ECOR 1045: Statics

Course Syllabus: Early Fall 2024

Faculty of Engineering and Design, Carleton University

Department of Civil and Environmental Engineering

Teaching Team

Instructors:

Thomas Walker (Section A)

thomas.walker@carleton.ca

Office hours TBD

Jack Vandenberg (Sections B & C)

jack.vandenberg@carleton.ca

Office hours TBD

TA(s):

Information will be posted to Brightspace when it becomes available.

Course Description and requirements

1) Course schedule

Lectures:

Section A (Walker): Tuesday and Thursday, 14:35-15:55

Section B (Vandenberg): Wednesday and Friday, 14:35-15:55

Section C (Vandenberg): Tuesday and Thursday, 13:05-14:25

PA Sessions:

Section	Time (Room)	Section	Time (Room)	Section	Time (Room)
A1	Mon, 08:35-11:25	B1	Mon, 14:35-17:25	C1	Tue, 08:35-11:25
A2	Fri, 14:35-17:25	B2	Fri, 08:35-11:25	C2	Mon, 11:35-14:25
A3	Mon, 18:05-20:55	B3	Fri, 08:35-11:25	C3	Tue, 14:35-17:25
A4	Tue, 11:35-14:25	B4	Wed, 08:35-11:25	C4	Wed, 18:05-20:55

PA Sessions are weekly, beginning on Monday, September 9, 2024. A course calendar for each lecture section will be posted to Brightspace.

*Please refer to the Public Class Schedule for the most recent information.

2) Course description

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 must practice and participate in lectures, problem analysis (PA) sessions, and other course elements.

3) 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 static problems;
- Correctly draw free body diagrams;
- Calculate the coord. of the centroid or center of gravity of 2D and 3D objects using integration and composite bodies;
- Calculate the effect of forces and moments on 2D and 3D rigid bodies;
- Analyze the equilibrium conditions of particles and rigid bodies in 2D and 3D space;
- Analyze the equilibrium conditions of 2D particles and rigid bodies when solving 2D truss problems;
- Determine axial force, shear force, and moment at a point for beams and frame elements;
- Understand and apply the basic structural engineering process; and,
- Understand how to approach solving engineering problems.

4) Graduate Attributes

The Canadian Engineering Accreditation Board (CEAB) requires graduates of undergraduate engineering programs to possess 12 attributes. Courses in all four years of our programs evaluate students' progress towards acquiring these attributes. Aggregate data (typically, the data collected in all sections of a course during an academic year) is used for accreditation purposes and to guide improvements to our programs. Some of the assessments used to measure GAs may also contribute to final grades; however, the GA measurements for individual students are not used to determine the student's year-to-year progression through the program or eligibility to graduate. This following list provides the GAs that will be measured in this course, along with the Learning Outcomes that are intended to develop abilities related to these attributes.

GA - Indicator	**Assessment Tool**
1.3 Fundamental Engineering Concepts	Final course grade

For information on GAs and continual curriculum improvement, visit the Accreditation section of Engineers Canada website.

5) Textbook(s)/References

Engineering Mechanics – Statics and Dynamics, 15th edition, R. C. Hibbeler

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.

6) Topics and tentative plan

It is expected that 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.

Lecture	Topic	Chapter
1	Course Introduction and General Principles	1 – General Principles
2	Force Vectors, Resultants, and 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	2D Rigid Body Equilibrium	5 – Equilibrium of a Rigid Body
12	3D Rigid Body Equilibrium	5 – Equilibrium of a Rigid Body

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.

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 participating in the lectures.

PA sessions will typically include a quiz during the last hour of the PA Session. Students must attend the full three-hour PA Session to receive credit for the quiz.

7) Evaluation and marking scheme

a) 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) will be provided by Pearson Education. Weightings are as follows:

Item	Description	Weight
Assignments	Weekly homework assignments administered through Mastering Engineering	5%
Quizzes	Weekly quizzes administered in the last hour of the PA sessions. Attendance is required to participate in the quizzes.	20%
Midterm Exam	Closed book. (Tentatively Sep 28-29)	25%
Final Exam	Closed book. (2-hour exam scheduled by the University, either Oct 26-27 or Nov 2-3)	50%

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

b) Final Examination

i) **Final exams are for evaluation purpose and will not be returned to students.**

ii) This is a closed book exam. No extra papers or crib sheets will be provided or accepted. Only a programmable calculator without storage capacity is allowed. The calculator must **not** have an integral function.

iii) Deferred Final Examinations: Students who are unable to write the final examination because of extenuating circumstances, as defined in the Academic Consideration Policy, may apply for accommodation by contacting the Registrar's office. Consult the Section 4.3 of the University Calendar.

c) Deferred term work and self declaration

Students who claim extenuating circumstances defined in the Academic Consideration Policy, as a reason for missed term work are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor and in all cases. This must occur no later than three (3) days after the term work was due. The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule. Consult Section 4.4 of the University Calendar.

8) Academic dates

Students should be aware of the academic dates (e.g. last day for academic withdrawal) posted on the Registrar's office web site https://carleton.ca/registrar/registration/dates/academic-dates/

Academic Integrity and Plagiarism

a) Please consult the Faculty of Engineering and Design information page about the Academic Integrity policy and our procedures: https://carleton.ca/engineering-design/current-students/fed-academic-integrity Violations of the Academic Integrity Policy will result in the assignment of a penalty such as reduced grades, the assignment of an F in a course, a suspension or, expulsion.

b) One of the main objectives of the Academic Integrity Policy is to ensure that **the work you submit is your own.** As a result, it is important to write your own solutions when studying and preparing with other students and to avoid plagiarism in your submissions. The University Academic Integrity Policy defines plagiarism as "presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one's own." This includes reproducing or paraphrasing portions of someone else's published or unpublished material, regardless of the source, and presenting these as one's own without proper citation or reference to the original source.

