ENG M 540 Course Outline
Optimization Models and Algorithms

September 2013 – December 2013
Thursdays 6:00 PM to 9:00 PM
Room: MEC 2-1

Instructor: John Doucette, Associate Professor, Engineering Management
Office: 5-8F Mechanical Engineering Building (5th floor West)
Office Hours: my door is always open… stop by any time
Web-Site: eClass system website

Textbook (available at the UofA Bookstore):

Marking Scheme:
- Assignments*: 10%
- Project: 25%
- Midterm Exam: 25%
- Final Exam: 40%

* Grades will roughly follow the recommended grade distribution provided by the registrar's office.

**Assignments must be handed in electronically via the eClass course web-site by the end of class on the due date. Submissions will be accepted in pdf format only. Late assignments will be rejected, and except in compelling circumstances (see below) will result in a grade of zero.

Re-examination policy:
In the event of a failing grade (F), an exam rewrite may be granted subject to the student meeting all re-examination requirements (except for the requirement of a 40% final). Application must be with the Faculty of Engineering and/or Dept. of Mechanical Engineering.
In such a case, the exam in which the student received the lowest grade will be replaced by a 3-hour comprehensive exam (scheduled after the semester is complete).

Missed assignment/exam policy:
An excused absence from an exam may only be granted if there are sufficient grounds for it as per university policy, and may require supporting documentation. Note that vacations or non-emergency travel are not sufficient grounds for an excused absence. An excused absence may be granted for no more than one exam, in which case the missed exam will be replaced by a 3-hour comprehensive exam covering the entirety of the semester's material (scheduled after the semester is complete). An excused absence may be granted for no more than one assignment; its weight will be distributed equally to the other assignments. An excused absence will not be granted for an exam if a re-examination is granted.
**Course Objectives:** The purpose of this course is to introduce graduate-level engineering students to optimization and linear programming techniques. ENG M 540 is also open to senior undergraduate students as a technical elective.

**Course Content:** The applications of optimization methods in solving engineering management problems. Both modeling techniques and algorithms will be covered. Specific topics include linear programming, formulation and modeling techniques, the simplex method, sensitivity analysis, duality, transportation and network problems, algorithmic and heuristic methods, integer programming, and/or non-linear programming.

**Course Format:** This course will be lecture based, primarily using white-board instruction. This will be supplemented with PowerPoint slides for key illustrations, in-class discussion, and problem-solving examples. All recommended reading and other external resources will be contained in the course text-book, supplemental handouts, and on the course web-site, which I will endeavour to keep updated with relevant materials in advance.

**Study Materials:** Previous exam and assignment solutions are not permitted and will not be provided. A sample term project is available on the eClass system.

### Tentative Course Schedule (subject to change):

<table>
<thead>
<tr>
<th>Lecture #</th>
<th>Date</th>
<th>Topic</th>
<th>Chapter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>05 Sept 2013</td>
<td>Course Introduction</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Introduction to Optimization and Modeling</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>12 Sept 2013</td>
<td>Linear Programming - Graphical</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>19 Sept 2013</td>
<td>Linear Programming - Models</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>16 Sept 2013</td>
<td>Simplex Method</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>03 Oct 2013</td>
<td>Simplex Method (cont’d)</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>10 Oct 2013</td>
<td><strong>Midterm Exam</strong></td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>17 Oct 2013</td>
<td>Sensitivity Analysis</td>
<td>5-6</td>
</tr>
<tr>
<td>8</td>
<td>24 Oct 2013</td>
<td>Transportation Problems</td>
<td>7</td>
</tr>
<tr>
<td>9</td>
<td>31 Oct 2013</td>
<td>Transportation Problems (cont’d)</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>07 Nov 2013</td>
<td>Network Models</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>14 Nov 2013</td>
<td>Integer Programming</td>
<td>9</td>
</tr>
<tr>
<td>11</td>
<td>21 Nov 2013</td>
<td>catch-up, review, project help</td>
<td>-</td>
</tr>
<tr>
<td>12</td>
<td>28 Nov 2013</td>
<td><strong>Final Exam</strong></td>
<td>-</td>
</tr>
</tbody>
</table>

Audio or video recording of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan. Recorded material is to be used solely for personal study, and is not to be used or distributed for any other purpose without prior written consent from the instructor.

**Note:** The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at www.ualberta.ca/secretariat/appeals.htm) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

Policy about course outlines can be found in Section 23.4(2) of the University Calendar.
Course Delivery Standards

Feedback to your Instructor:

Your questions, comments and suggestions regarding the course content and delivery, as well as the teaching and learning processes and related outcomes will be greatly appreciated. For learning facilitation and the benefit of all students in the class, selected comments and feedback (and their responses) will be published on the course web-site (with any identifying information from the sender removed).

Standards Application:

This course is delivered in the spirit of the principles contained in the ISO 9001: 2000 (quality management system), ISO 10001: 2007 (customer satisfaction codes of conduct) and ISO 10002: 2004 (complaint handling) standards. For example, your questions about the course will be answered in accordance with the “Response Code” for student satisfaction, shown below, which was established as per ISO 10001. The review of assignments and mid-term exam will follow the “Review Code”, which is also setup in accordance with ISO 10001. Your comments, complaints, and/or suggestions for course improvement will be acknowledged as per the time limit set in the “Response Code”, and processed in accordance with a system established to follow ISO 10002.

The application of quality assurance and management standards in this course is aimed to provide you with the best possible learning environment.

Response Code:

- I will respond to any email enquiry regarding the course within 24 hours of receiving it. Failure to do so will require an explanation in the next class and a plan for corrective action to ensure it does not occur again.
  - This code is valid 24 hours a day, 7 days a week, from the first day of class until the last day of class. However, this code won’t apply in cases of unforeseen natural or technical events beyond my control that would prohibit such a prompt review. Any such events known in advance (e.g., conference travel, dead computer, etc.) will be communicated to the class as early as possible. In addition, the code does not apply during the two weekends with a statutory holiday (Thanksgiving Day and Remembrance Day), since I may be away for either or both of those weekends.
  - Please let me know as soon as possible regarding any case where I did not respond to your inquiry within the promised time.

Review Code:

- Assignments and the mid-term exam will be graded and returned during or before the first class following the assignment due dates or exam date, and assignment solutions will be posted on-line by the end of the next day after their due dates. Failure to do so will require an explanation in the next class and a plan for corrective action to ensure it does not occur again.
  - This code does not apply in cases of unforeseen natural or technical events beyond my control that would prohibit such a prompt review, and any such events known in advance (e.g., conference travel, dead computer, etc.) will be communicated to the class as early as possible.
  - Please let me know through e-mail in case of any enquiry about this code.