ENGG*3100 Engineering and Design III

Winter 2019
Section(s): C01

School of Engineering
Credit Weight: 0.75
Version 1.00 - January 06, 2019

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1 Course Details

1.1 Calendar 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.

Pre-Requisite(s):	Registration in the B.Eng. program and completion of 6.00 credits of ENGG courses including ENGG*2100
Restriction(s):	Students must have a minimum cumulative average of 60% or higher in ALL ENGG courses. Restriction waiver requests are handled by the Director, School of Engineering, or designate.

1.2 Course Description

This course builds on the design skills taught previously and focuses on a project-based model of learning. The lab time is designed to use a studio-style pedagogical approach to design. Each student is to apply the knowledge that they learned in their discipline-specific courses in the design environment.

1.3 Timetable

Lectures:

Tuesday	13:00-14:20	ROZH 101
Thursday	13:00-14:20	ROZH 101

Design Labs:

0101	Monday	8:30 - 10:20	THRN 1002, 1006, 1435
0102	Wednesday	8:30 - 10:20	THRN 1002, 1006, 1435
0103	Wednesday	11:30 - 13:20	THRN 1002, 1006, 1435
0104	Monday	11:30 - 13:20	THRN 1002, 1006, 1435
0105	Friday	15:30 - 17:20	THRN 1002, 1006, 1435

1.4 Final Exam

No Final Exam.

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2 Instructional Support

2.1 Instructional Support Team

Instructor: Andrea Bradford
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2.2 Teaching Assistant(s)

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3 Learning Resources

3.1 Required Resource(s)

Course Website (Website)

https://courselink.uoguelph.ca/

Course material, announcements, and grades will be regularly posted to the **ENGG*3100** Courselink site. You are responsible for checking the site regularly.

3.2 Recommended Resource(s)

Recommended Resource to Improve Your Technical Writing Skills (Textbook)

Thorsten Ewald. 2014. ***Writing in the Technical Fields, A Practical Guide***. Oxford Univ. Press.

4 Learning Outcomes

This course builds on the design skills taught previously and focuses on a project-based model of learning. The lab time is designed to use a studio-style pedagogical approach to design. Each student is to apply the knowledge that they learned in their discipline-specific courses in the design environment.

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Apply skills and knowledge from core and program specific engineering courses to a relevant engineering problem.
2. Define a prolem with modest complexity and develop appropriate design criteria and constraints.
3. Build on experience with the design cycle to create, develop and assess a design solution.
4. Select, apply, and recognize the limitations of various engineering design tools, including model simulation and sensitivity analysis.
5. Critically evaluate information from many sources including engineering publications, data processing, and engineering analysis, and disseminate design information in technical communications.
6. Recognize professional and ethical behaviour and perform accordingly.
7. Analyze the social, environmental, economic and legal impacts of engineered designs.
8. Apply project management techniques to allocate time and resources and meet project objectives.
9. Work effectively and demonstrate leadership as a member of a team.

4.2 Engineers Canada - Graduate Attributes (2018)

Successfully completing this course will contribute to the following:

#	Outcome	Learning Outcome(s)
1	Knowledge Base	1
1.3	Recall, describe and apply fundamental engineering principles and concepts	1
1.4	Recall, describe and apply program-specific engineering principles and concepts	1
4	Design	2, 3, 7

#	Outcome	Learning Outcome(s)
4.1	Describe design process used to develop design solution	3
4.2	Construct design-specific problem statements including the definition of criteria and constraints	2, 7
4.3	Create a variety of engineering design solutions	3
4.4	Evaluate alternative design solutions based on problem definition	3, 7
4.5	Develop and refine an engineering design solution, through techniques such as iteration, simulation and/or prototyping	3
5	Use of Engineering Tools	4
5.1	Select appropriate engineering tools from various alternatives	4
5.3	Recognize limitations of selected engineering tools	4
6	Individual & Teamwork	9
6.3	Execute and adapt individual role to promote team success through, for example, timeliness, respect, positive attitude	9
6.4	Apply strategies to mitigate and/or resolve conflicts	9
6.5	Demonstrate leadership through, for example, influencing team vision and process, promoting a positive team culture, and inspiring team members to excel	9
7	Communication Skills	5
7.1	Identify key message(s) and intended audience in verbal or written communication as both sender and receiver	5
7.3	Construct the finished elements using accepted norms in English, graphical standards, and engineering conventions, as appropriate for the message and audience	5
7.4	Substantiate claims by building evidence-based arguments and integrating effective figures, tables, equations, and/or references	5
7.5	Demonstrate ability to process oral and written communication by following instructions, actively listening, incorporating feedback, and formulating meaningful questions	5
8	Professionalism	6

#	Outcome	Learning Outcome(s)
8.3	Demonstrate professional behaviour	6
9	Impact of Engineering on Society and the Environment	3, 7
9.1	Analyze the safety, social, environmental, and legal aspects of engineering activity	3, 7
9.2	Evaluate the uncertainties and risks associated with engineering activities	3, 7
9.3	Anticipate the positive and negative impacts of introducing innovative technologies to solve engineering problems	7
10	Ethics & Equity	6
10.3	Demonstrate values consistent with good ethical practice, including equity, diversity, and inclusivity	6
11	Economics and Project Management	3, 7, 8
11.1	Apply project management techniques and manage resources within identified constraints	8
11.2	Identify risk and change management techniques, in the context of effective project management	8
11.3	Estimate economic impact and feasibility of an engineering project or design using techniques such as cost benefit analysis over the life of the project or design	3, 7

5 Teaching and Learning Activities

The following schedules of lecture and lab activities will be adjusted at the discretion of the instructors.

