Graph Theory
MATH 340
Spring 2026

Instructor

Dr. Seth Harris
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Class Meetings

Monday, Wednesday 2:40 PM – 3:55 PM
Hall of Sciences 305

Zoom (when necessary)

This is an in-person course. It is possible that, when necessary, we may hold class online on Zoom.

Zoom link: https://drew.zoom.us/s/873663190

Meeting ID: 873 663 190

Office Hours

Monday 1:15 PM – 2:30 PM
Tuesday 10:30 AM – 11:30 AM
Wednesday 10:30 AM – 11:30 AM
or by appointment

Office hours will typically be held in person whenever Drew classes are meeting in person. However, you may always request to meet online during these times. Occasionally I will hold office hours online only.

Office hour Zoom link: https://drew.zoom.us/s/284748767

Office hour meeting ID: 284 748 767

Course Description

Graph theory is the study of any network of vertices and edges; in applications, a graph can represent a network of roads, websites, social accounts, neurons, and many more. The theorems of graph theory can unite these applications by asking common questions like: can every vertex be reached, how efficiently, and which are the most crucial to reach? Topics will include cycles, trees, traversability, graph coloring, matching, planarity, and graph algorithms. Further topics could include random walks, NP-complete graph problems, and network analysis and rankings. There is flexibility depending on student interest.

Prerequisite

Math 220 (Discrete Mathematics) or permission of the instructor.

Textbooks

Our primary textbook will be *A First Course In Graph Theory* by Gary Chartrand and Ping Zhang.

We may use supplemental material, all of which will be free online.

Expected Topics

Chapter 1: Introduction and Classes of Graphs
Chapter 10: Graph coloring
Chapter 2: Degrees
Chapter 3: Isomorphic Graphs
Chapter 4: Trees, Graph algorithms
Chapter 6: Traversability
Chapter 8: Matchings
Chapter 9: Planarity

Possible others: NP-complete problems; Random graphs; Random walks on a graph; Network analysis; Markov chains. And more!

Grading

35% Assignments
20% Midterm Exam, Monday, March 23
20% Final Exam, Friday, May 8
15% Final presentation
10% Class participation and in-class work

Homework

Homework will be assigned regularly, and you will generally be given one week to complete it. You are encouraged to work in groups, but each student must turn in their own work. You will be allowed to turn in at most two homework assignments late. Any late assignment is due at the beginning of the next class, and you need not give any explanation to your instructor regarding why it was late.

Exams

There will be one in-class midterm exam, currently scheduled for Monday, March 23.

If you are unable to make the exam, it is your responsibility to notify your instructor at least 24 hours prior to the exam and arrange a make-up time. If you miss an exam without doing so, a make-up exam will NOT be allowed, unless you have a valid absence verification from the CAE.

The final exam is currently scheduled for Friday, May 8 from 4:00–7:00 PM.

Final Presentation

Each student is required to choose a topic in graph theory and give a 20–30 minute presentation during the last several weeks of class. Later in the course, I will give more specific guidelines.

LaTeX

We will be using LaTeX, also known as simply TeX. Invented by Donald Knuth in the 1980's, LaTeX is the current standard program for typesetting papers in mathematics and computer science. This syllabus is written in LaTeX. Throughout the course, we will gradually learn the basics of LaTeX, and I will give you some practice assignments. My hope is that once you have had some practice TeXing, you will find it to be much easier for writing mathematics than, say, Microsoft Word, not to mention that the end result always looks much nicer.

We will also learn the Beamer presentation package for LaTeX ("PowerPoint for math"), and creating graphs and figures using the Tikz graphics package.

Attendance

We expect that you will attend class every day. Repeated absences will negatively affect your mathematical understanding and, ultimately, your final grade. Regular attendance will enhance your comprehension of mathematical concepts, and will help you solving your homework and being productive on exams.

Absence Policy Statement

In addition to the course attendance policy, students should be aware of their rights and responsibilities regarding absences for legitimate reasons as described in the Absence Policy: Student Rights and Responsibilities, which is located in the Academic Policy section of Drew's course catalog under Attendance. Legitimate planned absences may include religious holidays, NCAA-sanctioned competition, academic conference or some Drew-sanctioned events. Students need to inform the faculty member of planned absences in the first week of the semester. For unforeseen extended health issues please see the academic accommodations statement.

Academic Integrity

All students are required to uphold the highest academic standards. Any case of academic dishonesty will be dealt with according to the guidelines and procedures outlined in Drew University's Standards of Academic Integrity: Guidelines and Principles, which is located in the academic policies section of the catalog.

Student Learning Outcomes

During this course, students will:

- Identify common classes of graphs (bipartite, complete, k-regular, connected, directed, multigraph)
- Find the chromatic number of certain graphs
- Determine whether certain graphs are planar
- Determine the degree sequence of a graph, or whether a given degree sequence is graphable
- Apply algorithms (e.g. Dijkstra's, Kruskal's, Ford-Fulkerson) to find quantities (e.g. lightest path, minimum spanning tree, maximum flow) related to a graph and/or an application it represents.
- Use language of complexity theory to describe the runtime of algorithms, and/or explain what it means for an algorithm to be NP-complete.
- Demonstrate library research skills in the area of mathematics
- Learn how to typeset mathematics using the LaTeX language, the typesetting language most frequently used in mathematical research
- Communicate ideas from graph theory in a final 30-minute presentation

Academic Accommodations

Your experience in this class is important to me. If you have already established accommodations with the Office of Accessibility Resources (OAR), please provide me with a copy of your accommodation letter at your earliest convenience so we can discuss your needs in this course.

If you have not yet established services through the Office of Accessibility Resources (OAR), but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to: mental health, attention-related, learning, vision, hearing, physical or health impacts), you are encouraged to contact OAR. OAR offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions.

Although a disclosure may take place at any time during the semester, students are encouraged to do so early in the semester, because, in general, accommodations are not implemented retroactively.

Office of Accessibility Resources contact information:
Director: Dana Giroux
Location: Brothers College, Room 119B
Phone: 973-408-3962
Email: dgiroux@drew.edu, disabilityserv@drew.edu

Final Exam Policy Statement

If extenuating circumstances occur, students may submit a Final Exam Reschedule request for review by the Associate Provost. Students may not negotiate a make-up date directly with the course instructor. Students may request to reschedule an exam under the following circumstances:

1. Two final exams scheduled at the same time;
2. Three finals are scheduled in one calendar day; one of the exams will be rescheduled at the convenience of the instructor and the student;
3. Serious illness, or personal emergency; the student is required to present documentation to validate.

The final exam schedule is visible on the Registrar's website by the beginning of each semester. Students are expected to schedule travel plans for AFTER their final exams.