MAT 375-001 COMBINATORICS FALL 2011 COURSE INFORMATION

INSTRUCTOR:	Dr. K. Spackman
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	(This course information sheet is available now on my Web site. As the course proceeds, additional information and links will be added.)
OFFICE HOURS:	MWF 1:00-1:50, TR 11:00-12:00, or by appointment.
	(Actually, I'm available at many other times. Check with me after class, by phone or e-mail, and we'll set up a mutually convenient time to meet.)
CLASS MEETINGS:	TR 9:30-10:45 in BR 164
TEXT:	<i>Applied Combinatorics,</i> 5 th ed., Alan Tucker, 2007

LEARNING OBJECTIVES: The goal of the course is to learn what combinatorics is, some of its techniques, and many of its applications. In brief, combinatorics is the art and science of counting. There are seven specific learning objectives for the course.

By the end of the course, you will be able to:

- Use the principles of combinatorial reasoning to solve existence, optimization and enumeration problems
- Select and apply appropriate models, formulas, tests and algorithms in problem-solving
- Use the computer software *MAPLE* both for routine combinatorial calculations and for manipulation of generating functions and recurrence relations
- Demonstrate a good understanding of combinatorial concepts and how they are used in a variety of applications
- Construct both graph models and enumeration models to apply the principles of combinatorics to real-life problems
- Correctly use combinatorial terminology both orally and in writing
- Construct short mathematical proofs of basic principles in combinatorics

Achievement of these objectives will require each student to solve lots and lots of problems.

COURSE CONTENT: The course comprises two main topics: graph theory and enumeration. We will cover most of Chapters 1-8 and Appendix A.4 of the text. A tentative syllabus of topics is attached.

- COMPUTER USE: Most of the course topics do not really lend themselves to computer use. However, we will make occasional use of the mathematical software *MAPLE*, and possibly some additional applications and Web resources, for classroom demonstrations, homework and tests. The purpose of using the computer is primarily to implement tedious methods of calculation—the computer will never be used to replace reasoning—and to facilitate visualization of graph algorithms.
- TESTS: There will be two in-class tests and a final exam. The in-class tests will be announced at least one week in advance. (Approximate dates are Thursday, Oct. 6, and Tuesday, Nov. 15.) Ordinarily, no make-up tests will be given. If you foresee that you cannot avoid missing a test, notify me before the missed test. The final exam will be comprehensive, but will be weighed more heavily toward the second part of the course (enumeration) beginning with Chapter 5. The final exam is scheduled for Tuesday, December 13, 2011, from 8:00 11:00 am.
- HOMEWORK: Suggested homework will be assigned after each class period. Additional written assignments will be collected approximately weekly, corrected, graded, and returned. The hand-in homework will require considerable time and thought, but the work must be your own.

ATTENDANCE: Attendance at each class is expected. Absences must be kept to a minimum for success in the course.

GRADING: Your final grade will be determined according to the following weighting.

Test 1	25%
Test 2	25%
Final Exam	30%
Combined homework	20%

- PLUS/MINUS GRADING: A plus or minus will be used as a possible grade modifier for final grades <u>only</u>, at the end of the semester. Factors that influence the judgment to assign a + or (or neither) are: performance on the final exam, consistency of performance throughout the semester, proximity to a grade borderline, class participation and effort.
- INCOMPLETES: A grade of I (incomplete) is given only if documented circumstances beyond the student's control (e.g., medical, legal) render the student unable to complete the course work and only if there is a reasonable possibility of passing the course. The grade I is not given for simply failing to meet the course requirements.
- ACADEMIC HONESTY: Collaboration and discussion is encouraged on "suggested homework" problems. <u>Homework assigned to be handed in must be done individually</u>; that work must be your own. All tests are to be done without collaboration and without the aid of books or notes; calculators of any type are permitted and portions of the tests may require individual use of the computer. The Academic Honor Code (see the UNCW Code of Student Life) applies at all times, and rests on this principle: "It is ... this institution's stated policy that no form of dishonesty among its faculty or students will be tolerated." All students are expected to read and abide by the Academic Honor Code.
- STUDENTS WITH DISABILITIES: If you have a disability and need reasonable accommodation in this course, you should inform the instructor of this fact in writing within the first week of class or as soon as possible. If you have not already done so, you must register with the Office of Disability Services in DePaolo Hall, 1st floor (extension 962-7555) and obtain a copy of your Accommodation Letter. You should then meet with your instructor to make mutually agreeable arrangements based on the recommendations of the Accommodation Letter.
- CELL PHONES, TEXTING, ETC.: Please place cell phones and pagers on silent mode during class. Please don't read messages, text, tweet, surf or post during class.
- CAMPUS SAFETY: If you, or someone you know, ever feel unsafe for any reason, go to this Web site for campus and community resources available to help: <u>http://www.uncw.edu/safe-relate/</u>UNCW practices a zero-tolerance policy for violence and harassment of any kind. For emergencies contact UNCW CARE at 962-2273, or dial 911 (for Campus Police or Wilmington Police). For additional University or community resources visit <u>http://www.uncw.edu/wsrc/crisis.html</u>.
- RELIGIOUS OBSERVANCE POLICY: In accordance with North Carolina G.S. 116-11(3a), you are entitled to two excused absences for religious observances per academic year. In order to preserve your right to make up any tests or other work missed for religious observance required by your faith, you must inform the Registrar in writing of your intended absence before the end of the first week of class.

IMPORTANT DATES:

Wednesday, Aug. 31 Thursday, Oct. 13 Tuesday, Dec. 13 Last day to drop without a grade. Last day to withdraw with a W. Final Exam.

TENTATIVE SYLLABUS:

August 25	1.1 Graph Models
August 30 September 1	1.2 Isomorphism 1.3 Edge Counting
September 6 September 8	1.4 Planar Graphs 2.1 Euler Cycles
September 13 September 15	2.2 Hamilton Circuits2.3 Graph Coloring
September 20 September 22	3.1 Properties of Trees3.2 Search Trees and Spanning Trees
September 27 September 29	3.3 The Traveling Salesperson Problem3.4 Tree Analysis of Sorting Algorithms
October 4 October 6	4.1 Shortest Paths; 4.2 Minimal Spanning Trees Test 1
October 11 October 13	FALL BREAK 5.1 Two Basic Counting Principles
October 18 October 20	5.2 Simple Arrangements and Selections5.3 Arrangements and Selections with Repetitions
October 25 October 27	5.4 Distributions5.5 Binomial Identities
November 1 November 3	6.1 Generating Function Models6.2 Calculating Coefficients of Generating Functions
November 8 November 10	6.4 Exponential Generating Functions7.1 Recurrence Relation Models
November 15 November 17	Test 2 7.3 Solution of Linear Recurrence Relations
November 22 November 24	8.1 Counting with Venn Diagrams THANKSGIVING BREAK
November 29 December 1	8.2 Inclusion-Exclusion Formula A.4 The Pigeonhole Principle
December 6	Last day of class; wrap-up of course, review, course evaluation
December 13	Final Exam (8:00 – 11:00 am)