ENGG*3100 Engineering and Design III

SCHOOL OF ENGINEERING, UNIVERSITY OF GUELPH

Winter 2011

COURSE DESCRIPTION

This course combines the knowledge gained in the advanced engineering and basic science courses with the design skills taught in ENGG*1100 and ENGG*2100 in solving open-ended problems. These problems are related to the student's major. Additional design tools are presented, including model simulation, sensitivity analysis, linear programming, knowledge-based systems and computer programming. Complementing these tools are discussions on writing and public speaking techniques, codes, safety issues, environmental assessment and professional management. These topics are taught with the consideration of available resources and cost.

INSTRUCTORS

Dr. Gordon L. Hayward, THRN 2339, ext. 53644, ghayward@uoguelph.ca
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TEACHING ASSISTANTS

Luke Harris, lharri05@uoguelph.ca
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LIBRARY RESEARCH & WRITING CONSULTANTS

Peggy A. Pritchard, McLaughllin LIbrary, LIB Rm: 279, ppritcha@uoguelph.ca
Margaret Hundleby, McLaughllin LIbrary, LIB Rm: 120H, hundleby@uoguelph.ca

COURSE RESOURCES

Lectures: MWF, 8:30AM - 9:20AM, LA 204 or THRN 1002-6 (see page 3)
LAB: ENGG*3100*0101, Tues 01:00PM - 02:50PM, THRN, Room 1002
LAB: ENGG*3100*0102, Mon 12:30PM - 02:20PM, THRN, Room 1006
LAB: ENGG*3100*0104, Tues 03:30PM - 05:20PM, THRN, Room 1006

Course web site: http://courselink.uoguelph.ca/

REQUIRED TEXTBOOK

There is no required textbook for this course. However, some of the course material will be made available and can be accessed on Courselink:
https://courselink.uoguelph.ca/shared/login/login.html

COURSE FORMAT

Successful completion of ENGG3100 requires satisfactory performance in mandatory group components. Students will form groups of 3 students and assume the identity of a consulting engineering firm hired by the School of Engineering, University of Guelph, providing services on one of the following topics:

1. Design a rainwater harvesting system for the roof of the School of Engineering Building and assess environmental benefits and cost savings.
2. Design a Green Roof System for the School of Engineering Building and assess environmental benefits and cost savings.
3. Design a geo-thermal system for the School of Engineering Building and assess environmental benefits and cost savings.
4. Design a gray-water reuse system for the School of Engineering Building and assess environmental benefits and cost savings.
5. Stormwater Management Systems for the School of Engineering Building and assess environmental benefits.
6. Design Green Wall systems for the School of Engineering Building that would bring beauty and comfort to our indoor space.
7. Design an Intelligent Lighting System with motion/occupancy sensors and programmable lighting system to control, monitor, optimize and reduce energy consumption.
8. Design roof-top solar panels for a Green Energy source for our building.
9. Design a bio-containment Level II laboratory (including equipment) for handling infectious materials.
10. Design a laboratory (including equipment) to house an existing large 6 degree of freedom robot for whole body vibration testing including a motion capture camera.
11. Design a laboratory for x-Ray and micro-CT image acquisition and processing for testing human tissue under various mechanical loads.

Each group needs to submit a detailed hard copy (about 7 pages) of their proposal that should include a description of the project, literature review, objectives, methodology, deliverables, and detailed weekly timelines of tasks with deliverables (Gant chart) and also present (brief oral presentation) to the class on **Monday January 24th**.

Due diligence is required that each member keeps a log book (hard bound) and presented to the instructors during the weekly Professor in the Loop meetings. This will be valuable to you as designers and to us in the event problems arise. Good notes make design easier and our job of conflict resolution possible (although we hope this will not be necessary).

