

# ECOR1045: Statics

## Course Syllabus - Fall 2020 (last revised Aug. 27, 2020)

Faculty of Engineering and Design, Carleton University

Department of Civil and Environmental Engineering

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### 1 Course Overview:

This course introduces principles of statics for engineering structures. Learning statics 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:

- Apply the correct units, notation, and significant figures when solving engineering problems;
- Apply a vector formulation when solving statics problems;
- Correctly draw free body diagrams (FBDs);
- Calculate the coordinates of the centroid or center of gravity of 2D and 3D objects using integration and composite bodies; and,
- Analyze the equilibrium conditions of particles and rigid bodies in 2D and 3D space.

### 3 Textbook:

- Engineering Mechanics – Statics and Dynamics, 14<sup>th</sup> Edition, R.C. Hibbeler.

The students are encouraged to invest in this textbook since it is used also for the subsequent courses ECOR 1046 (Mechanics) and ECOR 1048 (Dynamics). See university bookstore which provides both a hard copy option and an e-copy option.

## 4 Tentative Lecture Schedule:

It is expected that class topics will follow the schedule below, but adjustments will be made during the term as needed. Students are strongly urged to read the sections of the textbook prior to the lecture.

Table 1. Tentative lecture schedule

Lec #	Topic	Chapter
1	Course Introduction and General Principles	1 - General Principles
2	Force Vectors, Resultants, Components	2 - Force Vectors
3	Cartesian Coordinates, Position and Unit Vectors	2 - Force Vectors
4	Dot Product and Components of Vectors	2 - Force Vectors
5	Particle Equilibrium and Free Body Diagrams (FBDs)	3 - Equilibrium of a Particle
6	Moments and the Cross Product	4 - Force System Resultants
7	Moment about an Axis, Couples, Triple Scalar Product	4 - Force System Resultants
8	Reduction of Force Systems and Distributed Loads	4 - Force System Resultants
9	Centre of Gravity by Integration	9 - Center of Gravity and Centroid
10	Centre of Gravity by Composite Bodies	9 - Center of Gravity and Centroid
11	2-D Rigid Body Equilibrium	5 - Equilibrium of a Rigid Body
12	3-D Rigid Body Equilibrium	5 - Equilibrium of a Rigid Body

## 5 Assessment:

### 5.1 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.

### 5.2 Assessment breakdown

The final grade for the course will comprise homework assignments, quizzes, a midterm exam, 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	5%
2	Quizzes	Weekly quizzes administered in the last hour of the PA sessions through Mastering Engineering. Attendance is required to participate in the quizzes.	10%
3	Midterm Exam	One hour exam. Closed book. Date and time TBD.	25%
4	Final Exam	Two hours exam. Closed book. Date and time TBD.	60%

## 6 Method of Delivery:

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

- Lectures are delivered via two parallel asynchronous methods:
  - (1) Pre-recorded in-class lecture videos.
  - (2) Pre-recorded videos using annotated slides.

Videos of lectures will be posted on cuLearn and will be available throughout the semester. 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 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.
- Midterm and final exam 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 attribute being measured in this course relate to knowledgebase of fundamental engineering concepts.

## 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 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, include your full name, student number, course, and section number (e.g. ECOR1045B). 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; 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 or midterm. 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. If you miss the midterm and present acceptable documentation, there will be a deferred midterm. Exact time to be confirmed.

### 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](mailto: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**

The materials created for this course (including the course outline and any slides, posted notes, labs, project, assignments, quizzes, exams and solutions) are intended for personal use and may not be reproduced, redistributed, or posted on any website without prior written permission from the author(s).