



ENGG*2100 Engineering and Design II

01

Winter 2023

Section(s): C01

School of Engineering

Credit Weight: 0.75

Version 1.00 - January 08, 2023

1 Course Details

1.1 Calendar Description

This course is a progression in engineering design skills with particular emphasis on computer usage in design, oral communication of solutions and team skills. Computer usage in design will include advanced CAD/CAM/CAE tools; and database management software. An introduction to safety in engineering practice and design, and the concept of sustainable development are covered.

Pre-Requisites: Completion of 4.00 credits including ENGG*1100

1.2 Course Description

This is the second course in the undergraduate engineering design sequence. The main goals of the courses are to provide experience and guidance for working in and leading teams, developing communication and presentation skills, and teaching design using 3D modeling techniques. Students in this course will work in teams to reverse engineer a Lego object (minimum 200 pieces) and then use skills learned in this project to then conceive, design, build, test, and present a unique solution to a complex design problem.

1.3 Timetable

Lectures - In-Person Delivery

Monday and Friday, 11:30 AM - 12:20 PM

Lectures will be delivered in-person in ROZH 103.

Labs - In-Person Delivery

Lab attendance is expected for all scheduled laboratory activities. You **MUST** attend your

assigned section only. Notify your GTA if you will be absent PRIOR to your scheduled lab time to arrange potential accommodations for missed assessments. Failure to do so may result in a grade of zero for that assessment.

Students will be divided between the computer lab and the project labs during the scheduled lab period. A lab schedule will be posted on CourseLink. For the first lab, all students should meet in THRN 1025.

Computer Labs - These labs will be held in the Thornbrough (THRN) Room 1004 computer lab.

Project Labs - The majority of the project labs (reverse engineering and design project) will be held in Thornbrough (THRN) Room 1025.

	Computer Lab & Project Labs (THRN 1004 & THRN 1025)
Section 1	Monday, 1:30 pm - 4:20 pm
Section 2	Wednesday, 10:30 am - 1:20 pm
Section 3	Tuesday, 8:30 am - 11:20 am
Section 4	Thursday, 2:30 pm - 5:20 pm
Section 5	Tuesday, 2:30 pm - 5:20 pm

Seminars - In-person

Each student will attend and give one seminar (PowerPoint Presentation) during the semester. The seminars will be delivered in-person in THRN 1002 or 1006 during your scheduled seminar time throughout the semester (starting in Week 3). You will be assigned a week and time slot and this information will be posted on CourseLink.

General Note

The expectation is that an average student requires about 15 hours per week to get a 'B' grade in this course. These 15 hours include the 5 hours of scheduled class time (2 hrs of lecture and 3 hrs of lab time), plus the scheduled seminar time.

1.4 Final Exam

The final exam is currently scheduled for April 14th, 2023, 7:00pm - 9:00pm. Please see WebAdvisor for the latest information.

2 Instructional Support

2.1 Instructional Support Team

Instructor: Ryan Clemmer

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

Lab Co-ordinator: Ahmed Mezil
Email: amezil@uoguelph.ca
Telephone: +1-519-824-4120 x53729
Office: THRN 2308

Lab Technician: Ken Graham
Email: kgraha06@uoguelph.ca
Telephone: +1-519-824-4120 x53924
Office: THRN 1021

Lab Technician: David Wright
Email: dwright02@uoguelph.ca
Telephone: +1-519-824-4120 x56706
Office: THRN 1023

Library Support: Jacqueline Kreller-Vanderkooy
Email: jkreller@uoguelph.ca
Telephone: +1-519-824-4120 x54539
Office: LIB 277

2.2 Teaching Assistants

Teaching Assistant (GTA): Dhruvin Dankhara
Email: ddankhar@uoguelph.ca

Teaching Assistant (GTA): Matthew Drummond
Email: mdrumm02@uoguelph.ca

Teaching Assistant (GTA): Nafiseh Mohammadtabar
Email: nafiseh@uoguelph.ca

Teaching Assistant (GTA): David Nguyen
Email: dnguye09@uoguelph.ca

Teaching Assistant (GTA): Masoomah Salahshoor
Email: msalahsh@uoguelph.ca

3 Learning Resources

3.1 Required Resources

CourseLink (Website)

<https://courselink.uoguelph.ca/>

Course material, news, announcements, and grades will be regularly posted to the ENGG*2100 Courselink site. You are responsible for checking the site regularly.

