

**ENGG\*1210: ENGINEERING MECHANICS I**  
**Fall 2016**



**School of Engineering**  
(Revision 0: August 25, 2016)

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## 1. INSTRUCTIONAL SUPPORT

### 1.1 Instructor

Instructor: Mostafa Elsharqawy  
Office: THRN 2407  
Email: [melsharq@uoguelph.ca](mailto:melsharq@uoguelph.ca)  
Office Hours: Wednesday and Friday 11:30AM – 12:30PM

### 1.2 Teaching Assistants

| GTA                 | Email  | Office Hours | Section(s) |
|---------------------|--|--------------|------------|
| Kathleen Songin     | <a href="mailto:ksongin@uoguelph.ca">ksongin@uoguelph.ca</a>           | TBA          | TBA        |
| Mohamed Al Hamahmy  | <a href="mailto:malhamahmy@gmail.com">malhamahmy@gmail.com</a>         | TBA          | TBA        |
| Stephen Emslie      | <a href="mailto:semslie@mail.uoguelph.ca">semslie@mail.uoguelph.ca</a> | TBA          | TBA        |
| Emmanuel Ogunsona   | <a href="mailto:eogunson@uoguelph.ca">eogunson@uoguelph.ca</a>         | TBA          | TBA        |
| Precious Arku (0.5) | <a href="mailto:parku@uoguelph.ca">parku@uoguelph.ca</a>               | TBA          | TBA        |

**NOTE: ALL TA OFFICE HOURS WILL BE HELD IN THRN 1425.**

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## 2. LEARNING RESOURCES

### 2.1 Course website

Course material, news, announcements, and grades will be regularly posted to the ENGG\*1210 CourseLink site. You are responsible for checking the site regularly.

### 2.2 Required Resources

Russell C. Hibbeler, Engineering Mechanics: Statics & Dynamics, 14<sup>th</sup> Ed., Prentice Hall, 2015

### 2.3 Additional Resources

**Lecture Information:** Notes to accompany lectures will be posted on the course website (CourseLink) throughout the semester. You will be granted access to the website when you register for the course. These lecture notes are not complete and it is still highly recommended that you print the notes prior to lectures and fill in the blank sections.

**Assignments:** Download the assignments according to the schedule given in the CourseLink website. All the solutions will be posted as indicated.

**Miscellaneous Information:** Other information related to Engineering Mechanics will be posted on the course website.

## 2.4 Communication and Email Policy

Please use lectures and tutorials as your main opportunity to ask questions about the course. Major announcements and/or changes will be posted to the course website. It is your responsibility to check the course website regularly.

Electronic communication should be limited to the course forum, however topics of a personal and confidential nature (e.g. marks) should be emailed to the instructor: [melsharg@uoguelph.ca](mailto:melsharg@uoguelph.ca). Please note that all email communication must be made through your University of Guelph email account (i.e. [username@mail.uoguelph.ca](mailto:username@mail.uoguelph.ca)).

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## 3. ASSESSMENT

### 3.1 Dates and Distribution

**Assignments:** 10 unmarked assignments 0%

**In-tutorial Quizzes:** 6 quizzes for a total of 20% scheduled as follows:

|         |                   |               |    |
|---------|-------------------|---------------|----|
| Quiz #1 | Week #3 (26 Sep)  | On Chapter 2  | 3% |
| Quiz #2 | Week #4 (3 Oct)   | On Chapter 3  | 3% |
| Quiz #3 | Week #7 (24 Oct)  | On Chapter 5  | 4% |
| Quiz #4 | Week #8 (31 Oct)  | On Chapter 6  | 3% |
| Quiz #5 | Week #9 (7 Nov)   | On Chapter 7  | 3% |
| Quiz #6 | Week #12 (28 Nov) | On Chapter 12 | 4% |

**In-class Tests:** 2 tests for a total of 40% scheduled as follows:

|         |              |                   |     |
|---------|--------------|-------------------|-----|
| Test #1 | 13 Oct, 2016 | On Chapters 1 - 4 | 20% |
| Test #2 | 17 Nov, 2016 | On Chapters 6 - 9 | 20% |

