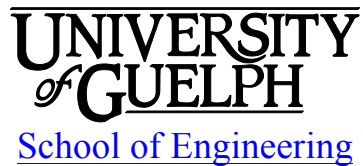


# ENGG\*4220 Interdisciplinary Mechanical Engineering

Design W (3-3) [0.75]

Winter 2014



(Revision 0: November 29, 2013)

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## 1 INSTRUCTIONAL SUPPORT

### 1.1 Instructor

Instructor: Ibrahim Deiab, Ph.D., P.Eng.

Office: THRN 2415, ext. 58391

Email: [ideiab@uoguelph.ca](mailto:ideiab@uoguelph.ca)

Office hours: Tuesday and Thursday 10:15 – 11:00, Wednesday 9:30 -11:00, via email or by appointment

### 1.2 Lab Technician

Technician: TBA

Office: THRN xx, ext. 53xx

Email: [xx@uoguelph.ca](mailto:xx@uoguelph.ca)

### 1.3 Teaching Assistants

<b>GTA</b>	<b>Email</b>	<b>Office Hours</b>
Fei He	<a href="mailto:hef@uoguelph.ca">hef@uoguelph.ca</a>	TBA on Courselink

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## 2 LEARNING RESOURCES

### 2.1 Course Website

Course material, news, announcements, and grades will be regularly posted to the ENGG\*4220 Courselink site. You are responsible for checking the site regularly.

### 2.2 Required Resources

1. George E. Dieter and Linda C. Schmidt, Engineering Design 5<sup>th</sup> edition, McGraw Hill
2. Handouts posted by instructor

### 2.3 Recommended Resources

### 2.4 Additional Resources

**Lecture Information:** Lecture notes will be posted on courselink.

**Lab Information:** The handouts for all the lab sessions are within the lab section. All types of resources regarding tutorials, will be posted on courselink.

**Assignments:** Assignments handout and due dates will be posted on courselink.

**Exams:**

**Miscellaneous Information:** Other information related to the course will also be posted on the web page.

### 2.5 Communication & Email Policy

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 <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

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## 3 ASSESSMENT

### 3.1 Dates and Distribution

**Quizzes:** 15% Feb 11 2014 and March 20 2014

**Labs:** 10% See section 5.3

**Term paper 10% See handout on course link**

**Project:** 35% , ((group meeting with instructor every other week or when called by instructor)

proposal: Due Jan 21 2014

Progress report: Feb 4<sup>th</sup> 2014

Log book: record of meetings and progress to be submitted as appendix to final report

Final Report and prototype: April 1 2014

Presentation and/or oral exam: During lab sessions in last week

Poster: April 1 2014

**Note:** Both paper and electronic copies are to be submitted

**Midterm Exam(s):** 30%

Tuesday March 11 2014

### 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 laboratory and exam course portions. Students must obtain a grade of 50% or higher on the exam(s) , this includes midterm(s), final and quiz(s), portion of the course in order for the laboratory write-up portion of the course to count towards the final grade.

**Missed midterm tests:** If you miss a test due to grounds for granting academic consideration or religious accommodation, the weight of the missed test will be added to the final exam. There will be no makeup midterm tests.

**Lab Work:** You must attend and complete all laboratories no make up for missed labs. If you are to miss a laboratory due to grounds for granting academic consideration, or if you are to miss a lab for religious accommodation, arrangements must be made with the teaching assistant apriori.

**Late Lab Reports:** Late submissions of lab reports will not be accepted.

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## 4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

### 4.1 Calendar Description

This is a general design course for students registered in the B. Eng. major in mechanical engineering who wish to develop a broad based mechanical engineering foundation. Students work in groups to develop a general mechanical engineering design. Special attention is paid to the sustainability of the design, its economic feasibility and overall efficiency.

Prerequisite(s): ENGG\*3100

*Corequisite(s):*

### 4.2 Course Aims

The main goals of the course are

- introduce the student to the product design process,
- Maintain creativity and critical thinking in solving technically challenging, open-ended mechanical engineering problems.
- Work in teams and apply effective teamwork concepts.
- Develop electronic, written and oral communication skills.
- Recognize professional and ethical responsibility.

