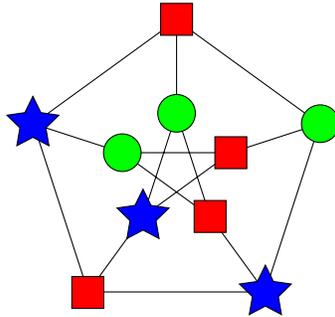


MATH 4022: INTRODUCTION TO GRAPH THEORY



Class info		Instructor info	
Time:	TR 2:00–3:15pm	Instructor:	Anton Bernshteyn
Format:	Hybrid	Email:	bahtoh@gatech.edu
Location:	Skiles 202 + MS Teams	Office hours:	TBA or by appointment
		HW presentations:	TBA
Website:		http://people.math.gatech.edu/~abernshteyn3/teaching/Fall12020/MATH4022	

Course description. A **graph** is a mathematical structure that is used to abstractly represent a collection of objects endowed with a pairwise relation. For instance, graphs can be used to model the link structure of the Internet, the connections in a social network, the chemical bonds between the atoms in a molecule, the physical interactions between the particles in a material, etc. Additionally, graph theory plays a central role in computer science, where many data structures are viewed as graphs. Furthermore, graph theory also has numerous applications in pure mathematics.

In this course we will introduce some of the central concepts and ideas in graph theory and cover many fundamental results in the subject. A special emphasis will be made on the common approaches and techniques that bind different parts of graph theory together, as well as on their applications in computer science and other areas of mathematics.

Prerequisites. This is an advanced mathematics course. As such, it requires a certain degree of mathematical maturity. In particular, you will have to be able to understand and write rigorous mathematical proofs. Please be aware that MATH 3012 (*Applied Combinatorics*) or an equivalent is a prerequisite for this class. To brush up on the MATH 3012 preliminaries, you may consult the book *Applied Combinatorics* by Mitchel T. Keller and William T. Trotter available at this link: <https://www.rellek.net/book/app-comb.html> (especially Chapter 5).

Text. The recommended textbook is *Introduction to Graph Theory* (2nd ed., 2001) by Douglas B. West. Most of the material in the class is also covered in *Graph Theory* (5th ed., 2017) by Reinhard Diestel, which is available electronically through the Georgia Tech library at https://gatech-primo.hosted.exlibrisgroup.com/permalink/f/1vgrnp4/01GALI_GIT_ALMA51296943950002947 (however, its presentation style is somewhat more advanced).

Format. This class will be taught in a **hybrid** format. The details of what that will mean are listed below. Please read them very carefully and let me know if you have any questions.

- In the first week (i.e., on August 18 and August 20), the lectures will be held **remotely** using **Microsoft Teams**. The link to the MS Teams meeting is posted on **Canvas**.
- Starting on August 25, I will be lecturing from the classroom (**Skiles 202**) using the same MS Teams meeting link.
- The students will be divided into two groups. The members of the first (resp. second) group may attend the lectures on Tuesdays (resp. Thursdays) in person, while joining the other lectures remotely.
- In-person attendance is **not mandatory**. The students may join the lectures remotely even on the assigned days when they are allowed to come to class in person.
- For contact tracing purposes, I will be keeping attendance records for in-person lectures, and the students attending in person will have to follow a prescribed seating assignment.
- Face covering is required during in-person classes.
- All lectures will be recorded and posted on MS Teams.
- All assignments (homework and exams) will be performed **remotely**.

I reserve the right to adjust or modify the class format at any time.

Office hours. Office hours will be held remotely using **MS Teams**. The link to the MS Teams meeting is posted on **Canvas**. The schedule of office hours will be announced later. You may also contact me to schedule an appointment at a different time.

Piazza. This class will be using **Piazza** as a forum for discussions, questions, etc. You can access Piazza through **Canvas**. You may (and are encouraged) to post any class-related questions there.