**Final Exam:** 40% Monday, 12<sup>th</sup> December 2016, 7:00PM – 9:00PM, Room TBA on WebAdvisor

### 3.2 Course Grading Policies

**Academic Consideration:** 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 Consideration of Religious Obligations:  
<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml>

**Passing Grade:** The passing grade is 50%.

**Missed Quizzes, Tests, or Midterms:** If you miss a test or midterm due to grounds for granting academic consideration or religious accommodation, the weight of any missed assessment will be added to the final exam weight. If you miss two or more quizzes due to grounds for granting academic consideration or religious accommodation, the weight of the second and higher missed quizzes will be added to the final exam weight. There will be no makeup quizzes, tests, or midterm.

**Questions Concerning Grades:** If you have questions about the grade your quiz or test received, please ask your TA within one week of the document being returned. However, all requests for re-marking must be made to the instructor and accompanied by a completed re-marking request form (found on CourseLink). Any item that is re-marked will be re-marked entirely. Therefore it is strongly suggested that you thoroughly review your entire document before making a re-marking request. Pencil-written works will not be re-marked. Re-marking requests will not be honoured more than one week after the document has been returned.

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## 4. AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

### 4.1 Calendar Description

The fundamental principles of Newtonian mechanics; statics of particles in 2-D space; equilibrium of rigid bodies in 2-D; distributed forces; friction, linear and angular momentum of rigid bodies; conservation of energy; principles of impulse and momentum; and, plane motion of rigid bodies.

### 4.2 Course Aims

This course is to introduce the basic principles of engineering mechanics with emphasis on their analysis and application to practical engineering problems. This course will focus on the most basic branch of mechanics: rigid-body mechanics. It is essential for the design and analysis of many types of structural members, mechanical components, or electrical devices encountered in engineering. It also forms the basis for future studies in mechanics, including deformable-body mechanics and fluid mechanics. Hopefully, by the end of the semester, you will have a better understanding of what mechanics means, and how this branch of science is useful for engineers.

### 4.3 Learning Objectives

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

1. Describe the motions and forces associated with the static and dynamic behavior of point objects and rigid bodies.

2. Clearly articulate and differentiate the main concepts of Newtonian mechanics including forces, moments, distributed forces, friction, linear and angular momentum, impulse, energy, power, efficiency and equilibrium.
3. Model and solve engineering mechanics problems with stated assumptions, using clearly communicated solutions complete with Free Body Diagrams, dimensional homogeneity, and correct use of significant digits.
4. Describe the force and moment distribution throughout structures and mechanisms.
5. Describe the motion of a particle or rigid body in terms of its position, velocity, and acceleration in different frames of reference

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

#### 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 assessments.

#### 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 and/or Current Courses:**

**MATH\*1200 & MATH\*1210:** Differentiation, integration

**Follow-on Courses:**

**ENGG\*2160:** Mechanics of deformable solids

**ENGG\*2230:** Mechanics of gases and fluids, material that cannot take a shear stress

**ENGG\*2400:** Engineering systems analysis –understanding of force, deflection, energy, and work

**ENGG\*2340:** Three-dimensional analysis of forces and motion

**ENGG\*3150:** Engineering Biomechanics properties

**ENGG\*3280:** Applications of engineering mechanics in the design of mechanical elements

## 5. TEACHING AND LEARNING ACTIVITIES

### 5.1 Timetable

**Lectures:**

|  | <b>Day</b>         | <b>Time</b>       | <b>Location</b> |
|--|--------------------|-------------------|-----------------|
|  | Tuesday & Thursday | 11:30AM - 12:50PM | ALEX 200        |

