ENGG*2100 Engineering and Design II

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Winter 2020
Section(s): C01

School of Engineering
Credit Weight: 0.75
Version 1.00 - January 05, 2020

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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 common object such as a lawn mower or 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.

1.3 Timetable

Lectures

THRN 1200, Monday and Wednesday, 9:30- 10:20 AM

(It is expected that students will have completed the majority of the first year courses and be taking the majority of the semester 3 courses for their engineering program).

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

per week.

Labs

You MUST attend your assigned section only. Lab Attendance is expected for all weeks.

All of the following rooms THRN 1004, SHOP (THRN 1025) & THRN 1006 will be used for the lab component of this course. Lab times by Section are as follows:

1.1, 1.2, 1.3, 1.4 & 1.5	Monday	2:30 - 5:20 PM
2.1, 2.2, 2.3, 2.4 & 2.5	Friday	2:30 - 5:20 PM
3.1, 3.2, 3.3, 3.4 & 3.5	Tuesday	2:30 - 5:20 PM
4 .1, 4.2, 4.3, 4.4 & 4.5	Thursday	2:30 - 5:20 PM
5.1, 5.2, 5.3, 5.4 & 5.5	Wednesday	2:30 - 5:20 PM

Seminars

Students will be assigned one seminar time slot in week 2, 3, or 4 as follows:

- Section 1.x - Week 2 - MCKN 224
- Section 2.x - Week 2 - MCKN 233
- Section 3.x - Week 3 - MCKN 224
- Section 4.x - Week 3 - MCKN 233
- Section 5.x - Week 4 - MCKN 224

Seminar times are listed below:

1.1, 2.1, 3.1, 4.1 & 5.1	Thursday	7:00 - 7:50pm
1.2, 2.2, 3.2, 4.2 & 5.2	Wednesday	7:00 - 7:50pm
1.3, 2.3, 3.3, 4.3 & 5.3	Tuesday	7:00 - 7:50pm
1.4, 2.4, 3.4, 4.4 & 5.4	Monday	6:00 - 6:50pm
1.5, 2.5, 3.5, 4.5 & 5.5	Monday	7:00 - 7:50pm

1.4 Final Exam

Friday April 17, 7:00 - 9:00 PM. Location TBA.

Exam time and location are subject to change. Please see WebAdvisor for the latest information.

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2 Instructional Support

2.1 Instructional Support Team

Instructor: Scott Brandon PhD, PENG
Email: bscott10@uoguelph.ca
Telephone: +1-519-824-4120 x52875
Office: THRN 2415
Office Hours: By appointment.

Lab Technician: David Wright
Email: dwrigh02@uoguelph.ca
Telephone: +1-519-824-4120 x56706
Office: THRN 1023

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

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

2.2 Teaching Assistants

Teaching Assistant: Raj Dahal
Email: rdahal@uoguelph.ca
Office Hours: During scheduled laboratory periods

Teaching Assistant: Joseph Lee
Email: jlee53@uoguelph.ca
Office Hours: During scheduled laboratory periods

Teaching Assistant: David Nguyen
Email: dnguye09@uoguelph.ca
Office Hours: During scheduled laboratory periods

Teaching Assistant: Olivia Roud
Email: oroud@uoguelph.ca
Office Hours: During scheduled laboratory periods.

Teaching Assistant: Samuel Salemi
Email: ssalemi@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.

3.2 Other Resources

Lecture Information: Lecture notes will not be posted on the web page.

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
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

#	Outcome	Learning Outcome
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
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 - group dynamics
Learning Outcome: 2, 3

Lecture 07

Topics: Brainstorming - overview

Learning Outcome: 2, 3

Lecture 08

Topics: Project Introduction

Learning Outcome: 2, 3

Lecture 09

Topics: Guest Lecture - TBD

Learning Outcome: 2, 3

Lecture 10

Topics: Assembly and Animation in Solidworks

Learning Outcome: 3, 4

Lecture 11

Topics: Brainstorming - by design

Learning Outcome: 3, 4

Lecture 12

Topics: Tolerancing

Learning Outcome: 4

Lecture 13

Topics: Effective Meetings

Learning Outcome: 4

Lecture 14

Topics: Creative Design - Evolution or Revolution?

Learning Outcome: 4, 8

Lecture 15

Topics: Guest Lecture - Design and Business

Learning Outcome: 4, 8

Lecture 16

Topics: Creative Design - Case studies, evaluating alternatives

Learning Outcome: 7

Lecture 17

Topics: Intellectual Property

Learning Outcome: 7

Lecture 18

Topics: Ergonomics - communicating through design

Learning Outcome: 7

Lecture 19

Topics: Quality Assurance

Learning Outcome: 7

Lecture 20

Topics: Manufacturing

Lecture 21
Topics: Sustainable and Ethics
Learning Outcome: 8, 9

Lecture 22
Topics: Safety
Learning Outcome: 8, 9

Lecture 23
Topics: International, National and Local Standards and Guidelines
Learning Outcome: 8, 9

Lecture 24

Topics: Course Review

5.2 Seminar

Week 1
Topics: No Seminars Scheduled this week.