Please use lectures and lab help sessions as your main opportunity to ask questions about the course. Major announcements will be posted to the course website. **It is your responsibility to check the course website 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 its students.

3.2 Other Resources

Lecture Information: Lectures will be delivered face-to-face

Lab Information: Teaching Assistants will be available in lab periods to direct activities and answer questions. The Teaching Assistants will provide resources regarding tutorials and links to related web pages. See Courselink for detailed information regarding which face-to-face labs (THRN 1004 and/or THRN 1006 and 1025) you are expected to attend throughout the semester.

4 Learning Outcomes

This is the second course in the undergraduate engineering design sequence. The main goals of the courses are to provide experience and guidance for working in and leading teams, developing communication and presentation skills, and teaching design using 3-D modelling techniques. Students in this course will work in teams to reverse engineer a common object such as a sewing machine, and then use skills learned in this project to then conceive, design, build, test and present a unique solution to a complex design problem.

4.1 Course Learning Outcomes

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

1. Develop and deliver an oral presentation on an engineering topic of interest
2. Work within a team to reverse engineer a complex structure
3. Work within a team to solve a complex problem
4. Conceptualize physical solutions to a complex problem
5. Develop, design, build, test and demonstrate a novel design solution for a complex problem
6. Generate an engineering design report
7. Identify various manufacturing strategies and their characteristics.
8. Evaluate safety issues related to design.
9. Discuss issues related to sustainability and ethics as they relate to design.
10. Demonstrate competency with standard computer aided design modelling techniques

4.2 Engineers Canada - Graduate Attributes (2018)

Successfully completing this course will contribute to the following:

#	Outcome	Learning Outcome
4	Design	4, 5, 7
4.2	Construct design-specific problem statements including the definition of criteria and constraints	4
4.3	Create a variety of engineering design solutions	4, 7
4.4	Evaluate alternative design solutions based on problem definition	4
4.5	Develop and refine an engineering design solution, through techniques such as iteration, simulation and/or prototyping	5
5	Use of Engineering Tools	2, 10
5.2	Demonstrate proficiency in the application of selected engineering tools	2, 10
6	Individual & Teamwork	2, 3
6.2	Understand all members' roles and responsibilities within a team	3
6.3	Execute and adapt individual role to promote team success through, for example, timeliness, respect, positive attitude	2, 3
6.5	Demonstrate leadership through, for example, influencing team vision and process, promoting a positive team culture, and inspiring team members to excel	2, 3
7	Communication Skills	1, 6
7.1	Identify key message(s) and intended audience in verbal or written communication as both sender and receiver	1
7.2	Interpret technical documentation such as device specification sheets, drawings, diagrams, flowcharts, and pseudocode	6
7.3	Construct the finished elements using accepted norms in English, graphical standards, and engineering conventions, as appropriate for the message and audience	6
7.4	Substantiate claims by building evidence-based arguments and integrating effective figures, tables, equations, and/or references	6
8	Professionalism	8
8.1	Demonstrate an understanding of what it means to be a professional engineer and distinguish between legislated and non-legislated professions	8

#	Outcome	Learning Outcome
9	Impact of Engineering on Society and the Environment	8, 9
9.1	Analyze the safety, social, environmental, and legal aspects of engineering activity	8, 9
11	Economics and Project Management	6
11.1	Apply project management techniques and manage resources within identified constraints	6

5 Teaching and Learning Activities

The following is an approximate schedule for the lab and lecture material. The instructor reserves the right to deviate from this schedule as needed.