TOPICS OF STUDY

Week	Date	Lecture Topics	Location
1	Jan. 10 Jan. 12 Jan. 14	Mon: Design Project Ideas Wed: Project Ideas (PITL) Fri: Talk by Jeremy Carkner	LA 204 THRN 1002 & 1006 LA 204
2	Jan. 17 Jan. 19 Jan. 21	Mon: Professor in the Loop (PITL) Wed: Writing a Successful Proposal Fri: Modelling by Calculation	THRN 1002 & 1006 LA 204 LA 204
3	Jan. 24 Jan. 26 Jan. 28	Mon: Student Proposal Presentations Wed: Research Strategies & **Quiz 1** (Peggy Pritchard) Fri: Modelling by Packages	THRN 1006 & LA 204 THRN 2313 LA 204
4	Jan. 31 Feb. 2 Feb. 4	Mon: Professor in the Loop (PITL) Wed: Sensitivity Analysis & **Quiz 2** Fri: Data Collection and Analysis, Project Management	THRN 1002 & 1006 LA 204 LA 204
5	Feb. 7 Feb. 9 Feb. 11	Mon: Professor in the Loop (PITL) Wed: Optimization & **Quiz 3** Fri: Materials and Methods	THRN 1002 & 1006 LA 204 LA 204
6	Feb. 14 Feb. 16 Feb. 18	Mon: Professor in the Loop (PITL) Wed: Writing Tech. Reports & **Quiz 4** (Margaret Hundleby) Fri: Linear Programming	THRN 1002 & 1006 LA 204 LA 204
-	**Feb. 21**	**Winter break: no classes scheduled this week**	
7	Feb. 28 Mar. 2 Mar. 4	Mon: Professor in the Loop (PITL) Wed: Codes and Safety Fri: Results and Discussions; IP Lecture	THRN 1002 & 1006 LA 204 LA 204
8	Mar. 7 Mar. 9 Mar. 11	Mon: Professor in the Loop (PITL) Wed: Cost Analysis Fri: Conclusions and Recommendations	THRN 1002 & 1006 LA 204 LA 204
9	Mar. 14 Mar. 16 Mar. 18	Mon: Professor in the Loop (PITL) Wed: Writing Final Reports & **Quiz 5** (Margaret Hundleby) Fri: Knowledge Based Systems	THRN 1002 & 1006 LA 204 LA 204
10	Mar. 21 Mar. 23 Mar. 25	Mon: Professor in the Loop (PITL) Wed: Presentation Skills – PowerPoint 101 Fri: Advanced Presentation Skills	THRN 1002 & 1006 LA 204 LA 204
11	Mar. 28 Mar. 30 Apr. 1	Mon: Term Project Presentations Groups 1 to 6 Wed: Term Project Presentations Groups 7 to 12 Fri: Term Project Presentations Groups 13 to 15	THRN 1006, LA 204 THRN 1006, LA 204 THRN 1006, LA 204
12	Apr. 4 Apr. 6 Apr. 8	Mon: Term Project Presentations Groups 16 to 21 Wed: Term Project Presentations Groups 22 to 27 Fri: Term Project Presentations Groups 28 to 30	THRN 1006, LA 204 THRN 1006, LA 204 THRN 1006, LA 204

WEEKLY PROGRESS MEETINGS

Typically the Monday lectures have been identifies as PITL, that is, 'Professor in the Loop'. Here groups will meet with the instructors or teaching assistants to discuss progress, problems faced and help required. To expedite this process, each group is required to submit a 1 page outline of progress, problems faced and help required for each PITL session.

TERM PROJECT REPORT AND PRESENTATION

Each group will submit a memo style Technical Report due Friday, March 11th and a Final Report due on Monday, March 28th. When submitting the proposal, technical report and final report, a letter of submission is required. This is to include a 1 or 2 line outline of what's in the report and of each group member's responsibilities and contributions. The term project reports will include:

- Cover material (cover letter, title page, table of contents, executive summary)
- The idea and topic (applied, practical, economical, clear objectives)
- Introduction (purpose, background, literature review, objectives, scope of work)
- Content (provides specific, accurate, precise information)
- Organization (individual paragraphs integrate smoothly into the overall report)
- Writing (organization lead to clear writing; sources properly cited using CSE style)
- Professional appearance (high quality of text, figures and tables presented)
- Data (use of a variety of sources appropriate to the project; cited as appropriate)
- Analysis (use of a variety of engineering knowledge and expertise)
- Results (clarity and accuracy of interpretation and discussion of the results)
- Conclusion (clarity of expression and understanding of concepts)
- Recommendations
- References (complete and properly formatted using CSE style)
- Format (typed, line spacing, margins, page numbers, grammar, spelling, professionally written, organized, readable, completeness, clarity, conciseness, and consistency)

Term projects will be presented to the class by all 3 members of the group (roughly 4 min for each student plus 3 min for the question period), according to the following schedule:

Date	Term Project Presentation Schedule	
	THRN 1006	**LA 204**
Mon. March 28th	Groups 1, 2, and 3	Groups 4, 5, and 6
Wed. March 30th	Groups 7, 8, and 9	Groups 10, 11, and 12
Fri. April 1st	Groups 13, 14, and 15	Groups 16, 17, and 18
Mon. April 4th	Groups 19, 20, and 21	Groups 22, 23, and 24
Wed. April 6th	Groups 25, 26, and 27	Groups 28, 29, and 30
Fri. April 8th	Groups 31, 32, and 33	Groups 34, 35, and 36

EVALUATION

The final grade will be determined from the results of the Project Proposal (10%), Technical Report (25%), Final Report (35%), Project Presentations (10%), and Quizzes associated with research and writing sessions (20%) weighted as follows:

• Project Proposal,	Due Mon. Jan. 24th	10%
• Quiz 1* on Research strategies,	Due Wed. Jan. 26th	4%
• Quiz 2* on Modelling,	Due Wed. Feb. 2nd	4%
• Quiz 3* on Sensitivity Analysis & Optimization	Due Wed. Feb. 9th	4%
• Quiz 4* on Writing technical reports,	Due Wed. Feb. 16th	4%
• Technical Report,	Due Fri. Mar. 11th	25%
• Quiz 5* on Writing final reports,	Due Wed. Mar. 16th	4%
• Final Report,	Due Mon. Mar. 28th	35%
• Project Presentations,	Due weeks 11 & 12	10%

*Quiz 1, 2, 3, 4 and 5 must be completed BY 11:59 PM the day they are due. The quizzes will not be available after that time and a mark of zero (0) will be recorded.

PLEASE NOTE

The regulations concerning academic misconduct as outlined in the current University of Guelph undergraduate calendar will be strictly enforced.
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml