ENGG*1100 Engineering and Design I

01

Fall 2020
Section(s): C01

School of Engineering
Credit Weight: 0.75
Version 1.00 - September 15, 2020

---

1 Course Details

1.1 Calendar Description

This course provides an introduction to engineering and design. An overview of design processes is covered and students experience a defined, open ended design project. Physical design development is emphasized, supplemented by elements of analysis. Engineering communications emphasize the visual form and span engineering drawings across a spectrum of engineering disciplines (2D and 3D, realistic and symbolic). Sketching and computer aided tools are both developed. Written communications (individual and team) focus on design. The practice of professional engineering, ethical principles and the engineer's role and obligations in society are all introduced. The coursework is team based to reflect the practice of engineering and the character of the School of Engineering.

Restrictions: Registration in the BENG Program

1.2 Course Description

Note - the format of this outline is not suitable for public release

The details of the course are entered to reflect the actual delivery for Fall 2020

Refer to the Word/PDF course outline provided to the SOE office for the posted version of the Course Outline.

The learning outcomes for GA assessment have been identified for GACIP purposes

Sept. 18/18

1.3 Timetable

Lectures (All sections):

Tuesday	2:00 – 3:50 p.m.	Online-Synchronous & Asynchronous

Labs (You may only attend your scheduled lab sections):

Section	COMPUTER Lab (Microsoft Teams or Zoom)	DESIGN Lab (Microsoft Teams or Zoom)
0101	Tuesday 8:30 – 10:20 am	Thursday 8:30 – 10:20 am
0102	Thursday 8:30 – 10:20 am	Tuesday 8:30 – 10:20 am
0103	Wednesday 8:30 – 10:20 am	Friday 8:30 – 10:20 am
0104	Friday 8:30 – 10:20 am	Wednesday 8:30 – 10:20 am

Lab Start Dates: The Design and Computer labs will start on Thursday September 10th and end on Friday December 2nd resulting in 11 sessions for each section in each lab.

Dates with no Labs: There are no labs on Monday October 12th (Thanksgiving), Tuesday October 13th (Fall Study Break Day), Wednesday October 14th, Thursday October 15th, or Friday October 16th.

Date with moved Lecture: There is no lecture scheduled for Tuesday October 13th (Fall Study Break Day). This lecture is moved to Thursday Dec. 3rd.

Additional Note:

The course carries a 0.75 credit weight. A typical “B” student is expected to require approximately 15 hours per week to receive a “B” grade in a course with this weighting. These 15 hours include the 6 hours per week of scheduled contact hours (2 hours in lecture and 4 hours in labs).

1.4 Final Exam

2:30-4:30 (2020/12/11)

Location: Online

---

2 Instructional Support

2.1 Instructional Support Team

Instructor: John R Donald
Email: jrdonald@uoguelph.ca
Telephone: +1-519-824-4120 x53084
Office: THRN 2503

Instructor: Ryan Clemmer
Email: rclemmer@uoguelph.ca
Telephone: +1-519-824-4120 x52132
Office: THRN 1337

Lab Technician: Alexis Galvez
Email: agalvez@uoguelph.ca
Telephone: +1-519-824-4120 x53663
Office: THRN 2363

2.2 Teaching Assistants

Teaching Assistant: Joseph Lee
Email: jlee53@uoguelph.ca

Teaching Assistant: Mohamed Aly
Email: maly@uoguelph.ca

Teaching Assistant: Olivia Roud
Email: oroud@uoguelph.ca

Teaching Assistant: C. Harrison Brodie
Email: hbrodie@uoguelph.ca

Teaching Assistant: Raj Dahal
Email: rdahal@uoguelph.ca

Teaching Assistant: Jasen Devasagayam
Email: jdevasag@uoguelph.ca

Teaching Assistant: Nikan Momenbeitollahi
Email: nmomenbe@uoguelph.ca

Teaching Assistant: Graham Pitfield
Email: gpitfiel@uoguelph.ca

Teaching Assistant: Erika Ziraldo
Email: eziraldo@uoguelph.ca

---

3 Learning Resources

3.1 Required Resources

1. Ewald, Thorsten, Writing in the Technical Fields: A Practical Guide, 3rd Edition, Oxford University Press, 2020. (Textbook)