5.1 Lecture

Lecture 01

Topics: Introduction to Course and Seminar Administration
Learning Outcome: 1

Lecture 02

Topics: Design and Engineering
Learning Outcome: 4

Lecture 03

Topics: "Total Design"
Learning Outcome: 4

Lecture 04

Topics: Tools of Engineering Design
Learning Outcome: 2, 4

Lecture 05

Topics: Teamwork - basics
Learning Outcome: 2, 3

Lecture 06

Topics: Teamwork - strategies for dealing with people
Learning Outcome: 2, 3

Lecture 07

Topics: Teamwork - group dynamics

Learning Outcome:	2, 3
Lecture 08	
Topics:	Drawing and Tolerancing
Learning Outcome:	7
Lecture 09	
Topics:	Brainstorming
Learning Outcome:	3, 4
Lecture 10	
Topics:	Brainstorming - by design
Learning Outcome:	3, 4
Lecture 11	
Topics:	Meetings
Learning Outcome:	2, 3
Lecture 12	
Topics:	Meeting - Chairing
Learning Outcome:	2, 3
Lecture 13	
Topics:	Creative Design - concept development
Learning Outcome:	4
Lecture 14	

Topics:	Creative Design - case studies
Learning Outcome:	4
Lecture 15	
Topics:	Design Ergonomics - communicating through your design
Learning Outcome:	4, 8
Lecture 16	
Topics:	Design Ergonomics - case studies
Learning Outcome:	4, 8
Lecture 17	
Topics:	Manufacturing
Learning Outcome:	7
Lecture 18	
Topics:	Polymer Manufacturing
Learning Outcome:	7
Lecture 19	
Topics:	Quality Assurance
Learning Outcome:	7
Lecture 20	
Topics:	International, National and Local Standards and Guidelines
Learning Outcome:	8, 9
Lecture 21	
Topics:	Sustainability and Ethics
Learning Outcome:	8, 9
Lecture 22	
Topics:	Safety

Learning Outcome: 8, 9

Lecture 23

Topics: Guest Lecture, TBA

Lecture 24

Topics: Course Review

5.2 Seminar

Week 3

Topics: Individual presentations

Week 4

Topics: Individual presentations

Week 5

Topics: Individual presentations

Week 7

Topics: Individual presentations

Week 8

Topics: Individual presentations

Week 9

Topics: Individual presentations

Week 10

Topics: Individual presentations

5.3 Lab Schedule

Week	Computer Lab (THRN 1004)	Project Lab (THRN 1025)	Deliverables
1	CAD Tutorial #1	Reverse Engineering Intro	
2	CAD Tutorial #2	Reverse Engineering	
3	CAD Tutorial #3	Reverse Engineering	Mastery Check
4	CAD Tutorial #4	Reverse Engineering	Mastery Check
5	CAD Tutorial #5	Reverse Engineering	2D Drawings
6	CAD Midterm Exam		CAD Exam
	No Labs - Winter Break	No Labs - Winter	

		Break	
	Design Lab (THRN 1006)	Project Lab (THRN 1025)	
7	Project Coaching	Design Project Coaching	Animation & Concept Sketches
8	Project Coaching	Design Project Coaching	Proof of Concept
9	Project Coaching	Design Project Coaching	Design Proposal
10	Project Coaching	Design Project Coaching	
11	Design Presentations		Design Presentations, Demonstration and Evaluation
12	No Labs		Design Report & Peer Assessment

6 Assessments

All design project and computer lab deliverables are due on the day of your scheduled lab (unless indicated otherwise).

6.1 Assessment Details

Seminar - individual presentation, with the use of aids (10%)

Date: Scheduled in the lab sections, weeks 3-5, 7-10, THRN 1002 & 1006

Learning Outcome: 1

Seminars will be held Jan 22 to Feb 9 and Feb 27 to Mar 23 during the scheduled seminar time

Reverse Engineering Project (20%)

Date: Scheduled in the first half of the course, see table for details, THRN 1004, 1006, and 1025

Learning Outcome: 2, 3, 10

Deliverable	Date	Assessment	Weight
Mastery Check 1	Week 3 (Jan 23 - 26)	Individual	1%
Mastery Check 2	Week 4 (Jan 30 - Feb 2)	Individual	1%
Engineering Part Drawings	Week 5 (Feb 6 - 9)	Individual	10%

