

Math 641 Combinatorics and Graph Theory

George Mason University

Fall 2022 Syllabus

Course Description

Math 641 is an introduction to combinatorics and graph theory. It focuses on the main theoretical ideas of graph theory (the mathematics of networks) and enumerative combinatorics (counting methods). We will also discuss algorithms and some real-world applications, for example to electrical networks, scheduling, and matching problems. Topics include connectivity, trees, spanning trees, Eulerian and Hamiltonian graphs, flow, planar graphs, and coloring. By the end of the course, students will be able to read research articles and conduct research in combinatorics and graph theory, and apply the key ideas of the course to other branches of theoretical and applied mathematics.

Prerequisite: Significant experience with abstract mathematics and proofs is required. Experience with elementary discrete mathematics, combinatorics, graph theory, linear algebra, and/or abstract algebra is helpful but not required.

Textbook: *Graph Theory: Modeling, Applications, and Algorithms* by Agnarsson and Greenlaw.

Course Meetings: Mondays and Wednesdays, 4:30-5:45pm. Online and synchronous.

Course Home Page: Blackboard, <https://mymasonportal.gmu.edu/>

Instructor Information

Name: Dr. Kirsch (she/her/hers)

Student Office Hours: Tuesdays 11am-12pm, selected Fridays 3:30-4:30pm, or by appointment.

Email Address: rkirsch4 @ gm.u.edu

Assessments and Letter Grades

Problem Sets

There will be approximately 12 problem sets. Problem sets may be done collaboratively or individually in any combination. It is essential and required for academic honesty that all submitted work reflects your own understanding, and that you give credit to all contributors: for each problem, write their names and state either that you are acknowledging them for helpful discussions or that you and they co-authored the solution. Use of external resources is also permitted as long as the sources and direct quotations are clearly identified.

Each problem set submission will be graded as either **Completed**, **Started**, or **Unsubmitted** based on the number of attempted solutions submitted. Additional feedback will be provided in response to questions in writing, in class, and/or in office hours.

Problem Presentations

You will present a problem of your choice to the class three times during the semester. The process works as follows.

By Wednesday Submit a problem set, with one question marked as your selection of a presentation problem. Book an office hours appointment with me for sometime in the next week.

During the intervening week Prior to the scheduled appointment I will provide detailed written feedback on your solution to your presentation problem. Then, when we meet, you may give a practice presentation and/or ask any lingering questions.

The following Wednesday During class you will present your solution to your chosen problem.

You may request an alternative assessment to take the place of problem presentations, likely a traditional written exam with reflection.

Letter Grades

Letter grades will be assigned at the end of the semester based on the following requirements for problem sets and problem presentations. All requirements must be met to earn the grade.

Grade	Problem Presentations	Completed Problem Sets	Unsubmitted Problem Sets
A+	3	12	0
A	3	≥ 10	≤ 1
A-	≥ 2	≥ 8	≤ 2
B	≥ 1	≥ 6	≤ 4

University Policies

Disability Services: Disability Services at George Mason University is committed to providing equitable access to learning opportunities for all students by upholding the laws that ensure equal treatment of people with disabilities. If you are seeking accommodations for this class, please visit <https://ds.gmu.edu/> for detailed information about the Disability Services registration process. Then please discuss your approved accommodations with me. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu. Phone: (703) 993-2474.

Academic Integrity: Students must be responsible for their own work, and students and faculty must take on the responsibility of dealing explicitly with violations. The tenet must be a foundation of our university culture. See Academic Integrity.

Honor Code: Students must adhere to the guidelines of the George Mason University Honor Code. See the Honor Code.

University Policies: Students must follow the university policies. See University Policies.

Responsible Use of Computing: Students must follow the university policy for Responsible Use of Computing. See Responsible Use of Computing.

University Calendar: Details regarding the current Academic Calendars. See the Academic Calendars.

Students are expected to follow courteous Internet etiquette.