

ENGG*41X ENGINEERING DESIGN IV

(1.0 Credits)



4110



4120



4130



4150



4160



4170



4180

Winter 2017



(Revision 0: 12DEC2016)

1 INSTRUCTIONAL SUPPORT

1.1 Instructor

Instructor: Richard G. Zytner, PhD, P.Eng.,FEC.
Office: CPES Dean Suite; Ext. 56430
Email: ecodner@uoguelph.ca and rzytner@uoguelph.ca
Office hours: Call Ext. for an appointment.

1.2 Lab Technician - Not Applicable

1.3 Teaching Assistants - Not Applicable

2 LEARNING RESOURCES

2.1 Course Website

Course material, news, announcements, and grades will be regularly posted to the ENGG*41X *Courselink* site. You are responsible for checking the site regularly. **As per University regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly;** e-mail is the official route of communication between the University and students.

2.2 Required Resources

- 1) Marston, D.L. (2008) Law for Professional Engineers (Fourth Edition). McGraw-Hill Ryerson. Toronto. ISBN 978-0-07-098521-6
- 2) Andrews, G.C. (2009) Canadian Professional Engineering and Geoscience, Practice and Ethics 5th Edition, Nelson, ISBN 13: 978-0-17-650990-3

2.3 Recommended Resources

- 1) Samuels, B. M and Sanders, D. R. (2011) Practical Law of Architecture, Engineering and Geoscience, Pearson, ISBN 978-0-13-700408-9

2.4 Additional Resources

Lecture: Notes are not available for this course. However, supporting information is posted on Courselink site.

Memos: Download the memo requirements according to the schedule given in this handout and posted on Courselink.

Projects: Download the assignments according to the schedule given in this handout and posted on Courselink.

School: 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. Small grants may be available to purchase materials or components which are essential to the project but cannot be sourced within the School. **Requests must be made to the course coordinator using the posted Supplies_Tech Request Form and/or Equipment Request Form, specifying the exact nature of the service required.** The sooner these requests have been submitted the better. The funds available depend upon the School's budget, and are not guaranteed.

2.5 Announcements

Information related to ENGG*41x0 will be posted on Courselink. In addition, per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly. This e-mail is the official route of communication between the University and students.

3 ASSESSMENT

3.1 Dates and Distribution

The final grade will be determined from the team work submitted to the faculty advisor and course coordinator. The submitted work will be evaluated according to the Rubrics posted on Courselink, with the assessment weighted as follows:

Interim Report	20% [#]	17 Feb. 2017 @ 17:00 h
Final Report	42% [#]	09 Apr. 2017 @ 09:00 h
Poster Presentation	10%	06 Apr. 2017 @ 10:00 h
Memos/Reflection	8%	
Proposal Memo:		16 Jan. 2017 @ 17:00 h (formative only)
Reflection:		27 Feb. 2017 @ 17:00 h (worth 5%)
Final Memo:		09 Apr. 2017 @ 09:00 h (worth 3%)
On-Line Quizzes	P/F	27 Jan. 1 Mar. and 24 Mar. (On course readings; taken until passed; if not INC given for course)
Exit Survey ^o	NIL%	07 Apr. 2017 @ 24:00 h
Final Examination	20%	10 Apr. 2017 @ 11:30 h; Place TBD

Failure to submit a distribution of effort (DOE - completed via PEAR - details available on Courselink) will result in an incomplete grade for this component of the course. Individual grades in a group will only be adjusted by the course coordinator if substantial differences in effort are documented in the individual log books (failure to provide an up to date log book will stop the grade adjustment process), information submitted via the electronic DOE and evidence of the steps taken to address the uneven effort. These steps include a group discussion with the presence of the project advisor or course instructor. It is unacceptable to expect grade adjustment if there is a perception that one or more group members worked harder than someone else. There must be explicit evidence to support the claim.

^o A special component of 41x0 is the Exit Survey, which provides important information to the Graduate Attribute component of the accreditation requirements in the School. More information on the Exit Survey is given in Section 4.4. **Failure to complete the Exit Survey will result in an Incomplete Grade for the entire course.**

3.2 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. See the undergraduate calendar for information on regulations and procedures for Academic Consideration:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor at 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, students must obtain an overall grade of 50% or higher on all the course work outlined in Section 3.1.