5.1 Lecture

Week 1

Topic(s): Course outline and learning outcomes. Problem-based learning approach. Review of design process and design competencies. Selecting an appropriate design project.

Week 2

Topic(s): Problem definition. Design constraints and criteria. Considering impacts on society and the environment. Finding and accessing resources for design projects.

Week 3

Topic(s): Project management (Part 1 - planning schedule, budget, responsibilities). Creativity in design. Generating design alternatives.

Week 4

Topic(s): Evaluating alternative designs including sensitivity analysis. Teamwork (Part 1).

Week 5

Topic(s): Due diligence. Technical writing workshop.

Week 6

Topic(s): Project Management (Part 2 - change management). Teamwork (Part 2 - conflict resolution).

Week 7

Topic(s): Materials selection. Life cycle assessment.

Week 8

Topic(s): Cost analysis. Sales and marketing.

Week 9

Topic(s): Refining/optimizing designs. Technical communications workshop.

Week 10

Topic(s): Ethics and equity.

Week 11

Topic(s): Design Project Presentations (Semi-finals)

Week 12

Topic(s): Wrap up. Design Day.

5.2 Lab

Week 1

Topic(s): Professional behaviour.

Week 2

Topic(s): Lifelong learning skills. Team building. Support for project selection.

Week 3

Topic(s): Support for preparation of proposals (All sections). Team skills (Friday).

Week 4

Topic(s): Team skills (Monday/Wednesday). Proposal feedback and scaffolded decision making (Friday).

Week 5

Topic(s): Proposal feedback and scaffolded decision making (Monday/Wednesday). Support for interim design report (Friday).

Week 6

Topic(s): Support for interim design report (Monday/Wednesday).

Week 7

Topic(s):	Feedback on Interim Design Process (All sections). Teamwork/conflict resolution activity (Monday/Wednesday). Support for progress on technical memo (Friday).

Week 8

Topic(s):	Feedback on Interim Report (All sections). Support for preparation of Technical Memo (Monday/Wednesday). Teamwork/conflict resolution activity (Friday).

Week 9

Topic(s):	Activity re: iteration/refining design.

Week 10

Topic(s):	Design presentations.

Week 11

Topic(s):	Cost memo and presentation feedback. Support for final design reports.

Week 12

Topic(s):	Lifelong learning activity.

5.3 Other Important Dates

Monday, January 7, 2019: First day of classes
Monday, February 18 – Friday, February 22, 2019: **Winter Break**
Friday, March 8, 2019: 40th class day. Last day to drop one semester courses.
Thursday, April 4, 2019: **Design Day**
Friday, April 5, 2019: Last day of classes

6 Assessments

6.1 Marking Schemes & Distributions

*Must earn a Pass on the Interim and Final Design Reflections to receive a grade on the associated design deliverable (Interim or Final Report).

Individual grades may be reduced from team grades if peer comments and/or instructor observations indicate that an individual has not made an equitable contribution (quality or quantity) to the design and/or design deliverables.

Name	Scheme A (%)
Course Learning Activities	10
Design Process Reviews	10
Design Proposal	10
Interim Design Report*	20
Technical Memo	10
Cost Memo	5
Design Presentation	10
Final Design Report*	25
Total	100

6.2 Assessment Details

Course Learning Activities (10%)
Date: Mon, Jan 7 - Fri, Apr 5, In weekly lectures and design labs

Design Process Reviews including Project Management (10%)
Date: Mon, Jan 14 - Fri, Apr 5, In weekly design labs
Students are required to maintain a logbook to keep a record of all group and individual activities, notes, ideas, calculations, planning, decisions etc. Logbooks will be checked weekly.

Team and Project Selection (0%)
Date: Sun, Jan 20, 10:00 PM, Submitted to CourseLink Dropbox.

Design Proposal (10%)
Date: Sun, Jan 27, 10:00 PM, Submitted to CourseLink DropBox.

Interim Design Report* (20%)
Date: Thu, Feb 14, 10:00 PM, Submitted to CourseLink Dropbox.
*Must pass Interim Design Reflection in order to earn individual grade on the Interim

Design Report.

Interim Design Reflection (0%)
Date: Sun, Feb 17, 10:00 PM, Submitted to CourseLink DropBox.
The Interim Design Reflection must be completed individually and submitted to Courselink by the due date. A passing grade on the reflection must be earned in order to receive the grade for the Interim Report**.** If the reflection is not submitted or does not earn a passing grade, the individual student will receive a zero on the Interim Design Report.