Week 2
Topics: Individual presentations

Week 3
Topics: Individual presentations

Week 4
Topics: Individual presentations

5.3 Lab Schedule

Week	Shop Activity	Shop Deliverables	Computer Lab Activity (THRN 1004)	Computer Lab Deliverables
1	**Reverse Engineering** • team creation • component distribution **Attendance Mandatory**	Team Data	3-D Modelling- Basic Skills 1 **Attendance Mandatory**	
2	**Reverse Engineering** • disassembly	**Reverse Engineering** • components assigned	3-D Modelling- Basic Skills 2	CAD Mastery Check 1
3	**Reverse Engineering** • materials & manufacturing		3-D Modelling- Basic Skills 3	CAD Mastery Check 2
4	**Design & Build Project** • introduction		3-D Modelling- 2-D Drawings & dimensioning	CAD Mastery Check 3
5	**Design & Build Project** • brainstorming		3-D Modelling- Assembly	CAD Mastery Check 4 **Reverse Engineering** • 2-D component drawings due
6	**Design & Build**		3-D Modelling-	CAD Mastery Check

	Project • brainstorming		Animations	5 **Reverse Engineering** • animations due
7	**Design & Build Project** • early bird printer access		**Design & Build Project** • design	**Design & Build Project** • Concept Sketches
8	**Design & Build Project** • early bird printer access	**Design & Build Project** • proof of concept due	**Design & Build Project** • coaching	
9	**Design & Build Project** • build		**Design & Build Project** • Presentation & Report coaching	**Design & Build Project** • Design Proposal due • participation check
10	**Design & Build Project** • build		**Design & Build Project** • final report preparation • presentation coaching	Final report check
11	**Design & Build Project** • group presentations, demonstration, design evaluation			

12	**Design & Build Project** • final report submission, final day of semester classes, all lab groups

6 Assessments

6.1 Assessment Details

Individual Presentation, with the use of aids (10%)
Date: Scheduled in the seminar sections, Weeks 2-4, Seminars
Learning Outcome: 1

Reverse Engineering Exercise (25%)
Date: scheduled in the first half of the course, Labs
Learning Outcome: 2, 10

skills mastery checks	(5 in total, individual assessment, in-lab)	5%
component drawings	(individual assignment, week 5)	10%
animation	(GROUP assignment, week 6)	10%

Design and Build project (45%)
Date: scheduled in the second half of the course, Labs
Learning Outcome: 3, 4, 5, 6

concept sketches	(individual assessment / team submission; week 7)	1%
proof of concept demo	(individual assessment / team submission; week 8)	2%
design proposal	(team assessment; week 9)	6%
participation check	(individual assessment / team submission; week 9)	1%
final report check	(individual assessment / team submission; week 10)	1%
group presentation	(team assessment; week 11)	6%
demonstration	(team assessment; week 11)	6%
design evaluation	(team assessment; week 11)	7%
final report	(team assignment; week 12)	15%

Final Exam (20%)
Date: Fri, Apr 17, 7:00 PM - 9:00 PM, TBA
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. 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

Passing grade: In order to pass the course, you must pass both the Design & Build component of the laboratory and the Final Exam components. A failing grade (50% or lower) on either the Design and Build portion OR the Final Exam will mean that you have failed the course. The assigned grade will be based on the failed items only. If a student passes both the Design & Build and 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.

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 will not be accepted.

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.

Letter grade translation:

A+	Really Impressive	100
A	Impressive	90
A-		82
B+		78
B	Expected	75
B-		72
C+		68
C	Satisfactory	65
C-		62

D+		58
D	Disappointing, serious flaws	55
D-		52
F	Inadequate	35
X	no submission or wholly inadequate	0

The Design and Build Project: This project forms a major activity in 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

Many laboratory sessions will be held in 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. There will be a maximum of 25 students in the shop at any point in time and this number can only be supported when both Ken or Dave and a GTA are present
3. You will NOT be able to attend any lab session other than the one assigned to your lab section of the course
4. You will be required to show respect for Ken, Dave, your GTA and the shop's equipment
5. You will be required to dress appropriately
6. No open toed shoes
7. No lose clothing
8. Safety glasses are to be worn
9. Shop coats are recommended and are available in the shop for your use
10. If you do not know how to use shop equipment - ASK!
11. THINK first.
12. Additional rules will be posted in the shop or expressed by Ken or Dave.
13. 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 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