### Learning Objectives

At the successful completion of this course, the student will have demonstrated the ability to:

1. Apply knowledge of mathematics, science and mechanical engineering to solve open ended engineering problem, as well as to analyze and interpret data necessary for solving engineering problem.
2. Identify, formulate, and solve engineering problems
3. Function on multidisciplinary teams
4. Communicate effectively to present the solution to the given project problem
5. Apply project management skills.
6. Use the techniques, skills, and modern engineering tools necessary for solving mechanical engineering problems
7. Demonstrate knowledge of relevant contemporary issues
8. Understand of professional and ethical responsibility
9. Understand the impact of the proposed engineering solutions in a global, economic, environmental, and societal context

### 4.3 Graduate Attributes

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

<b>Graduate Attribute</b>	<b>Learning Objectives</b>	<b>Assessment</b>
1. Knowledge Base for Engineering	1	Quizzes, Exams
2. Problem Analysis	1,2	Quizzes, Exams, Project
3. Investigation	1,2	Exam, Project
4. Design	2,6	Project
5. Use of Engineering Tools	6	Labs, Project
6. Communication	4	Labs, Project
7. Individual and Teamwork	3	Labs, Projects
8. Professionalism	8	-
9. Impact of Engineering on Society and the Environment	9	Project
10. Ethics and Equity	8	-
11. Environment, Society, Business, & Project Management	4,9	Project
12. Life-Long Learning		

### 4.4 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 tests and project.

### 4.5 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.

### 4.6 Relationships with other Courses & Labs

#### Previous Courses:

**ENGG\*1210:** Mechanical system fundamentals such as force, torques, friction, moments, free body diagrams

**ENGG\*1500:** Solving systems of linear equations, matrix algebra, complex numbers

**ENGG\*3100** Design tools and communications Skills

#### Follow-on Courses:

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## 5 TEACHING AND LEARNING ACTIVITIES

### 5.1 Timetable

**Lectures:**

Tuesday and Thursday 11:30AM - 12:50PM MACK, Room 238

**Laboratory:**

Friday 08:30AM - 11:20AM THRN, Room 1015

Wednesday 11:30 - 2:20 PM THRN, Room 1015

### 5.2 Lecture Schedule\*

<b>Lectures</b>	<b>Lecture Topics</b>	<b>References</b>	<b>Learning Objectives</b>
1-2	Introduction to Engineering Design	Chapter 1	1,3
3-4	Product development process	Chapter 2	1,4,5,6
5-7	Review of the design process	Chapter 3-9	1,2
8-9	Design for sustainability	Chapter 10	7,9
10-12	Materials Selection	Chapter 11	7,8,9
13-16	Design for manufacturing	Chapter 14	8,9
17-20	Quality, Robust design and optimization	Chapter 15	9
21-24	Economic decision making and cost evaluation	Chapter 16-17	9

\*tentative, length of coverage and order of topics may be changed

### 5.3 Lab Schedule\*

Week	Topic	
1	Introduction to Lab Equipment and Safety Training	
2	lab sessions will be designed to cover topics needed for the students project Will include tutorials on software and use of different pieces of equipment related to the course. Experiments will be presented as many projects where students work on designing and conducting the experiments. Labs are used for group meetings and meeting with instructor and GTA	Week 3
3		Week 4
4-5		Week 6
6		Week 7
7		Week 8
8		Week 9
9		Week 10
10-11		Week 11

\*Labs will be designed to cover topics related to students' projects, e.g. software packages, CNC machining. Labs will be project based where students will design a given a experiment that will run over few lab sessions. The Lab sessions will be also used to provide a common meeting time for groups to work on their projects.

### 5.4 Other Important Dates

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## 6 LAB SAFETY

There is zero tolerance for violating lab safety rules.

Please refer to Safety information tab on ENGG4220 course link page.

For casting experiment review also [ASTM E2349 - 12](#)

(Standard Practice for Safety Requirements in Metal Casting Operations: Sand Preparation, Molding, and Core Making; Melting and Pouring; and Cleaning and Finishing)

This is in addition to SOE lab manual and lab specific safety instructions.

**In case of doubt, always ask.**

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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.

### 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>

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## 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](mailto:csd@uoguelph.ca) or see the website: <http://www.uoguelph.ca/csd/>



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## 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.

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## 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>