Grade distribution. This course will include homework assignments, two midterms, and a final exam. The course grade is calculated according to the following formula:

$$\max \left\{ \begin{array}{l} 25\% \cdot \text{HW} + 25\% \cdot \text{Midterm I} + 25\% \cdot \text{Midterm II} + 25\% \cdot \text{Final}, \\ 20\% \cdot \text{HW} + 20\% \cdot \text{Midterm I} + 20\% \cdot \text{Midterm II} + 40\% \cdot \text{Final} \end{array} \right\}.$$

The letter grades are assigned as follows:

$$\mathbf{A:} \geq 85\% \quad \mathbf{B:} \geq 75\% \quad \mathbf{C:} \geq 65\% \quad \mathbf{D:} \geq 55\% \quad \mathbf{F:} < 55\%$$

Homework. Homework will be assigned once every one or two weeks. Homework must be submitted online through **Gradescope** (which can be accessed through **Canvas**). The students are strongly encouraged to typeset their homework solutions using \LaTeX . If you are not familiar with \LaTeX , it is a great idea to learn now! The Georgia Tech library holds regular workshops that cover the basics of \LaTeX (see <https://www.library.gatech.edu/events/latex-basics>). Please let me know if you need more resources.

Collaboration on homework. I encourage you to work together on homework problems. However, if you decide to collaborate with your peers, you must follow these rules:

- you must **acknowledge** any collaboration (i.e., write “I worked with so-and-so on this assignment” at the top);
- you must write up your solutions **on your own** and at least **two hours** after working on them with someone else.

Homework solutions. Instead of handing out written solutions, I will be giving presentations discussing solutions or hints to selected homework problems. These presentations will be held remotely using **MS Teams**. The link to the MS Teams meeting will be posted on **Canvas**. The time of these meetings will be announced later.

Late homework. Late homework submissions will generally **not** be accepted (see the section on missed assignments below for more details).

Exams. There will be two **midterms** and a **cumulative final**. The (tentative) dates of the exams are:

Midterm I: September 22, 2:00–3:15pm
Midterm II: October 29, 2:00–3:15pm
Final: December 1, 2:40–5:30pm

The midterms and the final will take place remotely using the proctoring tool **Honorlock**. Please review the following important technical requirements and let me know if you have any questions.

- The minimum system requirements for Honorlock can be found here: <https://honorlock.kb.help/-students-starting-exam/minimum-system-requirements/>.
- Students must have a broadband Internet connection.
- Students must have a webcam and a microphone.
- Students must have a secure private location to take an exam.
- Students will be asked to provide a picture ID and take a picture of themselves via a webcam as part of the exam process.
- Honorlock is not compatible with Linux OS, Virtual Machines, tablets, or smartphones.
- Honorlock requires the installation of Google Chrome and the Honorlock Chrome extension.

Grading disputes. If you have any questions about the grading of a particular assignment, you must contact me no later than the **next class day** after the graded work is returned.

Missed assignments. If you have an illness, accident, or family emergency that prohibits you from submitting an assignment on time, taking an exam, or participating in any other aspect of this course, you must contact the Division of Student Life in the Office of the Vice President and Dean of Students to submit the necessary documentation. I will then work with you to make up the missed assignments or find suitable alternatives if the missed assignments cannot be made up. For more information, see <https://studentlife.gatech.edu/content/get-help-now>.

Academic integrity. Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>. Any student suspected of cheating or plagiarizing on a quiz, an exam, or an assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Accommodations for students with disabilities. If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at 404-894-2563 or <http://disabilityservices.gatech.edu/> as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. I also encourage you to discuss your accommodations and needs with me as early in the semester as possible, and I will work with you to ensure that accommodations are provided as appropriate.

Health-related considerations. Effective July 15, 2020, the University System of Georgia (USG) institutions will require all faculty, staff, students, and visitors to wear an appropriate face covering while inside campus facilities or buildings where six feet social distancing may not always be possible. All members of the campus community will be provided reusable cloth face coverings. Face covering use will be in addition to and is not a substitute for social distancing. Anyone not using a face covering when required will be asked to wear one or must leave the area. Refusal to comply with the requirement may result in discipline through the applicable conduct code for faculty, staff or students.

There are a few exemptions. Reasonable accommodations may also be made for those who are unable to wear a face covering for documented health reasons.

For more information about face masks and coverings, please review the guidelines from Human Resources at <https://hr.gatech.edu/face-coverings>.

Student-faculty expectations. At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgment, and responsibility between faculty members and the student body. Please see <http://www.catalog.gatech.edu/rules/22/> for an articulation of some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

This syllabus is subject to change.