CAD Animation Week 7 (Feb 27 to Mar 2) Group 8%

CAD Midterm Exam (10%)

Date: Week 6, Virtual

Learning Outcome: 10

Available to be completed any time during Week 6 (Feb 13 - 16)

Design Project (40%)

Date: Scheduled in the second half of the course, see table for details, THRN 1006

Learning Outcome: 3, 4, 5, 6

Deliverable	Date	Assessment	Weight
Concept Sketches	Week 7 (Feb 27 - Mar 2)	Individual	3%
Proof of Concept	Week 8 (Mar 6 - 9)	Group	2%
Design Proposal	Week 9 (Mar 13 - 16)	Group	5%
Group Presentation	Week 11 (Mar 27 - 30)	Group	10%
Design Evaluation	Week 11 (Mar 27 - 30)	Group	5%
Final Report	Week 12 (Apr 3 - 6)	Group	10%
Peer Assessment	Week 12 (Apr 3 - 6)	Individual	5%

Final Exam (20%)

Date: Fri, Apr 14, 7:00 PM - 9:00 PM, In - person

Learning Outcome: 6, 8, 9

7 Course Statements

7.1 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 BEFORE the assessment is due. 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 within two weeks of 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>

Midterm Grading: If you miss the Midterm you will be assessed a mark of zero for the exam.

Passing grade: In order to pass the course, you must achieve a combined mark (all aspects of the course) of 50% or above. You must also pass both the Final Exam and the Design and Build Project portions of the course. 50% is considered a passing grade. A failing grade

(below 50%) for the entire course, or the Final Exam or the Design and Build Project will mean that you have failed the course. The assigned grade will be your lowest of these grades.

Outstanding Fees: Excess use of lab materials by a student team will result in monetary charges being assessed to all the students in that team. Failure to pay these charges will result in individual student final grades being withheld until their own balance is cleared.

Late Submissions: Deliverables are generally due at 10:59 PM on the date specified. An additional one-hour grace period will be provided beyond the due date. Deliverables handed in after the expiration of the grace period (as indicated on Courselink) but before 10:59 AM the following day will receive a penalty of 15%. Reports submitted between 12 and 24 hours late will receive a late penalty of 30%. Reports will not be accepted more than 24 hours beyond the due date.

Grading Philosophy: The grading philosophy used for this course will recognize that design has a significant artistic component and is not a right or wrong situation. Thus, we will start with a perspective that your work is assumed to be a "B" until there is evidence within that work that is impressive or aspects that are disappointing. Impressive and disappointing components are integrated to leave a final assessment. Letter grades are used to reflect that the process is not $\pm 2\%$ accurate and that design could never be assessed with fine resolution.

Group Assessment: Team-based activities form a major proportion of the course. Teams will be asked to evaluate individual team member participation. Evidence of lack of participation by individuals will result in a modified grade assessment for those students.

Final Exam: The Final Exam will be used to assess your understanding of the lecture material. The Final Exam will be closed book with no electronic aids permitted.

7.2 Laboratory/Machine Shop Safety

The Project Lab sessions will be held in THRN 1025, adjacent to the School's machine shop. The following safety principles apply to all sessions and to all students:

1. Ken Graham and Dave Wright have full authority for all aspects of our time in the shop
2. You will NOT be able to attend any lab session other than the one assigned to your lab section of the course
3. You will be required to show respect for Ken, Dave, your GTA and the shop's equipment
4. You will be required to dress appropriately
5. No open toed shoes
6. Safety glasses are to be worn
7. If you do not know how to use shop equipment - ASK
8. THINK first.
9. Additional rules will be posted in the shop or expressed by Ken or Dave.
10. Failure to safely work in the shop may lead to lost shop privileges. This is likely to have academic consequences.

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 make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

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, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. 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

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).

9.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campus/how-u-of-g-is-preparing-for-your-safe-return/>
- <https://news.uoguelph.ca/return-to-campus/spaces/#ClassroomSpaces>

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.
