ECOR1046: Mechanics

Course Syllabus - Winter 2022

Faculty of Engineering and Design, Carleton University

Department of Civil and Environmental Engineering

Instructors:

Ahmed Hassan (Sections D) Ahmed.hassan@carleton.ca

Jack Vandenberg (Sections E) jack.vandenberg@carleton.ca

Thomas Walker (Sections F) Thomas.walker@carleton.ca

1 Course Overview:

This course introduces principles of mechanics for engineering structures. Learning mechanics will provide you with important problem-solving concepts and skills that are transferable to many subjects in your program of study. In this course, you will learn the basic applications of the science of physics to the profession of engineering. Mathematics also plays an important role in this course and here you will use basic concepts and skills in algebra, trigonometry, vectors, and calculus to solve engineering statics problems. To develop the skills required for this course you have to practice and participate in lectures, problem analysis (PA) sessions, and other course elements.

2 Student Learning Outcomes:

At the end of this course, students will be able to:

- Analyze the equilibrium conditions of 2D particles and rigid bodies when solving 2D truss problems;
- Determine axial force, shear force, and moment (A, V, M) at a point for beams and frame elements;
- Determine shear and moment diagrams for beam elements;
- Understand and apply the basic structural engineering design process; and,
- Understand how to approach solving engineering problems.

3 Textbook:

The principle textbook for the course is the same textbook as ECOR 1045; namely,

1. **Engineering Mchanics – Statics and Dynamics**, 14th Edition, R.C. Hibbeler.

Excerpts from two additional textbooks will be provided, free of charge, by Pearson Education, and are posted on cuLearn.

2. **Mechanics of Materials**, 10th Edition, R.C. Hibbeler; and,
3. **Thinking Like an Engineer**, 4th Edition, Stephan, Bowman, Park, Sill, Ohland.

4 Tentative Lecture Schedule:

It is expected that class topics will follow the schedule below, but adjustments may be made during the term as needed.

Table 1. Mechanics

Lecture #	Topic	Chapter (Book)
1	Trusses by Method of Joints	Chapter 6 - Structural Analysis (1)
2	Project Discussion	-
3	Trusses by Method of Sections	Chapter 6 - Structural Analysis (1)
4	Introduction to Design Process	Chapter 3 – Design, Team Work (3)
5	Normal and Shear Stress	Chapter 1 – Stress (2)
6	Normal and Shear Strain	Chapter 1 – Strain (2)
7	Internal Forces in 2D Beam Elements	Chapter 7 - Internal Forces (1)
8	2D Frames and Machines	Chapter 6 - Structural Analysis (1)
9	Internal Forces in a 2D Frame	Chapter 6 - Structural Analysis (1)
10	Shear and Moment Diagrams for Beams	Chapter 7 - Internal Forces (1)
11	Shear and Moment Diagrams for Beams	Chapter 7 - Internal Forces (1)
12	Problem Solving	Chapter 6 - Problem Solving (3)

* (1) Engineering Mechanics – Statics and Dynamics, 14th Edition, R.C. Hibbeler;
(2) Mechanics of Materials, 10th Edition, R.C. Hibbeler; and,
(3) Thinking Like an Engineer, 4th Edition, Stephan, Bowman, Park, Sill, Ohland.

Assessment:

4.1 Requirements:

In order to use this course as a prerequisite for other engineering courses students are required to achieve a grade of C- or better.

4.2 Assessment breakdown

The final grade for the course will comprise homework assignments, quizzes, a project, and a final exam. Details on Mastering Engineering (the online system used to administer assignments and quizzes) will be provided by Pearson Education. Weightings are as follows:

Table 2. Assessment Breakdown

#	Sections	Description	Weights
1	Assignments	Weekly homework assignments administered through Mastering Engineering.	10%
2	Quizzes	Approximately biweekly quizzes administered in the last hour of the PA sessions through Mastering Engineering. Attendance is required to participate in the quizzes.	5%
3	Project	Multi-week group design project, including four deliverables. Project information to be posted on cuLearn.	30%
4	Final Exam	Two hours. Date to be determined.	55%

5 Project

Note that evaluations of each team member will be completed at the end of the project and students who have been deemed to have not contributed equally to the project, will have their project marked decreased accordingly.

6 Method of Delivery:

All the course activities including lectures, PA sessions, quizzes, and final exams are offered online.

