MIE561
Healthcare Systems
Instructor: Prof. Michael Carter, Mechanical & Industrial Engineering

Purpose: The purpose of MIE 561 is to give students an opportunity to integrate the engineering tools learned in previous courses by applying them to real world problems. While the specific focus of the case studies used to illustrate the application of engineering will be the Canadian health care system, the approach to problem solving adopted in this course will be applicable to any setting.

Objectives: This course will:

1) Provide a framework for identifying and resolving problems in a complex, unstructured decision-making environment.
2) Give students the opportunity to apply a problem identification framework through real world case studies.
3) Provide insight into the appropriate uses (and abuses) of engineering techniques in a practical setting.
4) Prepare students to become productive, practising engineers.
5) Make students aware of the implications of context on the practice of engineering.

Outcomes: After completing MIE 561, students will be able to:

1) Identify, describe and apply an appropriate model for analyzing unstructured problems in a complex decision making environment.
2) Define, describe, analyse and criticize methods for resolving complex problems in a practical situation.
3) Describe appropriate (and inappropriate) applications of engineering techniques.
4) Effectively communicate an understanding of a complex problem and a method of resolution, *in writing,* at a level consistent with current business practice.
5) Briefly describe Canada's health care system and the impact of its structure on decision making.

Evaluation: This course is preparation for entry into the profession of engineering in Ontario. Students will be expected to perform at a level consistent with current business practices for entry-level engineers in industry. The content, style and presentation of material will be considered when material is graded. Creative, original ideas are encouraged. Attention to detail combined with a good understanding of a problem and its underlying context are mandatory. Grammar, spelling and neatness will count!

2.5% - Effective management of group case study discussion.
2.5% - Professional presentation of case study results to class
5% - Participation in group case study discussion.
40% - Case study reports.
10% - Midterm exam.
40% - Final exam.

Structure: The course will be divided into two parts: background and application. The first three weeks of the course will focus on a review of background materials. After that, we will have a series of guest speakers from industry who will present practical problems as case studies. Case studies will be presented on January 16, February 6, March 5, and March 26. Students, in case study teams of two or three, will be responsible for analysing the problem presented by the speakers, determining a reasonable method for resolving the problem, and describing the strengths and weaknesses of their proposed approach. (Please note that you are not responsible for providing an answer for the problem - a description of how the answer might be obtained is all that is required.) Groups will have roughly three weeks to produce a formal case study report of the case.

To foster an exchange of ideas each of the case study teams will be responsible for leading a seminar discussion of one case and presenting their results to their peers for a different case. Seminar discussions will be held on the Monday following the case presentations. Case study groups will be divided into two sections (A and B) for the seminar and they will meet at the same time in different rooms. On the Tuesday that the cases are due, selected groups will present their results to the class.

Case Study Teams: An important aspect of professional practice is the ability to work in teams. As a practising engineer, students can expect much of their work to be done in teams, groups, task forces, or committees. Students will be assigned to groups of two or three, and you will be in a different group for each case. Teams will be responsible for analysing each of the four cases and writing a single, unified report reflecting the input of all members. Some students do not have a background in Industrial Engineering. This is no problem; however, each group will contain at least one participant from Industrial. Common marks for case studies will be assigned to each team member, unless extraordinary circumstances indicate that an adjustment is merited. Please see the instructor if you encounter difficulties.

Discussion Groups: As noted above, the class will be split into two groups, since a large group is inappropriate for a proper discussion. Each week one or two case study teams will be responsible for leading a discussion of the relevant issues surrounding the most recently presented cases. Students not leading the discussion will be responsible for participating in the discussion (i.e.: participation marks will be given).

The Midterm: The midterm will take place on Monday February 27, 2011 from 5:15-6:45 in the Exam Centre, room EX 310.

The Final: The exam will be Type A - closed book. No calculators will be permitted. Part A, consisting of a series of short answer questions, will be based on the material covered in the background review material. Part B will be a set of short essay questions based on material covered in the case studies, the readings and the guest lectures. Part C will be a case study. Students are expected to apply all of their knowledge to the solution of an abbreviated practical problem.

Required Text: "*Public Health and Preventive Medicine in Canada*" by Chandrakant Shah. (You can find them in the Medical Books Department on the second floor of the Bookstore. The Engineering rep used to try keeping the Shah texts in Engineering but people kept moving them thinking that they had been mis-shelved – so she gave in! ☺)

Recommended:

Prescription for Excellence: How Innovation Is Saving Canada's Health Care System by Michael Rachlis, Harper-Collins Canada. (www.michaelrachlis.com)
Operations Research: Applications and Algorithms (2nd Addition) by Wayne Winston is a useful reference.

Readings: Assigned readings will be provided throughout the course. Students will be expected to read the material and will be tested on content from the readings.

Website: The course website is accessed using Blackboard. All registered students should have access. The course outline, case notes, old exams, etc. will be available.