

ENGG*2100 Engineering & Design II

Winter 2018



(Revision 1: January 5, 2018)

1 INSTRUCTIONAL SUPPORT

1.1 Instructor

Instructor: S. Andrew Gadsden, Ph.D., P.Eng., P.M.P.
Office: THRN 2411, ext. 52431
Email: gadsden at uoguelph.ca
Office hours: By appointment

1.2 Lab Technician

Technicians:	Dave Wright	Ken Graham
Office:	THRN 1019, ext. 56706	THRN 1021, ext. 53924
Email:	dwrigh02 at uoguelph.ca	kgraha06 at uoguelph.ca

1.3 Teaching Assistant

GTA	Email	Office Hours
Andrew (Andy) Lee	alee32 at uoguelph.ca	Please use lab hours
Claudia Smith	csmith33 at uoguelph.ca	Please use lab hours
Elyse Hill	ehill06 at uoguelph.ca	Please use lab hours
Patrick Egan	pegan at uoguelph.ca	Please use lab hours
Stefano Rossi	srossi at uoguelph.ca	Please use lab hours
Steven Chiang	hchiang at uoguelph.ca	Please use lab hours

2 LEARNING RESOURCES

2.1 Course Website

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

2.2 Required Resources

Not applicable.

2.3 Recommended Resources

Not applicable.

2.4 Additional Resources

Lecture Information: Lecture notes will not be posted on the Courselink site.

Lab Information: Teaching Assistants (TAs) will be available in lab periods to direct activities and answer questions. The TAs will provide resources regarding tutorials and links to related web pages.

2.5 Communication & Email Policy

Please use lectures and 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 ASSESSMENT

3.1 Dates and Distribution

Seminars:

Presentation, individual, without the use of aids, scheduled in the first half of course	6%
Presentation, individual, with the use of aids, scheduled in the second half of course	8%

Labs: (please see 5.3 Lab Schedule for date information)

<u>Reverse engineering exercise</u> , scheduled in the first half of the course,		
- Skills mastery checks	(4 in total, individual assessment)	4%
- Participation check	(individual assessment)	1%
- Component drawings	(individual assignment)	8%

- Animation	(individual assignment)	8%
<u>Design and build project</u> , scheduled in the second half of the course,		
- Final report check	(individual / team assessment)	1%
- Participation check	(individual assessment)	1%
- Concept sketches	(individual / team assessment)	1%
- Design proposal	(team assignment)	6%
- Proof of concept demo	(individual / team assessment)	2%
- Group presentation	(team assessment)	6%
- Demonstration	(team assessment)	6%
- Design evaluation	(team assessment)	7%
- Final report	(team assignment)	15%

Final Exam:

Based on course content *largely* from lectures 20%
Monday, April 9th, 2018, 11:30 am – 1:30 pm, Room TBA
Note: Always confirm date, time, and location on Webadvisor!

3.2 Course 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 at 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 and Build component of the laboratory and achieve an overall final course mark equal to or above 50%. A failing grade (50% or lower) on the Design and Build portion will mean that you have failed the course. In this case, the assigned grade will be based on the failed items only. If a student passes both the Design and Build, 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 of the students in that team. Failure to pay these charges will result in individual student final grades being withheld until the own balance is cleared.

Late Submissions: Not 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 the work 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 such fine resolution.

The following letter grade translations will be adhered to throughout the course:

A+	Really Impressive	100%
A	Impressive	90%
A-		80%
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%

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 and any other material deemed relevant to the course content. The final exam will be closed book with no electronic aids permitted.

4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 Calendar Description

Progression in engineering design skills with particular emphasis on computer usage in design, on oral communication of solutions and team skills. Computer usage in design will include advanced

CAD/CAM/CAE tools, structured programming and database management software. An introduction to safety in engineering practice and design. An introduction to the concept of sustainable development.

Prerequisite(s): ENGG*1100 plus 4.0 credits

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

Credit weighting: 0.75

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

4.2 Course Aims

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.

4.3 Learning Objectives

At the successful completion of this course, the student will have demonstrated the ability 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 modeling techniques.

