MATH 320: Topics in Combinatorics
Fall 2019
MWF 11:45 am - 12:45 pm
Bunnell 410

Instructor: Jill Faudree
Contact Details: Chapman 306B, jrfaudree@alaska.edu, 474-7385
Office Hours: (*tentative*) MWF 10:30-11:30, R 11:00am-12:30pm and by appointment. Also, you are welcome to drop by. Note that these hours may change depending on student demands and scheduling concerns.
Textbook: *Combinatorics: A Guided Tour* by David Mazur, Mathematical Association of America
Online Access to Course Materials:

- **Blackboard** for written homework, class announcements, and group work.

- Dr. Faudree's webpage (**http://jrfaudree.github.io/M320F19home.html**) for the day-to-day schedule, old tests, and current quiz/test/final exam solutions.

Prerequisites: a grade of C or better in Math 265 Introduction to Mathematical Proofs or its equivalent or special permission of the instructor

Course Overview and Goals:
From the Course Catalog:

> Introduction to some fundamental ideas of combinatorics. Topics selected from such fields as enumerative combinatorics, generating functions, set systems, recurrence relations, directed graphs, matchings, Hamiltonian and Eulerian graphs, trees and graph colorings.

This course is an introduction to Combinatorics, the study of finite (or at least countable) discrete structures. Essentially all introductory courses begin with enumeration (Chapters 1, 2 and 3). While indeed this is all "counting stuff," a variety of tools and techniques will be used including inclusion-exclusion, generating functions, and recurrence relations. Combinatorial proofs, one of the most elegant of all proof techniques, will play a big role.

With basic enumerative techniques in place, we will incorporate some algebraic tools including Pólya's Theorem and learn some classic applications to error-correcting codes. We will end the semester studying some classic combinatorial objects: graphs and partially ordered sets.

Course Mechanics:

There are many great things about this course, but one of them is that it is not a prerequisite for any other course. This gives us a bit of flexibility in emphasis and speed. In particular, it provides an opportunity to practice two skills crucial to later success: collaboration and effective communication (written and oral).

Class meetings will always begin with you (the students) putting the reading questions on the board with your answers to them. This is also a good time to address other questions such as tricky homework problems or lingering issues from the previous meeting. Based on our progress addressing these questions, I will help fill in the details and any remaining big picture issues from the topic of the day. Before time runs out, new reading and reading questions due next class meeting will be assigned.

Yes. I do mean what I just wrote in the previous paragraph. You will come to class, put down your stuff, walk to the board and start writing. You are expected to participate in the class discussion including asking and answering questions. It is OK to answer questions incorrectly. It is not OK to not try.

Homework will be assigned weekly. Both assignments and solutions to assignments will be posted on Blackboard. Homework will be due by 4:00PM in Chapman 101 unless otherwise stated.

You may work with others on the homework and are encouraged to do so. However, you should always write up your solutions independently. You are expected to attempt every problem and will lose points for not doing so. Your written solutions will be graded on correctness.

Attendance and **class participation** are required.

There will be two **midterms** and a **comprehensive final exam.** The tentative dates for the midterms are Friday 16 October and Wednesday 25 November. The final exam is scheduled for Wednesday December 16 1:00-3:00 pm. **Make-up Midterms** will be given only for excused absences and only if approved in advance.

Grades will be calculated according to the following rubric:

class participation	10%
homework	20%
midterm 1	20%
midterm 2	20%
final exam	30%

Grade Bands: A, A- (90 - 100%), B+,B, B- (80 - 89%), C+, C, C- (70 - 79%), D+, D, D- (60 - 69%), F (0 - 59%). I reserve the right to lower the thresholds. The grade of $A+$ is reserved for outstanding performance in the course overall.

(TENTATIVE) SCHEDULE OF TOPICS:

week beginning	topics		week beginning	topics
8/31	preliminaries, §1.1		10/26	§4.4,5.1,5.2
9/7	§1.2, 1.3		11/2	§5.3-5.6
9/14	§1.4, 1.5		11/9	§6.1-6.2
9/21	§2.1-2.3		11/16	§6.3-6.4
9/28	§2.4, 3.1		11/23	review, Exam 2, Thanksgiving
10/5	§3.3-3.5		11/30	§7.1-7.3
10/12	catch-up, review, Exam 1		12/7	§7.4-7.5
10/19	§4.1-4.3		12/14	Review, Final Exam Wednesday 16 Dec

MISCELLANEOUS OTHER ISSUES:

Communication: I will communicate with you using three different channels: (1) class, (2) Blackboard (for general announcements) and (3) email (for private correspondence). I will not email you casually. If you receive an email from me, you need to read it and respond, if necessary. Class time and email is also the best way for you to communicate with me. (See homework at the end of this syllabus.)

Disability Services The Office of Disability Services implements the Americans with Disabilities Act (ADA), and ensures that UAF students have equal access to the campus and course materials. The instructors will work with the Office of Disability Services (208 Whitaker, 474-5655) to provide reasonable

accommodations to students with disabilities.

Student Protections and Services Every qualified student is welcome in our classes. As needed, we are happy to work with you, Disability Services, Military and Veteran Services, Rural Student Services, etc. to find reasonable accommodations. Students at this university are protected against sexual harassment and discrimination (Title IX), and minors have additional protections. *As required,* if we notice or are informed of *certain types* of misconduct, then we are required to report it to the appropriate authorities. For more information on your rights as a student and the resources available to you, please go to the following site: https://www.uaf.edu/handbook/www.uaf.edu/handbook.

Incomplete Grade Incomplete (I) will only be given in DMS courses in cases where the student has completed the majority (normally all but the last three weeks) of a course with a grade of C or better, but for personal reasons beyond his/her control has been unable to complete the course during the regular term. Negligence or indifference are not acceptable reasons for the granting of an incomplete grade.

Late Withdrawals A withdrawal after the deadline (currently 9 weeks into the semester) from a DMS course will normally be granted only in cases where the student is performing satisfactorily (i.e., C or better) in a course, but has exceptional reasons, beyond his/her control, for being unable to complete the course. These exceptional reasons should be detailed in writing to the instructor, department head and dean.

No Early Final Examinations Final examinations for DMS courses shall not be held earlier than the date and time published in the official term schedule. Normally, a student will not be allowed to take a final exam early. Exceptions can be made by individual instructors, but should only be allowed in exceptional circumstances and in a manner which doesn't endanger the security of the exam.

Academic Dishonesty Academic dishonesty, including cheating and plagiarism, will not be tolerated. It is a violation of the Student Code of Conduct and will be punished according to UAF procedures.