**Tutorials:**

| <b>Section #</b> | <b>Day</b> | <b>Time</b>       | <b>Location</b> |
|------------------|------------|-------------------|-----------------|
| 0101             | Monday     | 10:30AM - 11:20AM | MCKN, Room 307  |
| 0102             | Monday     | 08:30AM - 09:20AM | MCKN, Room 306  |
| 0103             | Monday     | 03:30PM - 04:20PM | MCKN, Room 304  |
| 0104             | Wednesday  | 01:30PM - 02:20PM | MCKN, Room 315  |
| 0105             | Thursday   | 08:30AM - 09:20AM | MCKN, Room 309  |
| 0106             | Wednesday  | 10:30AM - 11:20AM | MCKN, Room 311  |
| 0107             | Monday     | 01:30PM - 02:20PM | MCKN, Room 315  |
| 0108             | Friday     | 10:30AM - 11:20AM | MCKN, Room 307  |
| 0109             | Thursday   | 02:30PM - 03:20PM | MCKN, Room 307  |

### 5.2 Lecture Schedule

| <b>Lecture #</b> | <b>Lecture Topic</b>                         | <b>Reference</b> | <b>Learning Objectives</b> |
|------------------|--|------------------|----------------------------|
| 1                | Introduction to Engineering Mechanics        | Chapter 1        | 1, 2, 3                    |
| 2, 3             | Force Vectors                                | Chapter 2        | 1, 2                       |
| 4, 5             | Equilibrium of a Particle                    | Chapter 3        | 1, 2                       |
| 6, 7             | Rigid Body Force Systems                     | Chapter 4        | 1, 2                       |
| 8, 9             | Equilibrium of a Rigid Body                  | Chapter 5        | 1, 2                       |
| 10               | <b>Class Test 1</b>                          | -                | -                          |
| 11, 12           | Analysis of Structures                       | Chapter 6        | 1, 4                       |
| 13, 14           | Internal Forces                              | Chapter 7        | 1, 2, 4                    |
| 15               | Friction                                     | Chapter 8        | 1                          |
| 16, 17           | Centroids                                    | Chapter 9        | 1                          |
| 18, 19           | Particle Kinematics                          | Chapter 12       | 1, 2, 5                    |
| 20               | <b>Class Test 2</b>                          | -                | -                          |
| 21               | Kinetics of a Particle: Force & Acceleration | Chapter 13       | 1, 2, 5                    |
| 22, 23           | Kinetics of a Particle: Work & Energy        | Chapter 14       | 1, 2, 5                    |
| 24               | Kinetics of a Particle: Impulse & Momentum   | Chapter 15       | 1, 2, 5                    |

### 5.3 Tutorial Schedule

| Week # | Tutorial Activity   | Quizzes                |
|--------|---------------------|------------------------|
| 0      | No tutorials        | -                      |
| 1      | Solve Assignment 1  | -                      |
| 2      | Solve Assignment 2  | -                      |
| 3      | Solve Assignment 3  | Quiz 1 (on Chapter 2)  |
| 4      | Solve Assignment 4  | Quiz 2 (on Chapter 3)  |
| 5      | No tutorials        | -                      |
| 6      | Solve Assignment 5  | -                      |
| 7      | Solve Assignment 6  | Quiz 3 (on Chapter 5)  |
| 8      | Solve Assignment 7  | Quiz 4 (on Chapter 6)  |
| 9      | Solve Assignment 8  | Quiz 5 (on Chapters 7) |
| 10     | Solve Assignment 9  | -                      |
| 11     | Solve Assignment 10 | -                      |
| 12     | Solve Assignment 10 | Quiz 6 (on Chapter 12) |

### 5.4 Disclaimer

The instructor reserves the right to change any or all of the above in the event of appropriate circumstances, subject to the University of Guelph Academic Regulations.

### 5.5 Important Dates

Thursday, September 8, 2016: First day of class

Monday, October 10, 2016: Thanksgiving holiday

Tuesday, October 11, 2016: Fall study day, no classes

Friday, November 4, 2016: 40<sup>th</sup> class day, last day to drop classes

Monday December 12, 2016: 7:00PM – 09:00PM, Final exam of this course

## 6. 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.

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.

## 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-misconduct.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 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/undergraduate/current/c08/c08-amisconduct.shtml>