4.4 Graduate Attributes

Successfully completing this course will contribute to the following CEAB Graduate Attributes:

Graduate Attribute	Learning Objectives	Assessment
1. Knowledge Base for Engineering	2, 3, 7	-

2. Problem Analysis	3, 4	Exam, Labs
3. Investigation	3, 4	Labs, Project
4. Design	4, 5, 7	Labs, Project
5. Use of Engineering Tools	2, 3, 7, 10	Exam, Project, Labs
6. Individual and Teamwork	2, 3, 5	Labs, Project
7. Communication	1, 6, 10	Labs, Project, Seminars
8. Professionalism	3	
9. Impact of Engineering on Society and the Environment	5, 8, 9	Exam, Labs
10. Ethics and Equity	5, 9	Exam, Project
11. Environment, Society, Business, & Project Management	3, 5, 7	Exam, Labs
12. Life-Long Learning	2, 4	-

4.5 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/D2L but these are not intended to be stand-alone course notes. 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 quizzes and examination(s). Feedback for seminar presentations and lab work will be through those venues.

4.6 Students' Learning Responsibilities

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

4.7 Relationships with other Courses & Labs

Previous Course(s):

ENGG*1100: Design fundamentals and concept development

Follow-on Course(s):

ENGG*3100: Project-based design, field specific design, external/industrial applications

5 TEACHING AND LEARNING ACTIVITIES

5.1 Timetable

As always, confirm all locations, dates, and times on Webadvisor.

Lectures: ROZH 101 Monday, Friday 11:30 am – 12:20 pm

Labs: You MUST attend your assigned section only. Lab attendance is expected for all weeks. All of the following rooms will be used for lab components of this course: THRN 1004, THRN 1006, and THRN 1025 (SOE machine shop). For the first week of labs, go to THRN 1025 and meet with the TAs at 8:30 am. Lab times by section are as follows:

1.1, 1.2, 1.3, 1.4, and 1.5	Monday	8:30 am – 11:20 am
2.1, 2.2, 2.3, 2.4, and 2.5	Tuesday	8:30 am – 11:20 am
3.1, 3.2, 3.3, 3.4, and 3.5	Wednesday	8:30 am – 11:20 am
4.1, 4.2, 4.3, 4.4, and 4.5	Thursday	8:30 am – 11:20 am
5.1, 5.2, 5.3, 5.4, and 5.5	Friday	8:30 am – 11:20 am

Seminars: Seminars will be used for personal presentations. You are expected to show up for all of the seminars. Seminar times by section are available on WebAdvisor. However, your seminar presentations will be scheduled by the TAs and posted online (CourseLink).

Exam: Location TBA Monday, April 9, 2018 11:30 am – 1:30 pm

5.2 Class Schedule

Week	Day	Topic/Event	Learning Objectives
1 (01/08)	Monday Friday	L01: Introduction to Course and Seminar Administration L02: Design and Engineering	1 4
2 (01/15)	Monday Friday	L03: 'Total Design' L04: Tools of Engineering Design	4 4
3 (01/22)	Monday Friday	L05: Teamwork – Basics L06: Brainstorming	4 2 & 3
4 (01/29)	Monday Friday	L07: How to Brainstorm L08: Teamwork – Group Dynamics	2 & 3 2 & 3
5 (02/05)	Monday Friday	L09: Teamwork – Meetings L10: Creative Design – Evolution or Revolution	2 & 3 3 & 4
6 (02/12)	Monday Friday	L11: Creative Design – Case Studies L12: Design Ergonomics – Communicating Through Your Design	3 & 4 4
7 (02/19)	Monday Friday	Winter Break (No Classes, Labs, or Seminars)	N/A
8 (02/26)	Monday Friday	L13: Design Ergonomics – Case Studies* L14: 'Tolerancing'*	4 4 & 8
9 (03/05)	Monday Friday	L15: Quality Assurance* L16: Sustainability and Ethics*	4 & 8 7
10 (03/12)	Monday Friday	L17: Professional Engineering Design Reports* L18: Manufacturing*	7 7
11 (03/19)	Monday Friday	L19: Manufacturing with Polymers L20: Safety and Design	7 8 & 9
12 (03/26)	Monday Friday	L21: Safety and Applicable Regulatory Bodies and Standards No Class (Holiday)	8 & 9 N/A
13 (04/02)	Monday TBD Friday	L22: Course Review and Feedback ENGG*2100 Design Awards (Design Day at SOE) No Class (Work on Report or Study for Exam)	N/A
14 (04/09)	Monday Friday	No Classes (Study for Exam)	N/A

Important Note: The class schedule may be subject to change. Please refer to the most recent syllabus or outline available online. Classes denoted with a * indicate guest lecture modules by the Librarian.

