ENGG*2160 Engineering Mechanics II

Fall 2019
Section(s): C01

School of Engineering
Credit Weight: 0.50
Version 1.00 - September 04, 2019

---

1 Course Details

1.1 Calendar Description

Fundamental principles of the mechanics of deformable materials; stress and strain; Mohr's circle for transformation of stress and strain; deflection under load; design of beams, shafts, columns and pressure vessels; failure theory and design.

Pre-Requisites: ENGG*1210, ENGG*1500, 0.50 credits in calculus

1.2 Timetable

Lectures
Monday 2:30-3:20 PM MACN 105
Wednesday 2:30-3:20 PM MACN 105
Friday 2:30-3:20 PM MACN 105

Tutorials

Tuesday	Section 1	9:30-10:20 AM	MCKN 314
Tuesday	Section 2	8:30-9:20 AM	MCKN 305
Monday	Section 3	9:30-10:20 AM	MCKN 314
Thursday	Section 4	11:30-12:20 PM	MCKN 313
Wednesday	Section 5	8:30-9:20 AM	MCKN 305
Monday	Section 6	1:30-2:20 PM	MCKN 316

1.3 Final Exam

Monday December 9th, 2019 – 8:30 AM-10:30 AM, Room TBA on Webadvisor

---

2 Instructional Support

2.1 Instructional Support Team

Instructor: Michele Oliver Ph.D., P.Eng.
Email: moliver@uoguelph.ca
Telephone: +1-519-824-4120 x52117
Office: THRN 1335
Office Hours: TBA on Courselink or by appointment
First 6 Weeks, Midterm

Instructor: Abdallah Elsayed Ph.D., EIT
Email: aelsay01@uoguelph.ca
Telephone: +1-519-824-4120 x56933
Office: Richards 2523
Office Hours: TBA on Courselink or by appointment
Second 6 Weeks, Final Exam

2.2 Teaching Assistants

Teaching Assistant: Abdelrahman Allam
Email: allama@uoguelph.ca

Teaching Assistant: Valerie Bauman
Email: vbauman@uoguelph.ca

Teaching Assistant: Danjie Zhu
Email: danjie@uoguelph.ca

---

3 Learning Resources

3.1 Required Resources

Course Website (Website)
https://courselink.uoguelph.ca
Course material, news, announcements, and grades will be regularly posted to the ENGG*2160
Courselink site. You are responsible for checking the site regularly.

Beer, Johnston, DeWolf and Mazurek. Mechanics of Materials – Eighth Edition, International Student Edition for use outside of the U.S. (Textbook)
McGraw Hill, New York, New York (available for purchase in the bookstore).

It is mandatory to purchase one of two following ordering options for the textbook:

1) CONNECT (includes the textbook in electronic form as well as the ability to access and do the online assignments which are worth 10% of your final grade). Without CONNECT you cannot do and receive a grade for the assignments. **ISBN: 9781260403831**

OR

2) CONNECT + Hard Copy of Textbook. **ISBN: 9781260327571**

You cannot do the assignments without having your own access to CONNECT.

3.2 Recommended Resources

iClicker (Equipment)
You are not required to have an i-clicker for this class but they will be used to help the instructor assess class understanding of course concepts during lectures.

3.3 Additional Resources

Lecture Information (Notes)
Selected lecture notes are provided on the ENGG*2160 Courselink site.

CONNECT (Software)
The CONNECT system provides an integrated course eBook coupled with adaptive learning tools to help focus your study time. The system also includes supporting how-to videos and interactives along with extra practice materials.

Miscellaneous Information (Other)
Other information related to the course is also posted to the ENGG*2160 Courselink site.

3.4 Communication & Email Policy

Please use lectures and tutorial help sessions as your main opportunity to ask questions about the course. Major announcements will be posted to the ENGG*2160 Courselink site. **It is your responsibility to check the Courselink site 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 student.

---

4 Learning Outcomes

This course is an introductory course in the strength of materials, which is a basic course in most mechanical engineering programs. The main goals of the course are (1) to teach students the fundamental concepts regarding the strength of materials under a variety of

loading conditions and (2) to provide an introduction to how these fundamental concepts can be used in design.