Late Reports: There will be no extension of the deadlines for submissions, except for serious health or compassionate reasons, with the appropriate documentation. Just like the consulting world where projects are not awarded if the proposals are late, a grade of zero will be given for late submissions.

Certification: Students must write their PEO SMP (Student Membership Program) number on all submitted work. This signifies that the SOE Code of Ethics was adhered to. For group projects, students must also state that they contributed to the group effort in an equitable manner.

3.3 Course Format

Classes are scheduled for each week on Tuesday. In addition to classroom time, where active learning is being promoted, it is expected that each team member will spend an average of 15 to 20 h per week on the design project over the semester, as this course is equivalent to two regular senior engineering science courses. The active learning component will require group discussions and presentations on material related to the lecture material.

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.***

Teams are encouraged to use the design studios scattered throughout the Engineering Complex. Access to these rooms can be facilitated through the faculty advisor.

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. Accordingly, team members are required to keep a log book on the activities each individual completes. ***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.*** The respective log books will be reviewed in deciding the appropriate action.

4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 Calendar Description

This is the capstone design course for the Engineering program. Teams of normally 3-4 students apply engineering analysis and design principles to an engineering problem in their discipline. A completely specified solution at the level of preliminary or final design is required, including assessment of socio-economic and environmental impact. This is a small group design that requires reports and a poster presentation to a professional standard. Ethics and legal case studies relevant to professional engineering

practice are presented during the lectures.

Prerequisite(s): ENGG*4000

Restriction(s): Registration in semester 8 (last semester) of the B.Eng. program with a maximum 3.25 credits registration. Students must have a minimum cumulative average of 60% or higher in ALL ENGG courses. Instructor consent required. Restriction waiver requests are handled by the Director, School of Engineering, or designate.

4.2 Course Aims

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:

- i) **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.
- ii) **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.

Reports will follow the standard engineering report format followed in 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.

- iv) **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 verbal support of their work. **Marking of the models and prototypes is not part of the judges mandate.** Models and prototypes are to be graded by the advisor.
- v) **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 final report.
- vi) **Reflection:** Each team member will prepare an individual reflection on project management and how their work experience relates to PEO's work experience requirements.

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.

4.3 Learning 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 work on a complex engineering problem identified in ENGG*4000, (2) collect and analyze information and synthesize solutions taking into account significant technological, commercial, social and environmental factors, (3) prepare an interim report that summarizes the status of the project at week five, (4) summarize and communicate the design solution in written and graphical form as a final report, (5)

concisely explain the various stages of the design (interim and final) in a memo, (6) concisely articulate the design results in a poster that is orally presented to a group of P.Engs. at the end of the semester, (7) explain the responsibilities of engineers to society and demonstrate the expectations in professional practice through class discussions, report submission and the final exam, (8) participate in and further develop group interaction skills, which are monitored through the PEAR (Peer Evaluation Assessment and Review) software and (9) prepare a reflection on project management and work experience relative to PEO's work experience requirement for licensure..

4.4 Graduate Attributes

Successfully completing this course will contribute to the following CEAB Graduate Attributes:

Graduate Attribute	Learning Objectives	Assessment
1. Knowledge Base for Engineering	1,2	Project
2. Problem Analysis	1,2	Project
3. Investigation	1,2	Project
4. Design	1,2,3,4	Project
5. Use of Engineering Tools	1,2,3,4,6	Project
6. Communication	3,4,5,6	Project
7. Individual and Teamwork	1,2,3,4,5,6,8	Project
8. Professionalism	3,4,5,6,7	Project, Exam
9. Impact of Engineering on Society and the Environment	1,2,3,4,7	Project
10. Ethics and Equity	2,4,7	Exam
11. Environment, Society, Business & Project Management	1,2,3,4,5,6	Project
12. Life-Long Learning [#]	1,2,3,4,5,6,7,8, 9	Reflection

A component of Life-Long Learning is the School's Exit Survey. This Exit Survey provides valuable insight into student development and expectations as they enter the workforce. **Information provided to the School through the Exit Survey is confidential but completion is mandatory. Failure to complete the Exit Survey will result in an Incomplete Grade for the course.** Additional information on the Exit Survey will be provided in Courselink and in class.