5.3 Lab Schedule

Week	Shop Activity (THRN 1025)	Shop Deliverables	Computer Lab Activity (THRN 1004)	Computer Lab Deliverables
1 (01/08)	Reverse Engineering - Team creation - Component distribution Attendance Mandatory	Sign-in Sheets - Safety Attendance - Team Information	3D Modeling - Basic Skills 1 Attendance Mandatory	
2 (01/15)	Reverse Engineering - Disassembly		3D Modeling - Basic Skills 2	Basic Skills 1 - Mastery Check (1%)
3 (01/22)	Reverse Engineering - Disassembly	Reverse Engineering - Components assigned	3D Modeling - Basic Skills 3	Basic Skills 2 - Mastery Check (1%)
4 (01/29)	Design & Build Project - Introduction (THRN 1006)		3D Modeling - 2D Drawing & Dimensions	Basic Skills 3 - Mastery Check (1%)
5 (02/05)	Design & Build Project - Brainstorming		3D Modeling - Assembly	2D Drawing - Mastery Check (1%)
6 (02/12)	Design & Build Project - Brainstorming	Design & Build Project - Concept sketches (1%)	3D Modeling - Animations	Reverse Engineering - 2D drawings due (8%)
7 (02/19)	N/A	N/A	N/A	N/A
8 (02/26)	Design & Build Project - Early bird printer access	Design & Build Project - Progress check (1%)	Design & Build Project - Design	Reverse Engineering - Animations due (8%)
9 (03/05)	Design & Build Project - Early bird printer access	Design & Build Project - Proof of concept due (2%) - Design proposal due (6%)	Design & Build Project - Coaching	
10 (03/12)	Design & Build Project - Build	Design & Build Project - Progress check (1%)	Design & Build Project - Presentation coaching - Report coaching	
11 (03/19)	Design & Build Project - Build	Design & Build Project - Progress check (1%)	Design & Build Project - Final report preparation - Presentation coaching	
12 (03/26)	Design & Build Project - Group presentations, demonstrations, design evaluation, THRN 1006			
13 (04/02)	Design & Build Project - Final report submission, Friday, April 6th , all groups			
14 (04/09)	No lab activities scheduled.			

5.4 Seminar Schedule

This year, seminars run from January 22 to March 7, 2018. Please confirm the date of your seminar presentation(s) on the course webpage as assigned by the TAs.

5.5 Other Important Dates

Drop date is typically the 40th class day of the academic year (March 9th, 2018). Refer to the Graduate Calendar for the schedule of dates. Always check online for the latest dates and information (CourseLink and WebAdvisor).

6 LAB SAFETY

Safety is critically important to the School and it 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.

If the laboratory rules are not followed, consequences will include removing student's access to the lab. If this results in lab work not being completed, the student will receive a grade of 0.

All students are required to correctly complete a shop safety course. Failure to successfully complete the safety course will result in the loss of shop privileges.

Laboratory and 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 TA 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 TA, and the equipment in the shop.
5. You will be required to dress appropriately.
6. No open-toed shoes.
7. No loose clothing.
8. Safety glasses are to be worn at ALL times.
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, Dave, or the TA.
 13. Failure to safely work in the shop may lead to lost shop privileges. This is likely to have academic consequences.
 14. If at any time you feel uncomfortable or unwell, immediately stop work and inform the TA, Ken or Dave.
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7 ACADEMIC MISCONDUCT

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 discourages misconduct. 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.

Academic Conduct Expectations and Academic Misconduct: The course requires several team written submissions. All team members must sign the cover sheet for the submissions. This cover sheet must also have the following statement:

In signing this cover page, I certify that I have been an active member of the team and provided approximately equal contribution to the work. I understand that taking credit for work that is not my own is a form of academic misconduct and will be treated as such.

Respect for ownership of Intellectual Property (e.g., copyright, patents, trade marks, music, software) is important. Work that has been created or prepared with unlicensed or illegal software will not be knowingly accepted for submission with the course (e.g., a grade of zero will be assigned).

7.1 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:

<http://www.academicintegrity.uoguelph.ca/>

Please also review the section on Academic Misconduct in your [Engineering Program Guide](#).

The School of Engineering has adopted a Code of Ethics that can be found at:

<http://www.uoguelph.ca/engineering/undergrad-counselling-ethics>

8 ACCESSIBILITY

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability for a short-term disability should contact the Centre for Students with Disabilities as soon as possible.

For more information, contact CSD at [519-824-4120](tel:519-824-4120) ext. 56208 or email csd@uoguelph.ca or see the website: <http://www.uoguelph.ca/csd/>

9 RECORDING OF MATERIALS

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

10 RESOURCES

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs:
<http://www.uoguelph.ca/registrar/calendars/index.cfm?index>