Math 4707: Introduction to Combinatorics and Graph Theory

Spring 2022 Course Syllabus

Instructor: Gregg Musiker, Office in Vincent Hall 251,

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Meeting time: This class will meet on Mondays and Wednesdays in Vincent Hall 211. While this class is scheduled for 2:30-4:25, we will most often run from 2:30-4:00 (which includes a 10 minute break).

Office hours: Tuesdays 1:10-2:00 and Fridays 2:30-3:20; also by appointment.

Office hours will be held both in Vincent Hall 251 and over Zoom at
`https://umn.zoom.us/j/99013481214?pwd=ZExkZHNSUlFhLOswSjNOQUpEeWxzdzO9`.

Course Webpage: Through `https://canvas.umn.edu/` and additional info at
`http://www.math.umn.edu/~musiker/4707/`.

Course Content: This is a course in discrete mathematics, emphasizing both techniques of enumeration (as in Math 5705) as well as graph theory and optimization (as in Math 5707), but with somewhat less depth than in either of Math 5705 or 5707. We plan to cover most of the text, skipping Chapters 6, 14, and 15. We will also likely supplement the text with some outside material.

Prerequisites:

Math 2243 and either Math 2283 or 3283 (or their equivalent). Students will be expected to know some calculus and linear algebra, and have familiarity with proof techniques, such as mathematical induction.

Required Text: [LPV]

Discrete Mathematics: elementary and beyond, by Lovasz, Pelikan, and Vesztergombi (2003, Springer).

Other useful texts (on reserve in the math library):

Invitation to Discrete Mathematics, by Matousek and Nesetril (1998, Oxford).

Applied combinatorics, by A. Tucker (2004, Wiley & Sons)

Introduction to graph theory, by D. West, (1996, Prentice Hall)

Homework (40%): There will be 6 homework assignments due approximately every other week (tentatively) on Wednesdays. The first homework assignment is due on February 2nd.

I encourage collaboration on the homework, as long as each person understands the solutions, writes them up in their own words, and indicates on the homework page their collaborators. Late homework will not be accepted. Early homework is fine, and can be left in my mailbox in the School of Math mailroom in Vincent Hall 107. Homework solutions should be well-explained– the grader is told not to give credit for an unsupported answer. Complaints about the grading should be brought to me.

Exams (20% each): There will be 3 in-class exams, dates are listed below, each of which will be open book, open notes, and with calculators allowed. Missing an exam is permitted only for the most compelling reasons. You should obtain my permission in advance to miss an exam. Otherwise you will be given a 0. If you are excused from taking an exam, you will either be given an oral exam or your other exam scores will be prorated.

Class Participation: Participation in class is encouraged. Please feel free to stop me and ask questions during lecture. Otherwise, I might stop and ask you questions instead. Additionally, some course material will be taught by having the students work together in small groups cooperatively, followed by a representative coming to the board to explain their group's answer.

Public Health: The University of Minnesota currently requires all students, staff, and faculty to wear masks when indoors regardless of vaccination status, and strongly encourages members of the campus community to get boosted. See `https://safe-campus.umn.edu/return-campus/get-the-vax` for policies and resources for accessing vaccines. Please stay at home if you experience symptoms of COVID-19 and consult with your healthcare provider about an appropriate course of action. An absence due to symptoms of COVID-19 is an excused absence, and I will work with you to find the best course of action for missed work and/or class experiences. See `https://policy.umn.edu/education/makeupwork-faq`. As discussed below, remote options will be presented if needed as long as classroom technology allows.

Remote Learning Expectations: In the event of remote classes, while you engage in learning virtually, whether through Zoom, Google hangouts, email, blogs, group chats, video chats, etc., please know that the expectations for participation and conduct are the same as if you were taking the class in person. This includes students having the right to express themselves and to particiapte freely, and the expectation of treating each other with courtesy and respect. Expectations around academic integrity remain the same as well. Please see `https://communitystandards.umn.edu/know-code/online-learning-expectations`.

Zoom Etiquette: I ask students to have their videos on during remote classes whenever possible. Use of zoom backgrounds is fine. If there is a reason that having your video on could be an issue, I am receptive, but please let me know. If you do not have a webcam, please talk to your college advisor whom can provide

assistance. Also students are welcome to unmute themselves at anytime to ask questions. To minimize background noise, students are asked to mute themselves when not talking.

A Rewarding and Welcoming Experience For All: This class aims to offer a rewarding, challenging, supportive, and engagaing experience for every student. Please be prepared to take an active, patient, and generous role in your own learning and that of your classmates. This class is committed to creating a professional and welcoming environment that benefits from the diversity of experiences of all of its students.

University Policy Statements: The University Senate statements regarding academic dishonesty, credit, and workload expectations, and grading standards are at

`https://policy.umn.edu/education/gradingtranscripts` and

`https://policy.umn.edu/education/studentwork`.

Scholastic Misconduct: You must do your own work on all portions of the exams. Academic dishonesty in any portion of the academic work for this course will be grounds for awarding a grade of "F" for the entire course.

Workload: One credit is defined as equivalent to an average of three hours of learning effort per week (over a full semester) necessary for an average student to achieve an average grade in the course. This course is a 4 credit course that meets 3 hours per week. Therefore, you should expect to spend an additional 9 hours per week on coursework outside the classroom.

Tentative Homework and Exam Schedule:

HW 1	Wednesday	2/2
HW 2	Wednesday	2/16
Exam 1	Monday	2/21
HW 3	Wednesday	3/2
HW 4	Wednesday	3/23
Exam 2	Monday	3/28
HW 5	Wednesday	4/13
HW 6	Wednesday	4/27
Exam 3	Monday	5/2

Homework # 1: Exercises from [LPV]:
Section 1.8 # 12, 13, 14, 17, 22, 26, 29, 31, 33, 34,

Section 2.5 # 1, 3, 4, 5, 7, 8