

## APS1005S: Operations Research for Engineering Management Summer 2023

**Course Description:** This course introduces optimization techniques applicable in solving various engineering problems. These techniques are widely used in engineering design, optimal control, production planning, reliability engineering, and operations management. The contents of this course can be classified into two major categories: Modeling techniques (week 1) and Optimization algorithms (week 2). Topics include linear programming, network programming, integer programming, dynamic programming, and decision making under uncertainty. Widely available software will be used for numerically solving linear, network and integer programming models.

**Exclusion** MIE262 or equivalent

**Lecturer:** Daniel Frances (frances@mie.utoronto.ca)

**References:** 1. Operations Research - Applications and Algorithms by Wayne L. Winston, 4th Edition. 2004  
2. Practical Management Science, by W.L. Winston and S. Albright, 5th Edition. 2014

**Course Duration and Format:** This is an intense synchronous on-line 9-day course that requires full time participation. It is not recommended that students take this course while working. Video lectures are posted daily June 6<sup>th</sup>-9<sup>th</sup> and 12<sup>th</sup>-16<sup>th</sup>. Students are expected to attend the daily opening webinar, do problems during and after video postings, participate in the daily in-person 4-5 pm tutorial session (no video recorded), submit a daily assignment online by the end of the day, and write an in-person final exam 9-12 Tuesday June 20<sup>th</sup>.

**Required Software:** Microsoft Excel with Solver Add-In, AMPL for Courses

**Daily Tutorials:** 4-5 pm in-person in GB120

<b>Marking:</b>	Daily Assignments (Submitted online)	40%
	Opening Webinar Attendance	10%
	In-person Final Exam	50%

**Teaching Assistants**

TBA

<u>Day</u>	<u>Date</u>	<u>Topic</u>	<u>Ref*</u>
1	06-Jun	Linear Programming (LP) Formulations & Software	1,3/1-4
2	07-Jun	Network Problem (NP) Formulations & Software	7,8/5
3	08-Jun	Integer Programming (IP) Formulations & Software	9/6
4	09-Jun	Dynamic Programming Formulations and Algorithm	18/-
	10-Jun		
	11-Jun		
5	12-Jun	LP Solution Algorithm	4/-
6	13-Jun	LP Postoptimality Analysis	5,6/-
7	14-Jun	NP Solution Algorithm	8/-
8	15-Jun	IP Solution Algorithm	9/-
9	16-Jun	Decision Analysis	13/9
	20-Jun	Final Exam	

\* Chapter references shown are from Reference 1 / Reference 2.