ENGG*6140 Optimization
Winter 2014

School of Engineering

(Revision 1: January 16, 2014)

1 INSTRUCTOR

Instructor: Soha Eid Moussa, Ph.D., P.Eng.
Office: THRN 1341, ext. 56141
Email: smoussa@uoguelph.ca
Office hours: Open Door policy or by appointment

2 LEARNING RESOURCES

2.1 Course Website

Course material, news, announcements, and grades will be regularly posted to the ENGG*6140 Courselink site. You are responsible for checking the site regularly.

2.2 Required Resources


An electronic version of this book may be rented/accessed at the following web site:
http://www.coursesmart.com/IR/4030454/9780132555951?__hdv=6.8

2.3 Recommended Resources

2) INFORMS – Operations Research
3. Journal of the Operational Research Society
4. Journal of Computational Optimization and Applications
5. International Journal of Production Research
8. IEEE Transactions
10. Google Scholar
11. etc

2.4 Additional Resources

Lecture Information: All the lecture notes are posted on the web page (week #1-#12).
Assignments: Download the assignments, all the solutions will be posted.
Miscellaneous Information: Other information may be posted on the web page.
Lecture Information: All the lecture notes are posted on the web page (week #1-#12).
Lab Information: N/A
Assignments: Download the assignments, all the solutions will be posted.

2.5 Communication & Email Policy:

Please use lectures 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 check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

3 ASSESSMENT

3.1 Dates and Distribution

**Test 1:** 25%
   Wed February 5, 12:00-1:20, in class

**Test 2:** 25%
   Wed March 5, 12:00-1:20, in class

**Project:** 50%
   Presentations begin in class Mon March 10
   electronic submission of Report due April 2 by 4:00 pm
3.2 Course Grading Policies

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 in writing, with your name, id#, and e-mail contact. See the graduate calendar for information on regulations and procedures for Academic Consideration:
http://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/sec_d0e1415.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

Passing grade: In order to pass the course, you must obtain a grade of 65% or higher in the course.

Missed midterm tests: If you miss a test due to grounds for granting academic consideration or religious accommodation, a makeup test covering topics from both tests will be scheduled for the final exam period.

Lab Work: N/A

Late Lab Reports: N/A

4 AIMS & OBJECTIVES

4.1 Calendar Description

This course serves as a graduate introduction into combinatorics and optimization. Optimization is the main pillar of Engineering and the performance of most systems can be improved through intelligent use of optimization algorithms. Topics to be covered: Complexity theory, Linear/Integer Programming techniques, Constrained/Unconstrained optimization and Nonlinear programming, Heuristic Search Techniques such as Tabu Search, Genetic Algorithms, Simulated Annealing and GRASP.

4.2 Course Aims

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

4.3 Learning Objectives

At the successful completion of this course, the student will have demonstrated the ability to:

1. Utilize the Simplex Algorithm to solve Linear Programming Problems.
2. Utilize Branch and Bound technique to solve Integer Programming Problems.
4. Apply the appropriate optimization technique to optimize their system.
5. Concisely and articulately communicate the results of their optimization solution procedure.

### 4.4 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/D2L but these are not intended to be stand-alone course notes. 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 project.

### 4.5 Students’ Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and tutorials. 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.

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

**Recording of Materials:** Presentations which are made in relation to course work—including lectures—cannot be recorded in any electronic media without the permission of the presenter, whether the instructor, a classmate or guest lecturer.

### 4.6 Relationships with other Courses

**Previous Courses:** N/A
**Follow-on Courses:** N/A

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### 5 Teaching and Learning Activities

#### 5.1 Timetable

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>12:00 – 13:20</td>
<td>THRN 1002</td>
</tr>
<tr>
<td>Wednesday</td>
<td>12:00 – 13:20</td>
<td>THRN 1002</td>
</tr>
</tbody>
</table>
5.2 Lecture Schedule

The proposed schedule of topics is shown below.

<table>
<thead>
<tr>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is Operations Research?</td>
</tr>
<tr>
<td>Modeling with Linear Programming</td>
</tr>
<tr>
<td>The Simplex Method and Sensitivity Analysis</td>
</tr>
<tr>
<td>Duality and Post-Optimal Analysis</td>
</tr>
<tr>
<td>Integer Linear Programming</td>
</tr>
<tr>
<td>Dynamic Programming</td>
</tr>
<tr>
<td>Transportation Method</td>
</tr>
<tr>
<td>Advanced topics</td>
</tr>
</tbody>
</table>

5.3 Design Lab Schedule

N/A

5.4 Lab Schedule

N/A

5.5 Other Important Dates

**Drop Date:** The last date to drop one-semester courses, without academic penalty, is Friday, March 7, 2014. Two-semester courses must be dropped by the last day of the add period in the second semester. Refer to the Graduate Calendar for the schedule of dates: http://www.uoguelph.ca/registrar/calendars/graduate/2013-2014/sched/sched-dates-w11.shtml

Monday, January 6 2014: First day of class
Monday, February 17 – Friday, February 21 2014: Winter Break
Friday, March 7: drop date – 40th class,
Friday, April 4 2014: last day of class
6 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.

7 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. The Academic Misconduct Policy is detailed in the Graduate Calendar: http://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/sec_d0e1687.shtml

8 ACCESSIBILITY

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability for a short-term disability should contact the Centre for Students with Disabilities as soon as possible

For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.uoguelph.ca/csd/
9 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, classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

10 RESOURCES

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:
http://www.academicintegrity.uoguelph.ca/

The School of Engineering has adopted a Code of Ethics that can be found at:
http://www.uoguelph.ca/engineering/undergrad-counselling-ethics

The Graduate Calendar is the source of information about the University of Guelph’s procedures, policies and regulations which apply to graduate programs:
http://www.uoguelph.ca/registrar/calendars/graduate/current/