- Lectures are delivered via two parallel asynchronous methods:

(1) Pre-recorded in-class lecture videos; and,
(2) Pre-recorded videos using annotated slides.

Videos of lectures will be posted on cuLearn. Videos will be posted on the weekend before each lecture. Students should follow the course progress closely by watching the lectures.

- Lecture times are used as office hours to clarify students' questions. Students are encouraged to watch the videos before the lecture and to try the assignment questions and organize their questions to be asked during the lecture times.

- PA sessions (including the quizzes) are held **synchronously,** ie. at a specific time. Students must be available at the designated time.

- Final exams are held **synchronously**.

7 Graduate Attributes:

The Canadian Engineering Accreditation Board (CEAB) requires the faculty to collect data on graduate attributes and use that data to improve our program. The aggregate data is used for accreditation purposes and to guide program improvements **only**, and have no impact on individual student progression or evaluation. Data is collected in many courses across the faculty. The attributes being measured in this course relate to knowledgebase of fundamental engineering concepts, engineering design, and individual and team work.

8 Course Policies:

8.1 Classroom Behaviour:

During the synchronous sessions, students are required to observe standards of behaviour expected in a university environment and in the profession of engineering. Please maintain a professional, quiet, attentive and engaging classroom / office hour environment.

8.2 Communications:

Course materials will be distributed through the course's cuLearn page, which will also provide access to material in Mastering Engineering. Students are responsible for ensuring they are correctly registered through cuLearn, and for checking the cuLearn course management site regularly. Lecture slides will be made available before class; however, the presented material (e.g. solutions and calculations) in the lectures will not be accessible through the slides alone.

All electronic communications with the instructor must be through official Carleton email accounts. In your email, you must include your full name, student number, course, and section number (e.g. ECOR1046B). Professionalism is expected in all course communications; messages with informal language or improper grammar and spelling will not receive a response.

8.3 Attendance and Absences:

This course follows the topics required by the curriculum at a very fast pace. Every lecture presents a new topic which is based on the previous lectures and on the material covered in ECOR 1045 - Statics; Students should closely follow the course progress. Please note that the attendance in quizzes and examinations is mandatory and you will lose the designated mark to the quiz or the exam that you have missed. In case of emergency (e.g. serious illness), proper communications with your instructor is mandatory. Acceptable documentation is required to justify your absence within three days of the date of the quiz. In case of illness, a doctor note or a completed self-declaration form will be required (https://carleton.ca/registrar/special-requests/deferral/). You must obtain approval prior to the test/quiz/exam if you cannot write at the scheduled time (except in cases of unexpected emergencies). If you miss a quiz and present acceptable documentation, the weight of the missed component will be reweighted among the other quizzes.

8.4 Appeals:

All grade appeals in this course must be made within seven days of the posting or return of the graded component (quiz, project deliverable, etc). Appeals are to be addressed to the marking TA first. The final exam is for evaluation purposes only, and the paper will not be returned or made available to students by the instructors after it is marked. You will be able to make arrangements with the instructor or with the department office to see your marked final examination after the grades have been made available.

9 Academic Integrity:

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensure that a degree from Carleton University is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. Carleton University's Policy on Academic Integrity (http://www.carleton.ca/registrar/academic-integrity) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. It is your responsibility to be familiar with these policies. Any students who do not act with academic integrity will face severe consequences including immediate referral to the Associate Dean of Student Affairs.

10 Academic Accommodation:

Students with diverse learning styles and needs are welcome in this course. You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows. For more information, please consult: http://students.carleton.ca/course-outline

10.1 Pregnancy Obligation

Please contact the instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please consult: http://students.carleton.ca/course-outline

10.2 Religious Obligation

Please contact the instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please consult: http://students.carleton.ca/course-outline

11 Accommodations for Students with Disabilities

The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your **Letter of Accommodation** at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). **Requests made within two weeks will be reviewed on a case-by-case basis.** After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website (http://www.carleton.ca/pmc) for the deadline to request accommodations for the formally-scheduled exam (if applicable).

12 Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working, and living environment where sexual violence will not be tolerated, and survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, please visit: http://www.carleton.ca/sexual-violence-support

13 Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact the instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more information, please consult: http://students.carleton.ca/course-outline

14 Copyright on Materials