4.5 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.

4.6 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.

4.7 Relationships with other Courses & Labs

ENGG*41x0 a capstone course taken in the student's final semester. As such, students are required to build on the knowledge gained in all the preceding courses, applying engineering analysis and design principles to the design problem at hand. This includes assessment of socio-economic, environmental impact and safety.

5 TEACHING AND LEARNING ACTIVITIES

5.1 Timetable

Lectures: Tuesday from 19:00 to 21:00 in MACN 105

Poster: Thursday 06 Apr. 2017 from 10:00 to 14:00 h in Engineering Complex

Lecture Schedule

Week No.	Classroom Activity
1	History and evolution of the engineering profession in Canada [GA 8]. <i>The Engineering Proposal</i> [GA 6]
2	Regulation of engineering in Ontario; the Professional Engineers Act; Regulation 941, Professional Registration [GA 8]. <i>Creativity and idea generation for design.</i> [GA 4]
3	Professionalism, Moral Reasoning and Ethics [GA 8 & 12]. <i>Interim (Progress) Report.</i> [GA 6]
4	The Engineering Code of Ethics [GA 10]. <i>The Iron Ring Ceremony.</i>
5-7	Ethical dilemmas and difficult decisions, PEO Video Resource Case Study, Case studies: lessons from the blue pages, disciplinary measures [GA 10]. <i>Design stages - tools and techniques.</i> [GA 5]
8	Tort Law and Professional Liability [GA 10]. <i>The Final Design Report and Poster</i> [GA 6]
9-11	Contract Law [GA 10]
12	Professional Practice Examination [GA 8, 10 & 12]

5.2 Student Design Activity and Milestones

Week No.	Task
1	Confirm terms of reference and schedule faculty advisor meeting times. Prepare project proposal summary memo. Submit an electronic copy to Dropbox before Monday 16 Jan. 2017, 17:00 h.
2-6	Analyze and research problem, develop design alternatives, evaluate and specify prime contender. Before Friday 17 Feb. 2017, 17:00 h., submit hard copy of interim report to faculty advisor and post electronic copy to Dropbox. An electronic copy of the summary memo is posted to Dropbox. Electronic DOE completed on PEAR.
7-11	Develop final design/prototype, evaluate and refine.
12	Prepare design report, present findings with the poster and complete Exit Survey. (i) Poster presentation Thursday April 6, 2017, 10:00-14:00 h. Location Engineering Complex. Note! Attendance of all group members at the final poster presentation and evaluation is a course requirement. (ii) Sunday April 9, 2017, 09:00 h, submit hard copy of final report to faculty advisor and post electronic copy to Dropbox. An electronic copy of the summary memo is posted to Dropbox. Electronic DOE completed on PEAR. (iii) Before Friday April 07, 2017, 24:00 h, complete the confidential on-line Exit Survey. Further details in Courselink.

5.4 Other Important Dates

- i) Classes begin Monday 09 Jan. 2017 (first class of course Tuesday 10 Jan. 2017)
- ii) Family Day: 20 Feb. 2017
- iii) Study Break: 21 - 24 Feb. 2017
- iii) Last date to drop course – 40th class: Friday, 10 Mar. 2017
- iv) Last class: Friday 07 Apr. 2017

6 LAB SAFETY

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. ENGG*41x0 does not have a laboratory component for the lecture portion for the course. However, for the project component, some student teams may be in the shop and or lab to build and test their prototype or final design. When in the shop and lab, students must adhere to the applicable safety requirements and regulations. In addition, if a safety issue arises, you are responsible for reporting it to the laboratory supervisor and faculty adviser.

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.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member.

7.1 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

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

Please also review the section on Academic Misconduct in your [Engineering Program Guide](#).

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

7.1.1 Turnitin

Accounts are available to students on Turnitin to help with the editing of their submissions to ensure that plagiarism did not take place. Go to http://www.turnitin.com/en_us/home and create an account. For F16, Class ID: 13125320 and password: 41XF16. The School has been assured by the College that Turnitin does not store student work, so please take advantage of this tool when preparing your written submissions.

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

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs:
<http://www.uoguelph.ca/registrar/calendars/index.cfm?index>