

**Western University - Faculty of Engineering
Department of Civil and Environmental Engineering**

ES1022y – Engineering Statics - Course Outline 2024/25

This course introduces the principles of static equilibrium. The general objectives are for the student to become able to:

- identify, formulate, analyze, and solve engineering problems using the principles of static equilibrium;
- apply this knowledge to the analysis of two-dimensional trusses, frames and machines, internal forces within a beam, and impending motion of rigid bodies due to the effects of friction;
- apply calculus principles to determine the centroid of lines, areas, and volumes, and the moment of inertia of an area; and
- improve communication skills by documenting problem solutions in coherent and legible engineering calculations.

Calendar Copy:

Analysis of forces on structures and machines, including addition and resolution of forces and moments in two and three-dimensions. The application of the principles of equilibrium. Topics: trusses; frames; friction; and centroids. (0.5 course)

Prerequisites: None

Corequisites: None

Antirequisite: None

Note: It is the **student's responsibility** to ensure that all Prerequisite and Corequisite conditions are met or that special permission to waive these requirements has been granted by the Faculty. It is also the **student's responsibility** to ensure that they have not taken a course listed as an Antirequisite. The student may be dropped from the course or not given credit for the course towards their degree if they violate the Prerequisite, Corequisite, or Antirequisite conditions.

Contact Hours:

1. Two lecture hours/week; Students should review the online lectures in the week they are posted and be prepared to discuss and apply the concepts presented during the weekly lecture sessions.
2. 2 tutorial hours every other week - this is equivalent to 1 tutorial hour/week over one term. Attendance at the tutorial session is **mandatory**. A 2-hour tutorial session (Part (A) of assignments) scheduled every other week as per the course timetable will be delivered in person (synchronously) through the *MasteringEngineering* platform. A take-home assignment (Part (B) of assignments) will be delivered asynchronously every other week through the *MasteringEngineering* platform. Course Teaching Assistants (TAs) will hold weekly sessions for students seeking help with Part (B) of the assignment. The date/time of these help sessions will be posted weekly on the course site OWL.

Note: Review of lecture material and self-study should take approximately 6 hours per week.

Course Format:

This course will be delivered **in person**.

“In any circumstances that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL Brightspace for students to view at their convenience). The grading scheme will not change. Any remaining assessments will also be conducted online at the discretion of the course instructor”

Key Sessional Dates:

Fall term first day of classes: September 5, 2024
Winter term first day of classes: January 6, 2025
Fall reading week: October 12 – October 20, 2024
Spring reading week: February 15 – February 23, 2025
Fall term classes end: December 6, 2024
Winter term classes end: April 4, 2025
Midterm exam period: December 9 – 22, 2024
Final exam period: April 7 – 30, 2025

Instructors' contact information:

- **Fall Term**
Dr. Aiham Adawi, P.Eng. : (section 001), office: SEB 20, email: aadawi2@uwo.ca
Dr. Ayman El Ansary, P.Eng. : (section 002), office: SEB 3080, email: aelansa@uwo.ca
Dr. Hassan El-Chabib, P.Eng. : (section 003), office: SEB 3026A, email: helchab2@uwo.ca
- **Winter Term**
Dr. Aiham Adawi, P.Eng. : (section 001), office: SEB 20, email: aadawi2@uwo.ca
Dr. Ayman El Ansary, P.Eng. : (section 002), office: SEB 3080, email: aelansa@uwo.ca
Dr. Hassan El-Chabib, P.Eng. : (section 003), office: SEB 3026A, email: helchab2@uwo.ca

Note: Any emails addressed to course instructors must have a subject line that includes the student's lecture section number and tutorial section number (e.g., Lec Sec. 001/Tut Sec. 004). Emails must be sent from a UWO email account. All email communication addressed to students will be sent to their UWO email account.

Textbook:

Engineering Mechanics: Statics, 15th Edition, by R.C. Hibbeler, published by Prentice Hall, packaged with *MasteringEngineering* access code (**required**)

Students will be advised on class notes by individual instructors.

Computing:

The course website can be found on OWL Brightspace at <https://westernu.brightspace.com/d2l/home>, and should be checked regularly for class notes, participation activities, notices about assignments, quizzes, midterms, and grades. Tutorial assignments, participation activities, quizzes, midterm, and the final exam will require the use of the [MasteringEngineering platform](#). Registration on this website requires the use of an access code that can be purchased either packaged with the textbook or separately. An info session will be held during the first week of the Fall 2024 term to provide students with purchase options and instructions on how to use the *MasteringEngineering* platform.

Students are required to use computing devices (desktops, laptops, or tablets) capable of accessing the *MasteringEngineering* website during tutorials, quizzes, Midterm, and Final Exam.

Units:

Both SI and US Customary units will be used in lectures and examinations.

