ECOR1045: Statics

Course Syllabus – Early Winter 2023

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:


Students are encouraged to invest in this textbook since it is used also for two subsequent courses ECOR 1046 (Mechanics) and ECOR 1048 (Dynamics). An electronic version (eText) is available; details to be provided during the first lecture.

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 relevant sections of the textbook prior to each lecture.
# Table 1. Tentative lecture schedule

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

## 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. Please do not purchase the textbook nor Mastering Engineering until you receive instructions from Pearson Education (Pearson provides a significant discount when purchased through their instructions.)

Weightings are as follows:

# Table 2. Assessment Breakdown

<table>
<thead>
<tr>
<th>#</th>
<th>Item</th>
<th>Description</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Assignments</td>
<td>Weekly homework assignments administered through Mastering Engineering</td>
<td>5%</td>
</tr>
<tr>
<td>2</td>
<td>Quizzes</td>
<td>Weekly quizzes administered in the last hour of the PA sessions through Mastering Engineering. Attendance is required to participate in the quizzes.</td>
<td>10%</td>
</tr>
<tr>
<td>3</td>
<td>Midterm Exam</td>
<td>Closed book. (Tentatively February 4, 10:00am – 11:00am)</td>
<td>25%</td>
</tr>
<tr>
<td>4</td>
<td>Final Exam</td>
<td>Closed book. (2-hour exam scheduled by the University)</td>
<td>60%</td>
</tr>
</tbody>
</table>
6 Method of Delivery:

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

Lecture Notes will be posted on Brightspace and will be available on the weekend before the lectures. Students should follow the course progress closely by reviewing the Notes in advance of the lectures, reading the textbook, and attending/participating in the lectures.

PA sessions will typically include a quiz during the last hour of the PA Session. Quizzes will be administered through Mastering Engineering (details provided during first lecture). Students must attend the full three-hour PA Session to receive credit for the quiz.

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 relates to knowledge base of fundamental engineering concepts.

8 Course Policies:

8.1 Classroom Behaviour:

During the lectures, 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 Brightspace page, which will also provide access to material in Mastering Engineering. Students are responsible for ensuring they are correctly registered through Brightspace, and for checking the Brightspace 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. ECOR1045A). 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’s 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, the exact time of which will be confirmed later.

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

10.3 Special Information for Pandemic Measures

It is important to remember that COVID-19 is still present in Ottawa. The situation can change at any time and the risks of new variants and outbreaks are very real. There are a number of actions you can take to lower your risk and the risk you pose to those around you including being vaccinated, wearing a mask, staying home when you’re sick, washing your hands and maintaining proper respiratory and cough etiquette.

Feeling sick? Remaining vigilant and not attending work or school when sick or with symptoms is critically important. If you feel ill or exhibit COVID-19 symptoms do not come to class or campus. If you feel ill or exhibit symptoms while on campus or in class, please leave campus immediately. In all situations, you must follow Carleton’s symptom reporting protocols.

Masks: Carleton has paused the COVID-19 Mask Policy, but continues to strongly recommend masking when indoors, particularly if physical distancing cannot be maintained. It may become necessary to quickly reinstate the mask requirement if pandemic circumstances were to change.
**Vaccines:** Further, while proof of vaccination is no longer required as of May 1, 2022 to attend campus or in-person activity, it may become necessary for the University to bring back proof of vaccination requirements on short notice if the situation and public health advice changes. Students are strongly encouraged to get a full course of vaccination, including booster doses as soon as they are eligible, and submit their booster dose information in cuScreen as soon as possible. Please note that Carleton cannot guarantee that it will be able to offer virtual or hybrid learning options for those who are unable to attend the campus.

All members of the Carleton community are required to follow requirements and guidelines regarding health and safety which may change from time to time. For the most recent information about Carleton’s COVID-19 response and health and safety requirements please see the University’s COVID-19 website (carleton.ca/covid19) and review the Frequently Asked Questions (FAQs). Should you have additional questions after reviewing, please contact covidinfo@carleton.ca.

### 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).

Carleton University has launched a new academic accommodation management system, Ventus. With Ventus, course instructors can view up-to-date information on their student’s academic accommodation requirements, and submit and manage exam booking requests with the McIntyre Exam Centre. Ventus provides students with more control over their accommodations on a per-course and per-test basis, and creates an improved user experience for students and faculty with real-time data in one shared web location. Students can request and manage their academic accommodations via the Ventus Student Portal (ventus.carleton.ca/student). More information on using Ventus, with overviews of the student and faculty portals, can be found on VentusHelp.

### 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

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