4.1 Course Learning Outcomes

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

1. Understand the stress-strain behavior of engineering materials in service
2. Develop adequate procedures for finding the required dimensions of a member of a specified material to carry a given load subject to stated specifications of stress and deflection

4.2 Engineers Canada - Graduate Attributes (2018)

Successfully completing this course will contribute to the following:

#	Outcome	Learning Outcome
1	Knowledge Base	1, 2
1.1	Recall, describe and apply fundamental mathematical principles and concepts	1, 2
1.2	Recall, describe and apply fundamental principles and concepts in natural science	1, 2
1.3	Recall, describe and apply fundamental engineering principles and concepts	1, 2
1.4	Recall, describe and apply program-specific engineering principles and concepts	1, 2
2	Problem Analysis	1, 2
2.1	Formulate a problem statement in engineering and non-engineering terminology	1, 2
2.2	Identify, organize and justify appropriate information, including assumptions	1, 2
2.3	Construct a conceptual framework and select an appropriate solution approach	1, 2
2.4	Execute an engineering solution	1, 2

4.3 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
- MATH*1210: Differentiation, integration

Follow-on Courses:

- ENGG*2180: Introduction to Manufacturing Processes
- ENGG*3280: Machine Design

---

5 Teaching and Learning Activities

5.1 Lecture

Topics:

Approximate Lectures	Lecture Topics	References	Learning Outcomes
1	Introduction to Mechanics of Materials and Review of Mechanics I (Free Body Diagrams)	Overview of Text, Mechanics I Notes and Textbook	1,2
2-4	Stress (Normal, Shearing and Bearing, Factor of Safety)	Chapter 1	1,2

Approximate Lectures	Lecture Topics	References	Learning Outcomes
5	Strain (Normal and Shearing)	Chapter 2	1,2
6-12	Properties of Materials (True and Nominal Stress, Elastic and Plastic Deformation, Elastic, Shear and Bulk Modulus, Poisson's Ratio, Temperature Effects, Biaxial Loading, Generalized Hooke's Law, Superposition Solution Methods, Stress Concentrations)	Chapter 2	1,2
13-17	Torsion (Stresses on Oblique Planes, Power Transmission)	Chapter 3	1,2
18-21	Bending (Beams of 2 Materials, Shearing Stress in a Beam, Relationship Between Load, Shear and Bending Moment)	Chapter 4,5	1,2

Approximate Lectures	Lecture Topics	References	Learning Outcomes
22-28	Transformation of Stress and Strain (Principal Stresses, 2D and 3D Mohr's Circle, Thin Walled Pressure Vessels)	Chapter 7	1,2
29	Combined loading (Superposition solution methods)	Chapter 8	1,2
30-32	Beam Deflection Analysis Methods	Chapter 9	1,2
33-34	Columns	Chapter 10	1,2

5.2 Tutorials, Quizzes and Midterm Schedule

Week of	Tutorial	CONNECT Assignments	Tutorial Quiz	Midterm
Sept 2	No Tutorial	No Assignment	No Quiz	
Sept 9	Tutorial	Assignment 1	Dry Run Quiz (not for marks)	
Sept 16	Tutorial	Assignment 2	Quiz 1	
Sept 23	Tutorial	Assignment 3	Quiz 2	
Sept	Tutorial	Assignment	Quiz 3	

30		4		
Oct 7	Tutorial	Assignment 5	No Quiz	
Oct 14	Open Tutorials	Review Assignment (not for marks)	No Quiz	Midterm Part 1 - Friday October 18th - In Class
Oct 21	No Tutorial	Assignment 6	No Quiz	Midterm Part 2 - Monday October 21 - In Class
Oct 28	Tutorial	Assignment 7	Quiz 4	
Nov 4	Tutorial	Assignment 8	Quiz 5	
Nov 11	Tutorial	Assignment 9	Quiz 6	
Nov 18	Tutorial	Assignment 10	Exam Problem Quiz (not for marks)	
Nov 25	Open Tutorials	Review Assignment (not for marks)	No Quiz	

