UNIVERSITY of GUELPH

ENGG*3700   Optimization for Engineers

Fall 2018
Section(s): C01

School of Engineering
Credit Weight: 0.50
Version 1.00 - September 05, 2018

1 Course Details

1.1 Calendar Description

This course serves as an introduction to optimization. Topics to be covered include but are not limited to: linear programming, sensitivity analysis, linear integer programming technique, dynamic programming, Markov chains, transportation method, decision analysis, and queuing theory.

Pre-Requisite(s):   CIS*1500, MATH*2130, MATH*2270

1.2 Course Description

The main goal of this course is to help you learn how to determine the best choice among a set of alternatives.

1.3 Timetable

Lectures:
Tuesday 4:00 – 5:20 PM RICH 2520
Thursday 4:00 – 5:20 PM RICH 2520

Tutorials:
3624 (Monday, 7:00 – 8:50 PM) ROZH Room 105
3625 (Tuesday, 7:00 – 8:50 PM) MINS Room 103
3626 (Wednesday, 7:00 – 8:50 PM) ROZH Room 105

1.4 Final Exam

Tuesday, December 4, 2018, 2:30 - 4:30 pm. location TBA

2 Instructional Support

2.1 Instructor(s)

Soha Eid Moussa

Email:	smoussa@uoguelph.ca
Telephone:	+1-519-824-4120 x56141
Office:	THRN 1341
Office Hours:	open door policy or by appointment

2.2 Teaching Assistant(s)

Teaching Assistant:	Lukas Lesar-Kumer
Email:	lkumer@uoguelph.ca
Office Hours:	TBA on Courselink

Teaching Assistant:	Shashikanth Mayanarasaiah
Email:	smayanar@uoguelph.ca
Office Hours:	TBA on Courselink

Teaching Assistant:	Alexander Schnurr
Email:	aschnu02@uoguelph.ca
Office Hours:	TBA on Courselink

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3 Learning Resources

3.1 Required Resource(s)

Course Website (Website)
https://courselink.uoguelph.ca
Course material, news, announcements, and grades will be regularly posted to the
ENGG*3700 Courselink site. You are responsible for checking the site regularly.

Operations Research An Introduction, Tenth Edition (Textbook)
Hamdy A. Taha, Pearson Education Incorporated, 2017

3.2 Recommended Resource(s)

Clickers (Equipment)
Clickers: clickers will occasionally be used to verify understanding and encourage class
participation, please bring your clicker to class regularly

3.3 Additional Resource(s)

Lecture Information (Notes)
All the lecture notes are posted on the web page (week #1-#12).

Assignments (Other)
Download the assignments, all the solutions will be posted.

Miscellaneous Information (Other)
Other information may be posted on the web page.

3.4 Communication & Email Policy:

Please use lectures and lab help sessions as your main opportunity to ask questions about the
course. Major announcements will be posted to the course website. **It is your responsibility to
check the course website regularly.** As per university regulations, all students are required to

4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:
1. Utilize the Simplex Algorithm to solve Linear Programming Problems.
2. Utilize Branch and Bound technique to solve Integer Programming Problems.
3. Formulate a solution method and solve Dynamic Programming Problems.
4. Apply the appropriate optimization technique to optimize a system.
5. Concisely and articulately communicate the results of an optimization solution procedure.

4.2 Engineers Canada - Graduate Attributes (2018)

Successfully completing this course will contribute to the following:

#	Outcome Set Name	Course Learning Outcome
1	Knowledge Base	1, 2, 3, 4
1.4	Recall, describe and apply program-specific engineering principles and concepts	1, 2, 3, 4
2	Problem Analysis	1, 2, 3, 4
2.1	Formulate a problem statement in engineering and non-engineering terminology	1, 2, 3, 4
2.2	Identify, organize and justify appropriate information, including assumptions	1, 2, 3, 4
2.3	Construct a conceptual framework and select an appropriate solution approach	1, 2, 3, 4
2.4	Execute an engineering solution	1, 2, 3, 4
2.5	Critique and appraise solution approach and results	1, 2, 3, 4
5	Use of Engineering Tools	4
5.1	Select appropriate engineering tools from various alternatives	4
5.2	Demonstrate proficiency in the application of selected engineering tools	4
5.3	Recognize limitations of selected engineering tools	4
7	Communication Skills	5
7.1	Identify key message(s) and intended audience in verbal or written communication as both sender and receiver	5
7.3	Construct the finished elements using accepted norms in English, graphical	5

#	Outcome Set Name	Course Learning Outcome
	standards, and engineering conventions, as appropriate for the message and audience	
7.4	Substantiate claims by building evidence-based arguments and integrating effective figures, tables, equations, and/or references	5

5 Teaching and Learning Activities

5.1 Lectures

Topic	Learning Objectives
What is Operations Research?	
Modeling with Linear Programming	1, 4, 5
The Simplex Method and Sensitivity Analysis	1, 4, 5
Duality and Post-Optimal Analysis	1, 4, 5
Integer Linear Programming	2, 4, 5
Dynamic Programming	3, 4, 5
Transportation Method	4, 5
Other topics	4, 5

5.2 Tutorials

Tutorial Sessions will be used to discuss/explain solution methods of the Suggested Problem Sets. Students are encouraged to attempt to solve the problems prior to their tutorial session and come prepared with questions related to challenges faced.

5.3 Other Important Dates

Thursday, 6 September 2018: First class

Monday, 8 October 2018: Thanksgiving holiday

Tuesday, 9 October 2018: Study Break Day

Friday, 2 November 2018: drop date – 40th class

Thursday, 29 November 2018: replaces Study Break Day (Tuesday Schedule in effect)

Friday, 30 November 2018: last day of class (replaces Thanksgiving, Monday Schedule in effect)

Please refer to the undergraduate calendars for the semester scheduled dates.

6 Assessments

6.1 Assessment Details

Midterm test 1 (25%)
Date: Thu, Oct 18, 4:00 PM, RICH 2520
duration 60 minutes

Midterm test 2 (25%)
Date: Tue, Nov 13, 4:00 PM, RICH 2520
duration 60 minutes

Final Exam (50%)
Date: Tue, Dec 4, 2:30 PM - 4:30 PM, TBA on Webadvisor

6.2 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. See the undergraduate calendar for information on regulations and procedures for Academic Consideration: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml

Missed midterm tests: If you miss a test due to grounds for granting academic consideration or religious accommodation, the weight of the missed test will be added to the final exam. There will be no makeup midterm tests.

Passing grade: In order to pass the course, you must obtain a grade of 50% or higher in the course.

6.3 Relationships with other Courses & Labs

Previous Courses:

- **CIS*1500:** Introduction to Programming
- **MATH*2130:** Numerical Methods
- **MATH*2270:** Applied Differential Equations

Follow-on Courses: N/A

7 School of Engineering Statements

7.1 Instructor's Role and Responsibility to Students

The instructor's role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on Courselink but these are not intended to be stand-alone course notes. Some written lecture notes will be presented only in class. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and labs.

7.2 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and lab sessions. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

7.3 Lab Safety

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

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8 University Statements

8.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

8.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The regulations and procedures for Academic Consideration are detailed in the Undergraduate Calendar.

8.3 Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for Dropping Courses are available in the Undergraduate Calendar.

8.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

8.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance, and not later than the 40th Class Day.

More information: www.uoguelph.ca/sas

8.6 Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar.

8.7 Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

8.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.