Course Syllabus

Jump to Today

Welcome to Math 443, Graph Theory for honours students!

Overview

From the **calendar: (https://courses.students.ubc.ca/cs/courseschedule?pname=subjarea&tname=subj-course&dept=MATH&course=443)**

Introductory course in mostly non-algorithmic topics including: planarity and Kuratowski's theorem, graph colouring, graph minors, random graphs, cycles in graphs, Ramsey theory, extremal graph theory. Proofs emphasized. Intended for Honours students.

*Pre-reqs: A score of 68% or higher in one of **MATH 220 (https://courses.students.ubc.ca/cs/courseschedule?pname=subjarea&tname=subj-course&dept=MATH&course=220)**, **MATH 226 (https://courses.students.ubc.ca/cs/courseschedule?pname=subjarea&tname=subj-course&dept=MATH&course=226)**, **CPSC 121 (https://courses.students.ubc.ca/cs/courseschedule?pname=subjarea&tname=subj-course&dept=CPSC&course=121)**. (And at least 6 credits of Mathematics courses numbered 300 or above.)*

Instructor

Instructor: Dr. Elyse Yeager. You can contact me by email at **elyse@math.ubc.ca (mailto:elyse@math.ubc.ca)**. You can call me Elyse, or Dr. Yeager -- both are fine. Office hours are by appointment.

Textbook

We will be mostly working out of *A First Course in Graph Theory* by Chartrand and Zhang. You may find it useful as a reference, but purchasing it is not required. I saw it on Amazon.ca for about thirty dollars. Content warning for this book: it contains short biographies about relevant mathematicians, who had complicated and sometimes tragic lives. There is at least one mention of suicide, and several mentions of work camps.

Piazza sign-up link

Assessment

50% Weekly-ish homework

Submit your solutions as a pdf online to Canvas. It's OK to hand-draw images, if you choose. Some (but maybe not all) of the problems will be graded by our graduate TA. Your work will be judged on its entire explanation, not just the final answer, so make sure you justify and show your work.

The lowest two homeworks will be dropped. This is not intended as a grade giveaway, but rather as a paperwork-reduction tool for excused homework. Ordinary causes for excused homework (illness, late registration, computer issues, etc.) will be covered by these excused assignments, without the need to notify anyone.

Groupwork: HW 0 is an individual assignment. For HW 1 and 2, you'll be assigned a group to work with (unless you register very late). After that, you may choose a group of your own, or work alone. This way, everyone will know at least a few other students in the class, but nobody is stuck in a poorly functioning group. Details with be given with the assignments.

30% exams

There will be two in-class midterms, each worth 15% of your grade.

There will also be one optional midterm retake, scheduled during final exams. The exam will cover the entire course content, as a cumulative final would. If you take the retake, and score higher than your mark on at least one of the midterms (including a missed midterm), then your mark on the retake will replace your lowest mark on one midterm (but not both). If you don't take the retake, or if you do poorly on the retake, there is no penalty -- your midterm scores stay as-is.

MT1 will be held February 11; MT2 will be held March 26.

20% Final Project

In lieu of a traditional final exam, you'll present a research paper from a published journal. This assignment is scaffolded into a number of smaller assignments to help guide you through the process. This is an opportunity for you to practice reading technical papers and giving technical talks to an audience of your peers.

Something that I love about graph theory is how accessible a lot of research problems are. Lots of results are coming out that are accessible to undergraduates with just a term or two of classes. This is not the case in all fields of mathematics.

from late submissions, even if they are only late by a little bit. It is recommended that you turn in your homework well in advance of the midnight cut-off.

Weekly homework will not be accepted more than 2 days late. One reason for this policy is that it allows us to post solutions. Another reason is labour: it's more efficient to mark all at once, rather than a paper here and paper there. We do not have grading resources to mark papers one-by-one as they are turned in.

Course Structure

A graph is a way of representing discrete objects and their connections to one another. Examples of what the "objects" could be include molecules, people, tasks, countries; examples of their "connections" are physical connections, friendships, disease-sharing contact, direct flight connections, conflicts. Being mathematicians, however, we treat graphs as purely mathematical objects. That is, we focus on their theory, not their application.

In this course, we'll cover foundational topics in graph theory. Our treatment will be proof-heavy. Depending on time, we may cover basic definitions, trees, connectivity, planarity, colouring, discharging, and extremal graph theory (including Ramsey numbers).

In this class, you should be exposed to basic concepts and results in graph theory, building a sufficient background to understand some areas of recent or current research. You should practice reading and writing proofs, in preparation for research activities you may engage in later in graduate school.

Classes will primarily be lecture-based. There will be homework to practice and extend your in-class learning. Homework will be turned in on Canvas. At the end of the course, you will read and present a research paper. This will help you get used to reading scholarly work, and presenting in a conference-like setting.

Expectations

As a fourth-year honours course, you are expected to exhibit a high degree of self-regulated learning. For example, it is your responsibility to keep abreast of deadlines, and upload uncorrupted files. If you miss class for illness or another reason, it is your responsibility to get the notes from another student. Notes will not be published online, nor will they be provided by your professor.

Office Hours

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious, spiritual and cultural observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available **here. (http://senate.ubc.ca/policies-resources-support-student-success)**

Course Summary:

Date	Details	Due
Tue Jan 13, 2026	**Homework 0 - Definitions (https://canvas.ubc.ca/courses/174798/assignments/2373184)**	due by 11:59pm