Carleton University
School of Mathematics and Statistics
Combinatorial Optimization
Math3802A, Winter 2018

Instructor: Dr. Steven Wang
Tel: (613) 520 2600 (Ext. 2139)
Email: wang@math.carleton.ca
http://www.math.carleton.ca/∼wang

Office hours: 11:30am -12:25pm Wednesday; Other time is available by appointment.

Office Location: 4368HP

Day and time of course: Wednesday, Friday: 10:05 am - 11:25 am, Loeb Building B243

Textbook: No textbook is mandatory. A reference book: Combinatorial Optimization: Networks and Matroids by Eugene Lawler (Dover publications, Inc. 1976).

Prerequisites: Math 3801 or permission of the School.

Course Objective: The purpose of this course is to introduce Dijkstra's algorithm and Bellman-Ford algorithm for the shortest path problem, the minimum weight spanning tree problem, augmenting path algorithm and preflow-push algorithm for the max-flow min-cut problem, connections to linear programming, matchings in bipartite graphs and the assignment problem, the transportation problem, and the general minimum-cost flow problem.

Evaluation: Midterm (20%), Assignments (20%), and Final Examination (60%).

Tutorials: TBA. In each tutorial you will be given several questions to work on. Although there is no credit work for the tutorials, it is very important

to do those questions in a regular basis.

Midterm Exam: The midterm exam (Mar. 9) worth 20 marks.

Assignments: Two assignments (10 marks each). Due dates: Feb. 16 and Mar. 23.

Final Examination: This is a three hour closed-book exam scheduled by the University and will take place sometime during the examination period.

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://carleton.ca/equity/accommodation/student_guide.htm

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Students with disabilities requiring academic accommodations: in this course must register with the Paul Menton Centre for Students with Disabilities (PMC) for a formal evaluation of disability-related needs. Documented disabilities could include but are not limited to mobility/physical impairments, specific Learning Disabilities (LD), psychiatric/psychological disabilities, sensory disabilities, Attention Deficit Hyperactivity Disorder (ADHD), and chronic medical conditions. Registered PMC students are required to contact the PMC, 613-520-6608, every term to ensure that I receive your Letter of Accommodation, no later than two weeks before the first assignment is due or the first in-class test/midterm requiring accommodations. If you only require accommodations for your formally scheduled exam(s) in this course, please submit your request for accommodations to PMC by the last official day to withdraw from classes in each term. For more details visit the PMC website: http://www.carleton.ca/pmc/students/acad_accom.htm

Tentative lecture schedule

Week	Dates	Sections	Topics
1	Jan. 8-12	Introduction: Linear programming problems, combinatorial optimization problems.	
2	Jan. 15-19	Combinatorial optimization problems, minimum weight paths.	
3	Jan. 22-26	Dijkstras method, Bellman-Ford method, shortest paths between all pairs of nodes	
4	Jan. 29- Feb. 2	Matrix multiplication & Floyd-Warshall method, minimum spanning trees	
5	Feb. 5-9	Minimum spanning trees	
6	Feb. 12-16	Maximum flow in a network, augmenting paths, cuts in a network, augmenting path algorithm	Assign 1 due on Feb. 16
7	Feb. 19-23	winter break, no class	
8	Feb. 26-Mar. 2	Augmenting path algorithm for maximum flow	
9	Mar. 5-9	Applications of Maximum Flows: Bipartite Matching	Midterm on March 9
10	Mar. 12-16	Maximum flow by Pre-flow Push.	
11	Mar. 19-23	Maximum flow by Pre-flow Push.	Assign 2 due on Mar. 23
12	Mar. 26-30	Minimum cost network flow problem, assignment and transportation problem.	
13	Apr. 2-6	General minimum cost network flow problem.	
14	Apr. 9-11	Course review	