Andrews G.C., Aplevich J.D., MacGregor C., Fraser R.A., Introduction to Professional Engineering in Canada, 5th Edition, Prentice Hall, 2019 (Textbook)

Courselink (Website)
https://courselink.uoguelph.ca

Log Book (Equipment)

3.2 Course Website

Course material, news, announcements will be regularly posted to the ENGG*1100 Courselink site. You are responsible for checking the site regularly.

3.2 Additional Resources

Lecture Information: All the lecture notes are posted on Courselink (week #1-#12). These notes are skeleton in character. Do not consider these sufficient to gain the required knowledge, skills or thinking.

Lab Information: The handouts for all the lab sessions are posted on the Courselink site. All types of resources regarding tutorials, links to web pages can be found in this section.

Assignments & Project Information: This will be posted on the Courselink site.

Miscellaneous Information: Other information related to the course will be posted on Courselink site.

4 Learning Outcomes

The aim of the course is an introduction to engineering design and to Guelph's sequence of design courses, an introduction to expectations of the profession in spirit and specifics, to establish a collaborative and team philosophy around learning and engineering, and to stimulate enthusiasm through the successful completion of a design challenge. Finally to initiate the development of independent learning skills that are essential for success in engineering education and engineering careers.

4.1 Course Learning Outcomes

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

1. ***Describe (1)*** *a systematic engineering design process*
2. ***Design (6)*** *a solution to a defined engineering problem relying on high school background and first year engineering principles a.* ***Demonstrate (3)*** *command of constraints and criteria. b.* ***Integrate (5)*** *simple engineering analysis to defend and advance your design*
3. ***Produce (3)*** *engineering design documentation in written, oral and graphical (visual) forms with an emphasis on the graphical a. Prepare engineering drawings of design ideas and across engineering disciplines b. Explain engineering drawings across engineering disciplines*
4. ***Construct (3)*** *solutions with the aid of engineering tools (e.g. CAD, spreadsheet, programming and hand tools)*
5. ***Describe (1)*** *overall professional engineering responsibilities with particular emphasis in terms of ethics and safety*
6. ***Analyze (4)*** *existing and historical engineering designs*
7. ***Practice*** *individual and team work and project management necessary for learning and project completion on time.*

4.2 Engineers Canada - Graduate Attributes (2018)

Successfully completing this course will contribute to the following:

#	Outcome	Learning Outcome
4	Design	1, 2, 6
4.1	Describe design process used to develop design solution	1
4.2	Construct design-specific problem statements including the definition of criteria and constraints	2
4.3	Create a variety of engineering design solutions	2

#	Outcome	Learning Outcome
4.4	Evaluate alternative design solutions based on problem definition	2, 6
4.5	Develop and refine an engineering design solution, through techniques such as iteration, simulation and/or prototyping	2
5	Use of Engineering Tools	2, 3, 4
5.1	Select appropriate engineering tools from various alternatives	4
5.2	Demonstrate proficiency in the application of selected engineering tools	2, 3, 4
6	Individual & Teamwork	2, 7
6.1	Describe principles of team dynamics and leadership	2, 7
6.2	Understand all members' roles and responsibilities within a team	2, 7
6.3	Execute and adapt individual role to promote team success through, for example, timeliness, respect, positive attitude	2, 7
6.4	Apply strategies to mitigate and/or resolve conflicts	2, 7
6.5	Demonstrate leadership through, for example, influencing team vision and process, promoting a positive team culture, and inspiring team members to excel	2, 7
7	Communication Skills	2, 3
7.1	Identify key message(s) and intended audience in verbal or written communication as both sender and receiver	3
7.2	Interpret technical documentation such as device specification sheets, drawings, diagrams, flowcharts, and pseudocode	3
7.3	Construct the finished elements using accepted norms in English, graphical standards, and engineering conventions, as appropriate for the message and audience	2, 3
7.5	Demonstrate ability to process oral and written communication by following instructions, actively listening, incorporating feedback, and formulating meaningful questions	2, 3
8	Professionalism	2, 5, 7
8.1	Demonstrate an understanding of what it means to be a professional engineer and distinguish between legislated and non-legislated professions	5