5.3 Other Important Dates

First day of class: Friday Sept. 6th, 2019
Monday and Tuesday, October 14th and 15th: Fall Study Break
Last day of class: Friday November 29th, 2019 (Classes rescheduled from Monday October 14th; Monday schedule in effect)

---

6 Assessments

6.1 Marking Schemes & Distributions

Name	Scheme A (%)
CONNECT Assignments	10
Tutorial Quizzes	10

Name	Scheme A (%)
Midterm	40
Final Exam	40
Total	100

6.2 Assessment Details

CONNECT Assignments (the best 8 of 10 assignments count) (10%)
Date: Mon, Sep 9 - Mon, Nov 25, 11:00 PM
Learning Outcome: 1

CONNECT Assignment	Date Assigned	Due Date (Due by 11 pm)
1	Monday September 9th	Monday September 16th
2	Monday September 16th	Monday September 23rd
3	Monday September 23rd	Monday September 30th
4	Monday September 30th	Monday October 7th
5	Monday October 7th	Monday October 14th
6	Monday October 21st	Monday October 28th
7	Monday October 28th	Monday November 4th
8	Monday November 4th	Monday November 11th
9	Monday November 11th	Monday November 18th
10	Monday November 18th	Monday November 25th

Tutorial Quizzes (the best 4 of 6 quizzes count) (10%)
Date: Mon, Sep 16 - Mon, Nov 11, Tutorial Rooms
Learning Outcome: 1, 2

Quiz	Date
1	Week of September 16th
2	Week of September 23rd
3	Week of September 30th
4	Week of October 28th
5	Week of November 4th
6	Week of November 11th

Midterm (40%)
Date: Fri, Oct 18, 2:30 PM - Mon, Oct 21, 3:20 PM, MacNaughton 105 (Lecture Room)
Learning Outcome: 1, 2
Due to room scheduling constraints, the midterm exam will be run in-class over two

lectures:

Midterm Part 1 - Friday October 18th from 2:30-3:20 PM

Midterm Part 2 - Monday October 21st from 2:30-3:20 PM

The two parts will each contribute 20% towards your final course grade.

Final Exam (40%)

Learning Outcome: 1, 2

Please Note: If you score higher on the final exam than the midterm exam, and if you have written both portions of the midterm (i.e., Friday October 18th and Monday October 21st), the midterm weighting will be reduced to 20%, and the final exam weighting will be increased to 60%.

6.3 Course Grading Policies

Tutorial Quizzes:

There will be six in-tutorial quizzes through the semester. In order to receive credit for writing a quiz, students must be registered in the tutorial in which they write their quiz. The quizzes are intended to help students better understand the course content and account for 10% of the course marks. The best four of the six quizzes will count.

CONNECT Assignments:

There will be ten assignments for marks through the semester. The assignments are intended to help students better understand the course content and account for 10% of the course marks. The best eight of ten quizzes will count.

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 the exam portion of the course. Students must obtain a grade of 50% or higher on the exam portion of the course in order for the CONNECT assignments and tutorial quizzes to count towards the final grade.

Missed CONNECT assignments:

If you miss an assignment or don't complete the assignment before the due date due to grounds for granting academic consideration, your lowest assignment mark will be dropped.

Missed quizzes:

If you miss a quiz due to grounds for granting academic consideration, your lowest quiz mark will be dropped. There will be no makeup quizzes.

Missed midterm exam:

If you miss one or both days of the midterm exam due to grounds for granting academic consideration or religious accommodation, the weight of the missed exam or exam portion (i.e., October 18th and/or October 21st) will be added to the final exam. Each portion of the midterm exam contributes 20% towards the course grade.

---

7 School of Engineering Statements

7.1 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.

7.2 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.

7.3 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.

8 University Statements

8.1 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.

8.2 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

8.3 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

8.4 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.

8.5 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

8.6 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

8.7 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.

8.8 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
