Course Information for
MATH 4808A Graph Theory and Algorithms, Winter 2022

Instructor: **:** Jason Z. Gao, 4366HP, ext. 2138, email**:** zgao@math.carleton.ca
Lectures: Monday and Wednesday 4:05-5:25,
Office hours: Monday and Wednesday 2:30-3:30pm, or by appointment.

Prerequisites: MATH 3825/3855 or permission of the School.

There is no textbook for the course. The lecture notes will be posted on *brightspace*. The following are some good references.

- Robin J. Wilson, *Introduction to Graph Theory*, Longman, 4th Ed., 1999. ISBN 0-582-24993-7, QA166.W55
- D.B. West, *Introduction to Graph Theory*, Prentice-Hall,1996 ISBN 0-13-227828-6, QA166.W43
- J.A. Bondy and U.S.R. Murty, *Graph Theory*, Graduate Texts in Mathematics 244, Springer (2008) (ISBN 978-1-84628-969-9).
- Reinhard Diestel, *Graph Theory*, Graduate Texts in Mathematics, Volume 173, Springer-Verlag, Heidelberg,ISBN 978-3-642-14278-9

This course will be delivered online using ZOOM in Brightspace. To access your courses in Brightspace go to

https://brightspace.carleton.ca Please use the *help link* there if you need further assistance.

This class or portions of this class will be recorded by the instructor for educational purposes. These recordings will be shared only with students enrolled in the course. Your instructor will communicate how you can access the recordings.

Unauthorized student recording of classroom or other academic activities (including advising sessions or office hours) is prohibited. Unauthorized recording is unethical and may also be a violation of University policy. Students requesting the use of assistive technology as an accommodation should contact the Paul Menton Centre. Unauthorized use of classroom recordings – including distributing or posting them – is also prohibited. Under the University's Copyright Policy, faculty own the copyright to instructional materials – including those resources created specifically for the purposes of instruction, such as lectures slides, lecture notes, and presentations. Students cannot copy, reproduce, display, or distribute these materials or otherwise

circulate these materials without the instructor's written permission. Students who engage in unauthorized recording, unauthorized use of a recording, or unauthorized distribution of instructional materials will be referred to the appropriate University office for follow-up.

Grading :

- Final Exam 50% (a 3-hour closed book examination).
- Assignments (2) 30%.
- Midterm test 20%, **Mar. 01**
- **Retain your marked assignments and test until the end of the term**. Your term marks will be posted on brightspace, any error in your recorded mark should be called to my attention **before April. 12.**
- **Plagiarism is a serious academic offence and may lead to a failure grade**.

A tentative schedule

Topic	**Approx. # of weeks**
Definition of graphs, pictorial representation and matrix representations, graph isomorphism, walks, paths, cycles, connectivity, spanning trees, minimum-cost spanning trees.	2
Shortest paths, eulerian graphs and hamiltonian graphs, graph coloring and the greedy coloring algorithm, chromatic number and chromatic polynomial, the deletion-contraction recursion.	2
Planar graphs, Euler's formula, Kuratowski's theorem, 5-coloring theorem, Platonic solids, the dual of a plane graph, crossing number.	2
Midterm Test (Monday, Mar. 01)	0.5
Edge coloring, matching, directed graphs, directed eulerian graphs and hamiltonian graphs, tournaments, the matrix-tree theorem, electrical networks and perfect rectangles.	2
Network flows, Max-Flow Min-Cut Theorem, augmenting path algorithm, matchings and covers, Hall's marriage theorem, König's theorem, Menger's theorem.	2
Ramsey's theorem, integer flows, Tutte polynomial, review	2
Total	12.5

Academic accommodation

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:
Pregnancy obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: http://www2.carleton.ca/equity/
Religious obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: http://www2.carleton.ca/equity/
Academic Accommodations for Students with Disabilities: The **Paul Menton Centre** for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your ***Letter of Accommodation*** at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (*if applicable*). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (*if applicable*) at http://www2.carleton.ca/pmc/new-and-current-students/dates-and-deadlines/
You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at http://www2.carleton.ca/eq