#	Outcome	Learning Outcome
8.2	Effectively describe engineering law and its impact on professional engineering practice	5
8.3	Demonstrate professional behaviour	2, 5, 7
9	Impact of Engineering on Society and the Environment	2, 5
9.1	Analyze the safety, social, environmental, and legal aspects of engineering activity	2, 5
9.2	Evaluate the uncertainties and risks associated with engineering activities	5
9.3	Anticipate the positive and negative impacts of introducing innovative technologies to solve engineering problems	5
10	Ethics & Equity	5
10.1	Summarize ethical theories and equity, diversity, and inclusivity principles	5
10.2	Determine an ethical course of action by applying ethical theories and the PEO Code of Ethics	5
11	Economics and Project Management	2, 5, 7
11.1	Apply project management techniques and manage resources within identified constraints	2, 5, 7

5 Teaching and Learning Activities

5.1 Lecture

Topics: Week 1 - Course Overview and Introduction to Engineering

Learning Objective: 5

Topics: Week 2 - Engineering Communication, Teams

Learning Objectives: 3,5,7

Topics: Week 3 - Engineering Communication, Technology Stewardship

Learning Objectives: 3,5

Topics: Week 4 - Engineering Design Process 1

Learning Objectives: 1,2,3,6

Topics: Week 5 - Project Management

Learning Objectives: 7

Topics: Week 6 - Engineering Design Process 2

Learning Objectives: 1,2,3,6

Topics: Week 7 - Professionalism and Practice

Learning Objectives: 3,7

Topics: Week 8 - Ethics, Engineering Analysis

Learning Objectives: 5,6

Topics: Week 9 - Engineering Design Process 3, Sustainability in Design

Learning Objectives: 1,2,3,5,6

Topics: Week 10 - Design for Safety and Risk

Learning Objectives: 1,2,3,5,6

Topics: Week 11 - The 21st Century Engineer

Learning Objectives: 5,6

Topics: Week 12 - Course Wrap Up

Learning Objective: 5

Topics: Course Review and Wrap Up

Chapters: 2

Learning Objectives: None

5.2 Other Important Dates

Monday, October 8th - Thanksgiving holiday, no classes
Tuesday, October 9th - Fall Study Break Day, no classes
Friday, November 2nd - 40th class day – last day to drop one-semester courses
Thursday, November 29th - Tuesday Schedule in effect. Make up for Fall Study Break Day
Friday, November 30th - Monday Schedule in effect. Make up for Thanksgiving

5.3 Design & Computer Lab Approximate Schedule

Week	Dates	Computer Lab (THRN 1319)	Design Lab (THRN 1435)
1	Sept 10 – 14	Introduction to Computers, SolidWorks 1	Team & Design Exercises
2	Sept 17 – 21	SolidWorks 2, Arduino 1	Sketch 1 – Perspective
3	Sept 24 – 28	SolidWorks 3	Design Project Launch, Team forming
4	Oct 1 – 5	Arduino2, Motor Circuit	Sketch 2 – Orthographic Projection, Spreadsheets
5	Oct 8-12	NO LABS	NO LABS
6	Oct 15 – 19	Lab Quiz 1 (SolidWorks), AutoCAD 1	Ideas Exercises, Safety Exercise
7	Oct 22 – Oct 26	AutoCAD 2	Measurement, Criteria Exercise
8	Oct 29 – Nov 2	Lab Quiz 2 (Spreadsheets)	Life Cycle Exercise
9	Nov 5 – 9	AutoCAD 3	
10	Nov 12 – 16	Lab Quiz 2 (AutoCAD), AutoCAD 4	Aesthetics Assessment
11	Nov 19 – 23	Design Project	Design Project Performance

12	Nov 26 – 30	Project Wrap Up	Project Wrap Up

Note: No labs on Sept. 6th & 7th, Oct. 9th to Oct. 12th.