Technical Memo (10%)
Date: Thu, Mar 7, 10:00 PM, Submitted to CourseLink DropBox.

Cost Memo (5%)
Date: Thu, Mar 14, 10:00 PM, Submitted to CourseLink DropBox.

Design Presentation (10%)
Date: Mon, Mar 18 - Fri, Mar 22, In Design Lab.

Final Design Report* (25%)
Date: Sat, Apr 6, 10:00 PM, Submitted to CourseLink Dropbox.
*Must pass Final Design Reflection in order to earn individual grade on the Final Design Report.
At the time of final report submission, groups will be asked to submit a separate file containing the Executive Summary and a selected graphic(s) for inclusion in a Compendium of Winter 2019 3100 Design Projects, which will be made accessible to the public.

Final Design Reflection (0%)
Date: Sun, Apr 7, 10:00 PM, Submitted to CourseLink DropBox.
The Final Design Reflection must be completed individually and submitted to Courselink by the due date. A passing grade on the reflection must be earned in order to receive the grade on the associated design deliverable (Final Design Report). If the reflection is not submitted or does not earn a passing grade, the individual student will receive a zero on the Final Design Report.

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7 Course Statements

7.1 Engagement

Students are expected to spend about 15 h on academic tasks associated with a 0.75 credit course each week, including the lectures and labs. Active learning approaches will be incorporated into the lectures and labs and student participation is highly encouraged. The course employs a project-based learning approach such that full engagement in the design project activities is required to achieve the intended learning outcomes of the course.

7.2 Groupwork - Expectations

The dynamics of each learning activity should be based on professionalism and mutual respect. Everyone in the classroom has the right to participate and contribute. The learning environment must be free from harassment. Every student is expected to:

1. Maintain **courteous relations** with all members of their design team;
2. Maintain the **highest standards of integrity**, personal and professional conduct;
3. **Familiarize themself with and abide** by the letter and spirit of all applicable documents, policies, rules and regulations;
4. Comply with **both the letter and spirit of the law** to design a functional, safe, durable, cost effective, environmentally friendly, and socially beneficial design.
5. **Attend all Lab sessions**. If you are unable to make one of your lab sessions due to illness or extra-curricular responsibilities, it is essential that you let the professor know about your absence.
6. **Attend all group meetings.** If you are unable to attend a group meeting or expect to be late, it is essential that you clearly communicate with all members of your design team.
7. **Make an equal contribution to the work of the team**. Expectations for work quality and timing of deliverables must be communicated to and agreed upon by all group members.
8. Ensure that all **submitted work is original** or properly referenced.
9. Carefully **review any work** that is submitted by their group (and includes their name), even if it was completed by other group members.

7.3 Course Grading Policies

Course Learning Activities: There will be activities planned for many lectures and design labs. These activities are intended to help you better understand the course content and enable you to apply it to the design project. There will be no make-up activities.

Late Submissions: Late submissions will not be accepted.

Certification: Students must write their PEO SMP (Student Membership Program) number on all submitted work. This signifies adherence to the SOE Code of Ethics, including an equitable contribution to the group work.

Individual and Team Assessments:

Individual grades may differ from team grades in positive and negative ways.

- Individuals demonstrating exceptional leadership based on peer comments and/or instructor observations may be awarded bonus marks at the discretion of the instructors.
- Individuals not carrying their weight (quality or quantity) based on peer comments and/or instructor observations may receive a reduced grade at the

discretion of the instructors. A severe quantity issue may lead to a penalty for academic misconduct.

Contesting Grades Posted in CourseLink: If a student feels that a particular deliverable was graded unfairly, or if there is an error in the grading, it should be brought to the attention of the instructors within one week after the grade is posted on Courselink. Grades posted on Courselink will not be reconsidered beyond this period.

Adjustment of individual grades will be made at the end of the term. If a student feels that an adjustment has been applied unfairly, they should advise the instructors within one week. The onus will be on the student to produce their logbooks and other evidence of their contributions to the group design and deliverables.

Passing Grade: In order to pass the course, a student must obtain a final grade of 50% or higher.

7.4 Relationships with other Courses & Labs

Previous Courses:

ENGG*1100: Design 1 – an emphasis on the design process
ENGG*2100: Design 2 – an emphasis on computer tools

Follow-on Course:

ENGG*41x0: Capstone design course that brings all design and analysis together

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8 School of Engineering Statements

8.1 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 but these are not intended to be stand-alone course notes. Some written lecture notes will be presented only in class. 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 labs.

8.2 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and lab sessions. 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.

8.3 Lab Safety

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

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9 University Statements

9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

9.3 Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for course registration are available in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml

9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be

asked to resubmit work at any time.

9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

More information can be found on the SAS website
https://www.uoguelph.ca/sas

9.6 Academic Integrity

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 encourages academic integrity. 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 or faculty advisor.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

9.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student,

or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
https://www.uoguelph.ca/academics/calendars
