations, Sieve Methods (6 weeks)
- Partially Ordered Sets (4 weeks)
- Matroids (4 weeks)

Homework: Homework will be assigned weekly and is due in class on Thursday, unless otherwise indicated. Students must write up their own solutions. Working with other students is allowed, however, you must first attempt all problems on your own before discussing solutions with other students. Limit your group size to at most four students. Each student must write up their own solutions. Please indicate on your homework any sources that you used in preparing solutions (e.g. any groups members you worked with or discussed the problems with, if another student helped with a solution, or you found the solution in a book).

It is acceptable to use other sources besides the course notes and the text to aid your learning. However, using another student’s homework solutions from previous courses, online homework solutions from courses at other universities, or copying the solutions out of books are unacceptable sources for preparing your homework, and violate the university’s academic integrity policy.

Students are encouraged to prepare homework solutions in LateX. Homework assignments can be found at the course website as well as information on preparing your homework in LateX.

Policy on Late Homework: Homework is due in class on Thursdays, unless otherwise indicated. Late homework will be accepted up to Friday at 5 PM of the week it was due,
either to my mailbox, delivered to me in person, or by email and will received 80% of the points. **Any homework turned in after Friday at 5 PM will receive a zero.** If you must miss a class on the day a homework is due and you want full credit, it is your responsibility to get the homework to me by the beginning of class on Thursday. This could be delivered to my mailbox, delivered to me in person, turned in by another student, or by email.

**Quizzes:** There will be two 20-minute quizzes. Each quiz will be worth 5% of your grade. The quizzes will cover basic definitions and theorem statements only. The quizzes will be on September 24 and November 19.

**Exams:** There will be one in-class midterm exam and an in-class final exam. The midterm will be on October 8. The final exam will take place in the usual classroom from 1-4 PM on Thursday, December 12.

**Grades:** Grades will be based on Homework (40%), Quizzes (10%), Midterm (20%), and Final Exam (30%). Grades are based on the following scale: A: (> 85%), B: (70-85 %) C: (60-70%) D-F: (< 60%).

**Attendance:** Participation in class activities, group work, and class discussions will be a key contributor to your understanding of the material. To encourage your participation, I will provide up to one third of a letter grade "bonus" to students that attend regularly and participate actively in group work in class (fyi: one third of a letter grade means B would become B+, B+ would become A-, etc.).

**Adverse Weather:** Announcements regarding scheduled delays or the closing of the University due to adverse weather conditions will be broadcast on local radio and television stations and posted on the University homepage.

**Electronic Devices:** You may use your electronic devices in class as long as it is not distracting to the other students or me. (Warning: I get distracted very easily.) Acceptable: Using a tablet to take notes. Unacceptable: Answering your phone in class, typing on a laptop.

**Academic Integrity Statement:** Students are required to follow the NCSU policy. “Academic dishonesty is the giving, taking, or presenting of information or material by a student that unethically or fraudulently aids oneself or another on any work which is to be considered in the determination of a grade or the completion of academic requirements or the enhancement of that student’s record or academic career.” (NCSU Code of Student Conduct). The Student Affairs website has more information.

**Students with Disabilities:** Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State’s policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.01).

**Class Evaluations:** Online class evaluations will be available for students to complete during the last two weeks of class. Students will receive an email message directing them to a website where they can login using their Unity ID and complete evaluations. All evaluations are confidential; instructors will never know how any one student responded to any question, and students will never know the ratings for any particular instructors.