---

6 Assessments

6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Final Exam (individual)	20
Design Project (Team) Prototype Report	5
Design Project (Team) Performance	10
Design Project (Team) Final Report	25
Lab Assignment - Sketching (INDIVIDUAL)	1
Lab Quiz 1 - SolidWorks (INDIVIDUAL)	5
Lab Quiz 2 - Excel (INDIVIDUAL)	3
Lab Quiz 3 - AutoCAD (INDIVIDUAL)	5
Ethics Case Study - In Lab	1
Ethics Quiz	4
Log Book Checks (Individual)	3
Photo Essay - Technology Stewardship (INDIVIDUAL)	3
Idea Communication (Individual)	5
Self & Peer Review #1 (INDIVIDUAL)	2
Self & Peer Assessment (INDIVIDUAL)	3
Clicker Quiz	5
SOE Safety Quiz - Student Green Card (INDIVIDUAL)	0
Total	100

6.2 Assessment Details

Final Exam (individual) (20%)
Date: Week 13
Learning Outcome: 1, 2, 5, 6
December 11, 2:30-4:30 p.m.

Design Project (Team) Prototype Report (5%)
Date: Week 7
Learning Outcome: 2, 3, 4, 5, 6, 7
Due Nov. 2, 6 p.m.

Design Project (Individual) Prototype Report (5%)
Learning Outcome: 2, 3
Nov 2, 6 p.m.

Design Project (Team) Performance (10%)
Date: Week 11, THRN 1435
Learning Outcome: 2, 4, 7
Performance in Lab Time

Design Project (Team) Final Report (20%)
Date: Week 11
Learning Outcome: 2, 3, 4, 5, 6, 7
Appendix - due 2 days prior to Performance (6:00 pm), Prototype Report due 2 days after Performance Lab (6:00 pm)

Lab Assignment - Sketching (INDIVIDUAL) (1%)
Date: Week 2, THRN 1435
Learning Outcome: 3

Lab Quiz 1 - SolidWorks (INDIVIDUAL) (5%)
Date: Week 4, THRN 1319
Learning Outcome: 3, 4

Lab Quiz 2 - Excel (INDIVIDUAL) (3%)
Date: Week 7, THRN 1319
Learning Outcome: 3, 4

Lab Quiz 3 - AutoCAD (INDIVIDUAL) (5%)
Date: Week 10, THRN 1319
Learning Outcome: 3, 4

Ethics Case Study - In Lab (1%)
Date: Week 8, In Design Lab
Learning Outcome: 5

Ethics Quiz (4%)
Date: Week 9, In Design Lab
Learning Outcome: 5

Log Book Checks (Individual) (3%)
Date: Week 10
Learning Outcome: 3
Weeks 3,6,10

Photo Essay - Technology Stewardship (INDIVIDUAL) (5%)
Date: Week 5
Learning Outcome: 3, 5, 6

Idea Communication (Individual) (8%)
Date: Week 8
Learning Outcome: 2, 4, 5, 6

Self & Peer Review #1 (INDIVIDUAL) (2%)
Date: Week 7, PEAR
Learning Outcome: 7

Self & Peer Assessment (INDIVIDUAL) (3%)
Date: Week 11, PEAR
Learning Outcome: 7

SOE Safety Quiz - Student Green Card (INDIVIDUAL) (0%)
Date: Week 2, Courselink - SOE Machine Shop
Learning Outcome: 5
Pass/Fail - Failure to pass the SOE Safety Quiz to obtain your Student Green Card will result in an **Incomplete** grade for the entire course.

6.3 Log Books

Log books have significance beyond this 3% for individuals who are not equal contributors to their teams. See note in Section on team work.

