# ENGG*2160 Engineering Mechanics
# Fall 2018

UNIVERSITY of GUELPH

School of Engineering

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# 1 INSTRUCTIONAL SUPPORT

## 1.1 Instructors


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

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


## 1.2 Teaching Assistants

| GTA | Email | Office Hours |
|---|---|---|
| Bharathwaj Ananthapillai | banantha@uoguelph.ca | TBA on Courselink |
| Jessica Oreskovic | joreskov@uoguelph.ca | TBA on Courselink |
| Sahil Sharma | sahil@uoguelph.ca | TBA on Courselink |
| Shakti Chauhan | shakti@uoguelph.ca | TBA on Courselink |

# 2 LEARNING RESOURCES

## 2.1 Course Website

https://courselink.uoguelph.ca

Course material, news, announcements, and grades will be posted to the ENGG*2160 Courselink site. You are responsible for checking the site regularly.

## 2.2 Required Resources

- Ebook - Mechanics of Materials with CONNECT by Beer, Johnston, DeWolf and Mazurek, 7th Edition, 2015; ISBN 9780077625252 (Available through the Campus eBookstore; Access Codes are available both in-store and online).

## 2.3 Recommended Resources

- I<clickers for in-class questions and sample problems.

## 2.4 Additional Resources

**Lecture Information**: Selected lecture notes are provided on the ENGG*2160 Courselink site.

**Assignments**: Approximately 10 practice assignments will be available in CONNECT. Complete the assignments according to the schedule provided on the Courselink site. Solutions will be available on CONNECT.

**Miscellaneous Information**: Other information related to the course is also posted to the Courselink site.

## 2.5 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 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.

# 3 ASSESSMENT

## 3.1 Dates and Distribution

**Learn Smart Pre-Class Quizzes**: 5%
Wednesday September 12
Monday September 17
Monday September 24
Monday October 1
Wednesday October 10
Monday October 15
Monday October 22
Monday October 29
Monday November 5
Monday November 12
Monday November 19
Monday November 26

**Tutorial Quizzes:** 15% (best 5 of 7 quiz marks will be counted)
Week of September 17
Week of September 24
Week of October 1
Week of October 29
Week of November 5
Week of November 12
Week of November 19

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**Midterm**: 40%
Saturday October 20th, 2018 – 12:30-2:30 PM MacNaughton 105

**Final Exam**: 40%
Friday December 14th, 2018 – 8:30-10:30 AM, Room TBA on WebAdvisor

Please Note: If you score higher on the final exam than the midterm exam, the midterm weighting will be reduced to 20% and the final exam weighting will be increased to 60%. If you miss the midterm exam due to grounds for granting academic consideration or religious accommodation, the final exam will be worth 80%.

## 3.2 Course Grading Policies

**Learn Smart Pre-Class Quizzes:** Quizzes will be conducted weekly (for a total of 12 quizzes). To receive credit, quizzes must be completed by 7:00 AM on CONNECT prior to the

beginning of the first class of the week. The purpose of the quizzes is to allow you to become familiar with material to be covered in the upcoming week. The Learn Smart Quizzes count for 5% of course marks.

**Tutorial Quizzes:** There will be seven in-tutorial quizzes throughout the semester. To receive credit for writing a quiz, students must be registered in the tutorial in which they write their quiz. The quizzes count for 15% of course marks.

**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**: 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 Learn Smart quizzes and tutorial quizzes to count towards the final grade.

**Missed tutorial quizzes or midterm test**: If you miss a midterm test due to grounds for granting academic consideration or religious accommodation, the weight of the missed test will be added to the final exam. If you miss a tutorial quiz due to grounds for granting academic consideration, your worst tutorial quiz mark will be dropped. There are no make-up or quiz mark dropping options for the Learn Smart pre-class quizzes.

**Questions regarding midterm marking**: If you think a mistake was made in the grading of your midterm exam, you must contact the TA who marked the question prior to Wednesday October 31st at 5 pm. Prior to contacting the TA, please refer to the exam answer key and be prepared to explain where you believe more marks should have been allocated.

# 4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

## 4.1 Calendar Description

Study of the 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.
*Prerequisite(s)*: ENGG*1210, ENGG*1500, 0.5 credits in Calculus

## 4.2 Course Aims

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.

## 4.3 Learning Objectives

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

## 4.4 Engineers Canada - Graduate Attributes

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

| Graduate Attribute | Learning Objectives | Assessment |
|---|---|---|
| 1. Knowledge Base for Engineering | 1,2 | Quizzes, Exams |
| 2. Problem Analysis | 1,2 | Quizzes, Exams |

## 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 site 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. Scheduled classes will be the principal venue to provide information and feedback for tests.

## 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 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

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# 5 TEACHING AND LEARNING ACTIVITIES

## 5.1 Timetable

| **Lectures** | | | |
|---|---|---|---|
| Monday | | 8:30-9:20 AM | ALEX 200 |
| Wednesday | | 8:30-9:20 AM | ALEX 200 |
| Friday | | 8:30-9:20 AM | ALEX 200 |
| **Tutorials** | | | |
| Monday | Section 1 | 11:30 AM -12:20 PM | MCKN 316 |
| Wednesday | Section 2 | 4:30-5:20 PM | MCKN 304 |
| Monday | Section 3 | 2:30-3:20 PM | MCKN 316 |
| Monday | Section 4 | 1:30-2:20 PM | MCKN 317 |
| Friday | Section 5 | 1:30-2:20 PM | MCKN 317 |
| Monday | Section 6 | 4:30-5:20 PM | MCKN 304 |
| Wednesday | Section 7 | 1:30-2:20 PM | MCKN 314 |

## 5.2 Approximate Lecture Schedule

| **Approximate Lectures** | **Lecture Topics** | **References** | **Learning Objectives** |
|---|---|---|---|
| 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 |
| 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 |

| Approximate Lectures | Lecture Topics | References | Learning Objectives |
|---|---|---|---|
| 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 |
| 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 |

## 5.3 Tutorials, Quizzes and Midterm Schedule (all deal with learning objectives 1&2)

| Week of | Tutorial | Unmarked Assignment | Learn Smart Pre-Class Quiz | Midterm |
|---|---|---|---|---|
| Sept. 3 | | | | |
| 10 | Tutorial | √ | √ | |
| 17 | Quiz | √ | √ | |
| 24 | Quiz | √ | √ | |
| Oct. 1 | Quiz | √ | √ | |
| 8 | No Tutorials (Fall Study Break) | √ | √ | |
| 15 | Open Tutorials | | √ | Midterm (Saturday October 20th, 2018 – 12:30-2:30 PM - MacNaughton 105) |
| 22 | No Tutorials | √ | √ | |
| 29 | Quiz | √ | √ | |
| Nov. 5 | Quiz | √ | √ | |
| 12 | Quiz | √ | √ | |
| 19 | Quiz | √ | √ | |
| 26 | Open Tutorials | | √ | |

## 5.4 Other Important Dates

Friday, September 7th 2018: First day of class

Monday and Tuesday, October 8th and 9th, 2018: Thanksgiving Day and Fall Study Break Day

Friday, November 2nd, 2018: Drop date – 40th class

Friday November 30th, 2018: Last day of class (Classes rescheduled from Monday, October 8th, Monday schedule in effect)

# 6 LAB SAFETY

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. While there are no laboratories in this course, 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.

# 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

# 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 or for a short-term disability should contact the Student Accessibility Services as soon as possible. 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 more information, contact SAS at 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