University of Toronto
Department of Mechanical and Industrial Engineering

MIE1620: Linear Programming and Network Flows

(Fall 2024)

Instructor Isabelle Rao, MC317, rao@mie.utoronto.ca
Office hours: By appointment

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Lectures Thursday 12pm-3pm RS208

Course Site on q.utoronto.ca

Textbook Introduction to Linear Optimization, Bertsimas & Tsitsiklis. Athena Scientific.

Supplemental textbooks
- Linear and Nonlinear Programming (3rd ed), Luenberger & Ye.
- Convex Optimization, Boyd & Vandenberghe.

Description Rigorous introduction to the theory of linear programming. Simplex method, revised simplex method, duality, dual simplex method. Post-optimality analysis. Interior point methods. Decomposition methods. Network flow algorithms. Maximum flow, shortest path, assignment, min cost flow problems.

Prerequisite MIE262 or APS1005. Linear algebra. Mathematical maturity.

Policies Academic integrity: Students are reminded of the seriousness of academic dishonesty in any form, including plagiarism. Students are expected to adhere to the "Code of Behaviour on Academic Matters" as well as the "Code of Student Conduct" available at http://www.governingcouncil.utoronto.ca/policies/behaveac.htm and at http://www.governingcouncil.utoronto.ca/policies/studentc.htm, respectively. General academic integrity information is available at http://www.utoronto.ca/academicintegrity/.

Communication: I access my email during regular business hours. Email should not be seen as an alternative to office hours, nor should it be used as a mechanism to receive private tutorials prior to an exam/assignment or on lecture material. Class-wide announcements will generally be made via the class website – make sure you are signed up with a valid U of T email address.

Grading Late homework will generally **not** be accepted. If you submit an official petition with adequate supporting evidence, it will be considered. A petition is also required for a missed quiz. If you request a regrade, do not write anything in the exam booklet or assignment. Please write a note on a separate sheet of paper describing the reason for the regrade request. The request must be submitted within one week of the exam/assignment being made available for pick up.

Final grades will be based on the following:

Homework	20%
Quiz #1	35%

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Quiz #2 45%

For the **Quizzes** you are allowed to bring one 8.5 x 11 formula sheet (double-sided). A basic scientific calculator is allowed (no programming or graphing functions).

Homework assignments are due at the beginning of lecture. If an assignment is due on a non-lecture day, it must be received by 5pm. Working with your classmates and discussing problem solving approaches is encouraged, but each of you must write and submit your solutions independently, and indicate with whom you collaborated. If you find information from the internet or elsewhere that helps you solve a particular problem, you must cite the source. Academic dishonesty will not be tolerated.

Tentative Course Outline

	Date	Topic	HW	Textbook sections
1	Sept 12	Chapter 1: Introduction to LP		1.1-1.5
2	Sept 19	Chapter 2: Geometry of LP		2.1-2.6
3	Sept 26	Chapter 3: Simplex method	1	3.1-3.5
4	Oct 3	Chapter 4: Duality		4.1-4.5
5	Oct 10	Chapter 4: Duality		4.6, 4.8-4.9
6	Oct 17	**Quiz #1**	2 (Oct 15)	
7	Oct 24	Chapter 5: Sensitivity Analysis		5.1-5.2
8	Oct 31	*Fall study week – No class*		
9	Nov 7	Chapter 6: Large scale optimization		6.1-6.4
10	Nov 14	Chapter 7: Network flows	3	7.1-7.3
11	Nov 21	Chapter 7: Network flows		7.4-7.6, 7.8-7.9
12	Nov 28	Chapter 9: Interior point methods	4	9.1, 9.3-9.4
13	Dec 5	**Quiz #2**		