---

7 Course Statements

7.1 ENGG*1100 Specific

The computer labs are largely limited to computer use only.

You are required to have a “Student Green Card” to access and use the project storage space and to use the student shop space. To obtain your Student Green Card you must review the online lecture and supporting material in the Courselink Course “SOE Machine Shop” and pass the Green Card Safety Quiz that accompanies the “SOE Machine Shop” course.

Requirements for Student Shop Usage

- Safety glasses on at **ALL** times.

- Leave the space as clean as or cleaner than when you arrived.
- Do not let other students in – if they have access permission their card works at the door.
- Do not work alone

Students will be working in teams and in a collaborative learning environment. You are responsible to be an active contributor to your teams. You are responsible to maintain a personal logbook that documents your teamwork. Courselink provides an overview of the expected use and content of your logbook.

7.2 Lab Work

You are expected to attend and participate in all laboratories. You may only attend your scheduled section. Professor Donald's permission is required for you to attend an alternate. If you complete an assessment in an alternate section without Professor Donald's permission then your assessment will not count.

7.3 Missed items

There will be no makeup for missed individual in-lab assignments or in-lab quizzes. If you are granted academic consideration (medical or compassionate) or religious accommodation, the weight of the missed item will be added to the corresponding parallel items

7.4 Late

Late submissions will not be accepted.

7.5 Team Work

If there is some observation or evidence that you have not been an approximately equal contributor to your team's work then you will be asked to provide evidence of your individual efforts, contributions and results. A logbook is a required means to help demonstrate your contributions. Low contributions may lead to a lower grade than the "team grade" or, in more extreme cases, academic misconduct policies being applied. Log Book and/or other indicators such as self & peer assessments may trigger meetings with individuals and/or teams regarding contributions.

7.6 Student Green Card

If no members of your design team hold a student green card then your team will not be able to use the student project storage space or the student shop space. You will need to meet these needs on your own. Failure to pass the SOE Safety Quiz to obtain your Student Green Card will result in an Incomplete grade for the entire course.

7.7 Passing Grade

The passing grade for this course is 50%.

7.8 Students' Learning Responsibilities

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

Students will be working in teams and in a collaborative learning environment. You are responsible to be an active contributor to your teams. You are responsible to maintain a personal logbook that documents your teamwork. Courselink provides an overview of the expected use and content of your logbook.

7.9 Relationships with other Courses & Labs

Con-Current Courses:
CIS*1500: Programming the Arduino Microcontroller complements your programming course.

Follow-on Courses:
ENGG*2100, 3100, 41x0: Engineering & Design II, III & IV
ENGG*3/4XX: Each engineering program has at least 3 additional design courses.
ENGG*XXXX: A very large fraction of your program will encourage and/or rely on collaborative, team learning approaches.

Concurrent Pedagogical Research: Students in this course will be invited to participate in an "Engineering Team Dynamics" research study about the impact of team dynamics and social interactions on students' academic trajectories early in their engineering education. This research will advance understanding of barriers to undergraduate's long-term engagement and academic success in STEM, so participants will be asked to release their academic records for this research. Participation is voluntary and should take less than 45 minutes (total); choosing not to participate will not impact your relationship with the University of Guelph or your course standing in any way. This study has been reviewed and received clearance through research ethics committees at the Universities of Guelph and Waterloo.

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.

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

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of

Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic 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

Associate Diploma Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.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.

For Guelph students, information can be found on the SAS website
https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website
https://www.ridgetownc.com/services/accessibilityservices.cfm

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

9.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings and academic schedules. Any such changes will be announced via CourseLink and/or class email. All University-wide decisions will be posted on the COVID-19 website (https://news.uoguelph.ca/2019-novel-coronavirus-information/) and circulated by email.

9.10 Illness

The University will not normally require verification of illness (doctor's notes) for fall 2020 or winter 2021 semester courses. However, requests for Academic Consideration may still require medical documentation as appropriate.