   Examples of violations of the policy include, but are not limited to:

   - any submission prepared in whole or in part, by someone else;
   - using another's data or research findings without appropriate acknowledgement;
   - submitting a computer program developed in whole or in part by someone else, with or without modifications, as one's own; and
   - failing to acknowledge sources of information through the use of proper citations when using another's work and/or failing to use quotations marks.

Copyright

Learning and Working Environment

The University and all members of the University community share responsibility for ensuring that the University's educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the Department of Equity and Inclusive Communities at equity@carleton.ca

We will strive to create an environment of mutual respect for all through equity, diversity, and inclusion within this course. The space which we work in will be safe for everyone. Please be considerate of everyone's personal beliefs, choices, and opinions.

Academic Accommodations

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

Academic 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 .

You should request your academic accommodations in the Ventus Student Portal, for each course at the beginning of every term. For in-term tests or midterms, please request accommodations at least two (2) weeks before the first test or midterm. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable).

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 your 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, see the Senate Policy on Accommodation for Student Activities (PDF).

Pregnancy Obligation: Please contact your 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 review the Student Guide to Academic Accommodation (PDF).

Religious Obligation: Please contact your 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 review the Student Guide to Academic Accommodation (PDF).

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 where 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, visit the Sexual Violence Prevention & Survivor Support.

Engineering Academic Advising

The Engineering Academic Support Service assists undergraduate engineering students with course selection, registration, and learning support from first-year through to graduation.
Academic Advisors Contact can be found here: https://carleton.ca/engineering-design/current-students/undergrad-academic-support/undergraduate-advisors/.

Student Mental Health and Wellness

As a university student you may experience a range of mental health challenges that can significantly impact your academic success and overall well-being. Carleton's **Wellness Services Navigator** is designed to help students connect with mental health and wellness resources.

If you need to talk to someone from the department for more information and support with connecting to resources, you can contact the following faculty members, or contact the department at CEEUGChair@cunet.carleton.ca. We provide contact information for our department; students should contact their respective departments for resources.

ACSE: Prof. Elie Azar
Email: Elie.Azar@carleton.ca, Office: 3432 Mackenzie

CIVE: Prof. Heng Khoo
Email: heng.khoo@carleton.ca, Office: 3364 Mackenzie

ENVE: Prof. Shoeleh Shams
Email: shoelehshams@cunet.Carleton.ca, Office: 4242 Mackenzie

Here is a list of on-campus and off-campus recourses:

1. **Carleton's Wellness Desk**: Located at 204A MacOdrum Library, is a space for students to learn about resources, connect with our Wellness Coordinator, and decompress during stressful times of the year. You can pop into the Wellness Desk any time during its hours of operation – no appointments necessary! https://wellness.carleton.ca/mental-health/wellness-desk/

2. **Carleton's Health and Counselling Services:** To book an appointment contact the main clinic by calling (613) 520-6674. If urgent, let the Patient Care Coordinator know or go in person to the main clinic (2500 Carleton Technology and Training Centre Building) and indicate that they are in crisis and need to speak to someone right away. https://carleton.ca/health/

3. **Residence Counselling and Wellness Service:** Counselling services specifically for students in residence. https://carleton.ca/health/residence-counselling/

4. **Therapy Dogs:** Carleton's therapy dogs are around campus with their owners (who are Carleton University staff and faculty) to comfort and provide support to help you thrive as a university student. https://wellness.carleton.ca/mental-health/therapy-dogs/

5. Emergencies and Crisis and Emergency Numbers

6. **Good2Talk (1-866-925-5454):** Good2Talk is a free, confidential helpline providing professional counselling and information and referrals for mental health, addictions and well-being to post-secondary students in Ontario, 24/7/36 https://good2talk.ca/

7. **Empower Me:** Undergraduate students have access to free counselling services in the community through Empower Me, either in person, by telephone, video-counselling or e-counselling. **This free service is accessible 24/7, 365 days per year.** Call **1-844-741-6389 (toll free)** to make an appointment with a counsellor in the community. More information is available https://students.carleton.ca/services/empower-me-counselling-services/

8. **The Walk-In Counselling Clinic (off-campus community resource):** The walk-in Counselling Clinic have offices in various locations across Ottawa and the greater Champlain region that are open 7 days a week. Individuals will be assisted, with no appointment, on a first-come, first-serve basis during the Walk-in Counselling Clinic hours. The Walk-in Counselling Clinic **offers services in many languages** and is free and confidential. More information can be found at: https://walkincounselling.com/

9. **Distress Centre of Ottawa and Region**: Available 10am-11pm, 7 days/week, 365 days/year. **Distress Line:** 613-238-3311, **Crisis Line:** 613-722-6914 or 1-866-996-0991, **Text:** 343-306-5550. https://www.dcottawa.on.ca/

10. **Distress and Crisis Ontario**, Available for chat 2 pm – 2 am EST. https://www.dcontario.org/

11. **BounceBack Ontario (Toll-Free: 1-866-345-0224)** is a free skill-building program managed by the Canadian Mental Health Association (CMHA). It is designed to help adults and youth 15+ manage low mood, mild to moderate depression and anxiety, stress or worry. Delivered over the phone with a coach and through online videos, you will get access to tools that will support you on your path to mental wellness. https://bouncebackontario.ca/.