ENGG*2100 Engineering and Design II

01

Winter 2022
Section(s): C01

School of Engineering
Credit Weight: 0.75
Version 1.00 - January 06, 2022

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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 4.0 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 - Synchronous Virtual and In-Person Delivery

Monday and Wednesday, 8:30 AM - 9:20 AM

Lectures will be delivered virtually at the start of the semester. If UG deems it appropriate for in-person learning, the lectures will then be delivered in-person in Alexander Hall (ALEX), Room 100.

Labs - Synchronous Virtual and In-Person Delivery

Lab attendance is expected for all scheduled laboratory activities. You MUST attend your assigned section only.

Labs will be delivered virtually at the start of the semester. If UG deems it appropriate for in-person learning, the labs will then be delivered in the rooms discussed below.

Computer Labs - These labs will be held in the Thornbrough (THRN) Room 2313 computer lab.

Project Labs - The majority of the project labs (reverse engineering and design project) will be held in Thornbrough (THRN) Room 1025. For presentations only, MacKinnon (MCKN) Room 235 will be used. A schedule will be provided to indicate which lab room you should attend.

	Computer Lab (Virtual/THRN 2313)	**Project Labs (Virtual/MCKN 235 or THRN 1025)**
Section 1	Thursday, 10:30am - 12:20pm	Tuesday, 10:30am - 12:20pm
Section 2	Tuesday, 10:30am - 12:20pm	Thursday, 10:30am - 12:20pm
Section 3	Friday, 3:30pm - 5:20pm	Wednesday, 3:30pm - 5:20pm
Section 4	Wednesday, 3:30pm - 5:20p	Friday, 3:30pm - 5:20pm

Seminars - Synchronous Virtual Delivery

Each student will attend and give one seminar (PowerPoint Presentation) during the start of the semester. The seminars will be delivered virtually, during your scheduled Project Lab time throughout Week 3 to 5. You will be assigned a week and time slot based on alphabetical order and this information will be posted on Courselink.

General Note

This means an average student requires about 15 hours per week to get a 'B' grade. These 15 hours include the 6 hours of scheduled class time (2 hrs lecture, 3 hrs lab & 1 hr seminar) per week.

1.4 Final Exam

The final exam will be delivered online via a CourseLink quiz. The final exam is currently scheduled for April 13th, 2021, 7:00pm - 9:00pm. Note that this exam time is subject to change. Please see WebAdvisor for the latest information.

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2 Instructional Support

2.1 Instructional Support Team

Instructor: Alexander Bardelcik MASc, PhD, PEng
Email: abardelc@uoguelph.ca
Telephone: +1-519-824-4120 x53228
Office: TBD
Office Hours: By appointment.

2.2 Teaching Assistants

Teaching Assistant (GTA): Miriam Naim Ibrahim
Email: mnaimibr@uoguelph.ca
Office Hours: During scheduled laboratory periods

Teaching Assistant (GTA): Peter Zytner
Email: pzytner@uoguelph.ca
Office Hours: During scheduled laboratory periods

Teaching Assistant (GTA): Megan Govers
Email: mgovers@uoguelph.ca
Office Hours: During scheduled laboratory periods

Teaching Assistant (GTA): Benjamin Rothwell
Email: brothwel@uoguelph.ca
Office Hours: During scheduled laboratory periods.

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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.

WebEx Virtual Meeting Platform (Software)

We will be using the Webex platform for all labs, seminars and lectures.

3.2 Other Resources

Lecture Information: Virtual lectures will be delivered synchronously.

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.

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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 lawn mower, 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

#	Outcome	Learning Outcome
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
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

#	Outcome	Learning Outcome
11	Economics and Project Management	6
11.1	Apply project management techniques and manage resources within identified constraints	6

5 Teaching and Learning Activities

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

5.3 Lab Schedule

Week	Computer Lab	Project Labs
1	CAD Tutorial #1	**No Lab**
2	CAD Tutorial #2	Reverse Engineering Intro
3	CAD Tutorial #3	Reverse Engineering & Seminars
4	CAD Tutorial #4	Reverse Engineering & Seminars
5	CAD Tutorial #5	Reverse Engineering & Seminars
6	CAD Midterm Exam	Reverse Engineering
7	**No Labs - Winter Break**	**No Labs - Winter Break**
8	Project Coaching - By Appointment only	Design Project Coaching
9	Project Coaching - By Appointment only	Design Project Coaching
10	Project Coaching - By Appointment only	Design Project Coaching
11	Project Coaching - By Appointment only	Design Project Coaching
12	Project Coaching - By Appointment only	Design Project Coaching
13	**No Labs**	Design Project Presentations

6 Assessments

6.1 Assessment Details

Seminar - individual presentation, with the use of aids (10%)
Date: Scheduled in the lab sections, weeks 3-5, Virtual
Learning Outcome: 1

Reverse Engineering Project (20%)
Date: scheduled in the first half of the course
Learning Outcome: 2, 3, 10

Engineering Part Drawings (Due Feb. 13)	(individual assessment)	10%
CAD Assembly & Animation (Due Feb. 20)	(group assessment)	10%

CAD Midterm Exam (10%)
Date: Week 6
Learning Outcome: 10
Available to be completed any time during Week 6

Design Project (40%)
Date: scheduled in the second half of the course
Learning Outcome: 3, 4, 5, 6

Concept Sketches (Due Mar. 6)	(individual assessment)	5%
Design Proposal (Due Mar. 20)	(group assessment)	5%
Group Presentation (During Week 13)	(group assessment)	10%
Design Evaluation (During Week 13)	(group assessment)	5%
Final Report (Due Apr. 10)	(group assignment)	10%
Peer Assessment (Due Apr. 10)	(individual assessment)	5%

Final Exam (20%)
Date: Wed, Apr 13, 7:00 PM - 9:00 PM, Online
Learning Outcome: 6, 8, 9

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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. 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 (due to accommodation), the missed assessment weight will automatically be added to that of the Final Exam. Additionally, if your Final Exam grade is greater than your Midterm grade, your Midterm grade will be automatically dropped and the weight of the midterm (10%) will be added to that of the Final Exam.

Passing grade: In order to pass the course, you must pass the Final Exam. If a student passes the Final Exam components of the course, their final mark will be the average of all course components, and a grade of 50% is considered a passing grade. A failing grade (49% or lower) on the Final Exam will mean that you have failed the course. If you fail the Final Exam and the average of all course components is greater than 50%, your final grade will be assigned as 49%.

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:.

<1hr = 5% penalty
>1hr = 20% penalty per 24hr period (i.e. per day)

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

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