Math 429: Graph Theory
Fall 2026
Syllabus

Professor: Josh Laison
he/they, Ford 215, jlaison@willamette.edu

Student Office Hours: You don't need an appointment to come see me at these times.
Mondays 11:00-12:00
Wednesdays 10:00-11:00
Thursdays 1:00-2:00

You are very welcome to talk with me at other times. If I'm in my office you can drop by without an appointment, or you can schedule an appointment via email to meet in person or over Google Meet.

Class Meetings: Ford 201, 9:40-11:10, Tuesday and Thursday

Course Web Page containing the current schedule of topics and assignments by day: http://www.willamette.edu/~jlaison/graphtheory.html

Course Canvas site: https://willamette.instructure.com/courses/10669

Software:
Overleaf for typing assignments in Latex
Google Colaboratory for coding in Python

Grading:

Homework assignments (approx. 7)	40%
Exploration projects (approx. 5)	15%
Quizzes (approx. 7)	35%
Final presentation (1)	10%
Total	100%

Goals of the Course: Gain knowledge of a variety of topics in graph theory; gain experience thinking about graph theoretic ideas from both formal proof and algorithmic viewpoints; improve problem-solving, logical, and analytic skills; learn about some applications of graph theory outside of mathematics; gain facility programming to solve graph theoretic problems; gain experience communicating about graph theory in conversation and formal presentation.

Topics Covered: Graph families; graph algorithms; paths and cycles; directed graphs and tournaments; trees; connectivity; matchings and covers; planarity; graph coloring; and extremal graph theory. More topics as time permits.

Software: We'll use LaTeX and Python in this course. I'll ask you to write your homework assignments in LaTeX. Several homework assignments will include a problem asking you to implement a graph theoretic algorithm in Python, and we'll spend time practicing with Python in class.

Reading assignments: (Around once a week) You'll read a section of a textbook or article in preparation for new topics in class. I'll ask you to think about and comment on these through the software Perusall. You'll also get a chance to respond to classmates' comments and start a discussion outside of class. Perusall assesses your contributions and gives you a grade. I hope this is a way for you to think about each topic before we talk about it in class, and engage with these ideas as a community.

Homework assignments: (Around once a week) You are encouraged to work together on these problems and form homework groups. However, please don't use internet-based sources to solve the problems for you, and don't directly copy another person's work.

Quizzes: (Around once every two weeks, 30 minutes each) The quizzes will test your understanding of the fundamental ideas of the course, including definitions, examples, and short proofs.

Presentations: (Once during the semester, 5 minutes each per person) In consultation with me, you'll research and present a topic in graph theory to the rest of the class. I hope we can use these presentations to showcase a wide variety of graph topics, including within graph theory, applied to other areas of math, applied to other academic disciplines, or applied outside of academia.

Attendance at the Math Department Colloquium: According to math department policy, since you are enrolled in a 300-level mathematics course, you are required to attend at least 3 mathematics department colloquium talks this semester. The goal of this requirement is to expose you to a wider range of mathematics, and to make you want to go to more than 3 talks! I hope you will decide by the end of the semester, as I have, that math talks are a lot of fun.

Important dates:

Add/drop deadline 9/4
Withdraw deadline 10/23
Advising day (no class) 11/3
Fall break (no class) 11/25 through 11/27
Last day of class 12/3
Final presentations day 12/7 8:00-11:00

Course Policies

Community: (Adapted from Federico Ardila) This course aims to offer a joyful, meaningful, and empowering experience to every participant. As a community of scholars, our work gets better when we're all invested in a common effort of learning and discovery. We will build that rich experience together by supporting each other. Please be prepared to take an active, critical, patient, and generous role in your own learning and that of your classmates.

Anti-racism: (Adapted from the Office of Equity, Diversity and Inclusion) I affirm our commitment to anti-racist action in the coming semester and beyond. I stand in solidarity

with those who have been calling for justice and working to end institutionalized racism and white supremacy across the country and at Willamette.

Systemic racism at Willamette University is not an issue that can be addressed superficially. It will take a deep commitment from all parts of our community to make the changes that are necessary, and that is what I offer here: a commitment to gather, build, and act on a clear anti-racist agenda together.

Land Acknowledgement: (Adapted from the Dean's Office) Willamette is built on the land of the Kalapuya, who today are represented by the Confederated Tribes of the Grand Ronde and the Confederated Tribes of the Siletz Indians. I offer gratitude for the land, for those who have stewarded it, and for the opportunity to work on it. I acknowledge that our University's history is fundamentally tied to the first colonial developments in the Willamette Valley.

Diversity and Accessible Education Statement: (Adapted from the Accessible Education Services Office) Willamette University and I value diversity and inclusion. We are committed to a climate of mutual respect and full participation. My goal is to create a learning environment that is usable, equitable, inclusive and welcoming for people of any gender identity or expression, race, color, national or ethnic origin, religion or religious belief, age, marital status, sexual orientation, or ability.

If there are aspects of the instruction or design of this course that result in barriers to your inclusion or accurate assessment or achievement, please notify me as soon as possible. Students with disabilities are also encouraged to contact the Accessible Education Services office in Smullin 155 at `https://willamette.edu/offices/accessibility` or `accessible-info@willamette.edu` to discuss a range of options to removing barriers in the course, including accommodations.

Religious Accommodations: (Adapted from the former Office of the Chaplain) I recognize the value of religious practice and I will accommodate your commitment to your religious traditions whenever possible. If you anticipate missing class for religious reasons, please contact me to discuss your needs.

Time Commitment: Willamette's Credit Hour Policy expects 2-3 hours of work outside of class for every hour of in-class time. Since this class meets for three hours a week you should anticipate spending between 6 and 9 hours outside of class engaged in course-related activities.

Academic Integrity: (Adapted from the Dean's Office) Plagiarism can take different forms, but its essence is presenting the words or work of another person as your own. When you are quoting from, paraphrasing, or using images created by another person in any of your work, you should acknowledge that source in a citation.

On homework assignments, you are encouraged to discuss the homework with fellow students, and get help from your professor, textbook, notes, or calculator, but your submitted written work should be your own. Don't use solutions generated by someone else, including AI. On the quizzes and final exam, you shouldn't consult other sources at all.

AI policy: As with any other source, presenting the work of AI as if it was your own is plagiarism. Additionally, many mathematical statements generated by AI are false, and can lead you to misunderstanding if you don't independently verify the results. Using work created by other sources in place of your own, even if it's not your final product, might bypass the learning benefits of the assignment. As with any other source, avoid using information presented by AI in place of your own understanding.