SCHOOL OF ENGINEERING
UNIVERSITY OF GUELPH

ENGG*4110 Biological Engineering Design IV
ENGG*4120 Engineering Systems and Computing Design IV
ENGG*4130 Environmental Engineering Design IV
ENGG*4150 Water Resources Engineering Design IV

Course Outline - Winter 2009

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Note: All course material is posted on Blackboard site

Course Restrictions: This course may only be taken by engineering students in their final academic semester. Each design group and project must be approved by the course coordinator during the course selection pre-registration period.

Textbook (Required):

Samuels, B.M. and Sanders, D.R. (2007) *Practical Law of Architecture, Engineering and Geoscience*, Pearson-Prentice Hall, Toronto, ON. ISBN 0-13-197623-0, 364p

Textbook (Recommended):

Andrew, G.C. (2005) *Canadian Professional Engineering and Geoscience: Practice and Ethics*. Nelson/Thomson Canada Ltd. Toronto. ISBN 0-17-641594-7

Course Objectives: The goal is to prepare students to deal with open-ended, multi-faceted design problems similar to those that they will encounter as working professionals. To that end, students will: (1) apply their academic knowledge to the solution of a specific engineering problem, (2) collect and analyse information and synthesize solutions taking into account significant technological, commercial, social and environmental factors, (3) summarize and communicate the design solution in written and graphical form as a final report, and, (4) present their design in a poster format at the end of the semester. The following specific activities will be required of the design teams:

1. **Submit a proposal** - An engineering project proposal will be submitted to the faculty advisor for grading (and to the external advisor if there is one). The proposal will define the scope, duration, schedules and deliverables for the interim and final design reports.

2. **Submit an interim project report** - An interim report will be prepared by the midpoint of the semester and submitted to the faculty advisor for grading (and to the external advisor) detailing progress and presenting information and design alternatives for discussion.

3. **Submit a final design report** - The final design report and all deliverables agreed to at the proposal stage will be submitted at the end of the semester. The faculty advisor will evaluate the work submitted and assign a grade to it.

4. **Create a poster** - Each team will create a poster presenting their work. Members of the faculty, the University community and local engineers will be invited to view the posters, discuss them with the participants and offer comments to the course coordinator who will evaluate both the poster and the group's support of their work.

5. **Submit Progress Report Memos** - Each team will prepare and submit progress report memoranda **to the course coordinator** at the submission of the proposal, at the submission of the interim report and on the last day of the semester. The contribution of each student in the group must be clearly stated, along with a summary description of each aspect of the work completed and discussion of overall progress. A group evaluation form is available for this purpose. The group members must all sign the form indicating agreement and acceptance of the content.

In addition to their work on the team design project, all students will study material on professional practice, engineering ethics, law and liability relevant to the professional practice examination (PPE). A final written examination will be based on that material.

Course Format: Classes are held each week on **Tuesday** and **Thursday** from **13:00-14:20** in **MACS Room 209.** In addition to classroom time, it is expected that each team member will spend an average of **15 hours per week** on the design project over the semester, i.e., this course is equivalent to two regular senior engineering science courses (3-5). The Design Studio and Resource Library is reserved for design group activity days and evenings. Contact Ms. Payne for after-hours card access.

Students work in teams of three or four persons. Smaller (or larger) groups are only considered by the course coordinator under extraordinary circumstances, and approval is conditional on availability of sufficient resources. Inter-disciplinary groups are encouraged if a particular problem has sufficient scope to provide appropriate experience to all team members. ***It is expected that the selection of the team, the project and the faculty advisor was arranged before the start of the semester.***

Each team is advised by a School faculty member responsible for helping to delineate the terms of reference for the project, providing guidance where necessary, and evaluating all written reports. The projects are self-administered: each team must carry out planning and execution of the project on its own. There will be no extension of the deadlines for submissions, except for serious health or compassionate reasons, with the appropriate documentation. ***Team members and their faculty advisor should discuss and record concerns about the group's progress at the interim report stage and take appropriate action***.

School Resources: Students are encouraged to design and build components or prototypes of devices if possible. Facilities of the School machine shop, access to all undergraduate laboratories and associated instruments and equipment are available subject to approval. The need for, and costs of, materials, special services or use of other facilities should be foreseen.

Requests must be made in writing to the course coordinator specifying the exact nature of the service required. Small grants are available to purchase materials or components which are essential to the project but cannot be sourced within the School. A brief proposal in memo form must be submitted to the course coordinator for such items **within the first two weeks of the semester**. The funds available depend upon the School's budget, and are not guaranteed.

Report Requirements: Reports will follow the standard engineering report format followed in ENGG*2100 and ENGG*3100. Text will be supplemented with diagrams, charts, graphs and illustrations that contribute to overall clarity. Appendices should be typed if they are descriptive text but may be neatly handwritten in **black ink** if they contain a large number of engineering calculations. All calculations and drawings must be checked and approved (signed and initialled) as in standard engineering practice.

Grade Assigned: The final grade will be determined from the team work submitted to the faculty advisor and course coordinator, from evaluation of the poster presentation, and from the final examination and will be weighted as follows:

Proposal	10%
Interim Report	15%
Final Report	40%
Poster Presentation	10%
Memos	5%
Final Examination	20%

Individual grades assigned to members of a team for group work may vary only if substantial differences in effort are documented by the signed contribution sheets submitted with memos. Adjustments will be made by the course coordinator in consultation with the faculty advisor and the team members.

Week No.	Student Design Activity and Milestones
0	Selection of project, formation of team, and selection of faculty advisor
1	Confirm terms of reference and schedule faculty advisor meeting times. Prepare project proposal, including task list, logic network, and time schedule. **Submit proposal to faculty advisor and summary memo to course coordinator by Monday Jan. 12, 2009, 12:00 h.**
2-6	Analyze and research problem, develop design alternatives, evaluate and specify prime contender. **Submission of interim report and memo on or before Friday, Feb. 13, 2009, 12:00 h.**
7-12	Develop and specify final design, evaluate and refine. **(a) Poster presentation Friday, April 3, 2009, 10:00-13:00 h. Location TBA** **(b) Submission of final design report to faculty advisor and course coordinator, and summary memo to course coordinator before Monday, April 6, 2008, 12:00 h.**
	Final Exam Thursday April 9, 2009 08:30 to 10:30 h. Location TBA

Attendance: Note! Attendance of all group members at the final poster presentation and evaluation is a course requirement.

Week No.	Classroom Activity
1	History and evolution of the engineering profession in Canada. *The Engineering Proposal*
2	Regulation of engineering in Ontario; the Professional Engineers Act; Regulation 941, Professional Registration.. *Creativity and idea generation for design*
3	Professionalism, Moral Reasoning and Ethics. *Interim (Progress) Report*
4	The Engineering Code of Ethics. *The Iron Ring Ceremony*
5-7	Ethical dilemmas and difficult decisions, PEO Video Resource Case Study, Case studies: lessons from the blue pages, disciplinary measures. *Design stages - tools and techniques.*
8	Tort Law and Professional Liability. *The Final Design Report and Poster*
9-11	Contract Law
12	Professional Practice Examination, *Design Failures and Engineering Advances*

Major Holy Days: The student must contact the instructor within the first two weeks of class if academic consideration is to be requested due to religious reasons.