

MATH 5678 - Graph Theory - Fall '26

Lecturer: Puck Rombach (puck.rombach@uvm.edu)

Texts: Graph Theory, by Reinhard Diestel (diestel-graph-theory.com)

Overview

The course will cover foundational topics in graph theory, such as trees, paths, cycles, Hall's theorem, connectivity, vertex/edge covering, Menger's theorem, Tutte's theorem, bipartite graphs, König's theorem, Hamiltonicity, coloring, Turán and Ramsey numbers, flows, Ford-Fulkerson algorithm, planarity, Kuratowski's theorem,...

Reading is recommended in advance of each class, and a large part of the class time will be devoted to discussion and active learning. The focus of this class will be on proof writing, and some optional programming in SageMath.

Homework

The class notes contain exercises, some of which we will work on collaboratively in class. Each week, you will write up a set of exercises of your choice (worth at least 5 points total), which are handed in at the start of the following week and graded. Each Homework is graded as 0, 1/2 or 1.

Final Project

During the semester, you will look for an open problem to make progress on and write an original result. At the end, you will submit this as your final project. You will each work on your own problem but you are encouraged to talk to each other.

Attendance

Attendance is important for you to be successful in this course. Please attend all lectures if possible and let me know when you will be absent.

Office Hours and Appointments

There will be regularly scheduled office hours, but I am available for drop-ins or appointments outside of office hours as well, depending on my schedule. I want you to do well in this class and checking in with me early can make a big difference. This is a small class so I hope to chat regularly with all of you.

Flexibility and accommodations

If you cannot make an occasional deadline due to health or personal reasons, you can ask for an extension. You do not need to disclose the reason. If you encounter continuing barriers, please let me know as soon as possible, so that we can determine if there is a design adjustment or accommodation that can be made.

Grading

Grades are determined as follows. Each of the 12 Homework sets is worth 1 credit if completed satisfactorily. The final project is worth 3 credits. At the end of the semester, 13 credits are worth an A, 10 credits a B and 7 credits a C.