Specific Learning Objectives: [GA Indicator]

1. Statics of Particles
 - a) Apply parallelogram law of vector addition to forces [KB1, KB2]
 - b) Resolve forces in rectangular, cylindrical, and spherical coordinates [KB1, KB2]
 - c) Apply scalar and vector methods to calculate the resultant of concurrent forces [**KB1**, KB2]
 - d) Analyse a frictionless system of pulleys [KB1, PA2]
 - e) Calculate forces in elastic springs [KB1]
 - f) Solve equilibrium problems involving concurrent forces in 2D and 3D [**KB2**, PA2]
2. Statics of Rigid Bodies
 - a) Calculate the moment of a force about a point and about an axis [KB2, PA2]
 - b) Determine the resultant force/couple system at a given point in 2D and 3D [KB2, PA2]
 - c) Determine the resultant of a coplanar system of forces and couples [KB3, PA2]
 - d) Master procedure for drawing free-body diagrams [PA1]
 - e) Solve equilibrium problems in 2D with concentrated and distributed loading [**KB3**, PA2]
3. Trusses
 - a) Calculate tension and compression forces in members using the method of joints [KB3, PA2]
 - b) Calculate tension and compression forces in members using the method of sections [KB3, PA2]
 - c) Identify the zero-force members [KB3, **PA1**]
4. Frames and Machines
 - a) Recognize internal and external forces on pin-connected members [KB3, PA2]
 - b) Recognize two and three-force members [KB3]
 - c) Draw free-body diagrams of various components of frames and machines [PA1]
 - d) Solve equilibrium problems involving multi-component frames and machines [KB3, PA2]
5. Internal Forces
 - a) Calculate internal forces in members using the method of sections [KB3, PA2]
 - b) Draw shear force and bending moment diagrams [KB3, PA2]
6. Friction
 - a) Implement the theory of dry friction and the concept of impending motion in rigid body analysis [KB3]
 - b) Solve equilibrium problems involving wedges [KB3, PA2]
7. Centroid and Centre of Gravity
 - a) Apply calculus principles to determine the centroid of lines, areas, and volumes. [KB1]
 - b) Locate the centroid and center of gravity of composite bodies [KB3, **PA2**]
8. Moment of Inertia
 - a) Apply calculus principles to determine the moment of inertia of an area [KB1]
 - b) Calculate the moment of inertia of composite bodies using the parallel axis theorem [KB3, **PA2**]

Instructors may expand on material presented in the course as appropriate.

General Learning Objectives

E = Evaluate, T = Teach, I = Introduce

Knowledge Base	E	Engineering Tools		Impact on Society	
Problem Analysis	E	Teamwork		Ethics and Equity	
Investigation	I	Communication		Economics and Project Management	
Design		Professionalism		Life-Long Learning	

Accreditation Units:

50% Natural Science; 50% Engineering Science.

Evaluation:

The final course mark will be determined as follows:

Participation (Learning Catalytics):	10%
<i>MasteringEngineering</i> assignments:	10%
Quizzes:	20%
Midterm exam:	30%
Final exam:	30%
Total:	100%

- Note:
- (a) **To pass the course the sum of the student's grades in both the midterm and the final exam must be at least 50% of the total mark of the two exams combined. Students scoring less than 50% will be assigned the aggregate mark, as determined above, or 48%, whichever is less.**
 - (b) **Students who have failed this course previously must repeat all components of the course.** No special permissions will be granted enabling a student to retain laboratory, assignment, or test marks from previous years. Previously completed assignments and laboratories cannot be resubmitted.
 - (c) Should any of the quizzes conflicts with a religious holiday that a student wishes to observe, the student must inform the instructor of the conflict no later than two weeks before the scheduled test.

For further information on accommodations for religious holidays see

http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_16

Quizzes and Examinations:

- Four quizzes** will be given during tutorials throughout the year (two per term). The dates and times for these quizzes depend on which tutorial section a student is enrolled in. Quizzes dates/times will be posted to the calendar on the course OWL site at the beginning of each term.
- A two-hour midterm examination** will take place during the December 2024 examination period.
- A two-hour final examination** will take place during the April 2025 final examination period.
- Biweekly MasteringEngineering Assignments:**

Six coursework-related assignments will be given throughout the year using the *MasteringEngineering* tutorial and homework system (three per term). Late assignments will receive a grade based on the questions **completely** answered by the student at the time that the assignment is due. Extensions are to be negotiated with the course instructor, not the teaching assistants.

5. Participation:

In-class participation marks will be assigned based on students' activities in completing *LearningCatalytics*, which is a classroom learning tool packaged with the *MasteringEngineering* online platform. Students will be informed weekly when such participation activities will be made available.

I. Missed/Late Accommodation Policy:

1. Students missing a test/assignment/lab or examination must report the absence by submitting Academic Consideration Request form through [STUDENT ABSENCE PORTAL](#).
2. Documentation must be provided as soon as possible.

II. Exam Accommodation:

1. If you are unable to write a final examination, report your absence using the Academic Consideration Request Form through [STUDENT ABSENCE PORTAL](#).
2. Be prepared to provide the Undergraduate Services Office with supporting documentation (see next page for information on documentation) the next day, or as soon as possible (in cases where students are hospitalized). The following circumstances are not considered grounds for missing a final examination or requesting special examinations: common cold, headache, sleeping in, misreading timetable and travel arrangements.
3. In order to receive permission to write a Special Examination, you must obtain the approval of the Chair of the Department and the Associate Dean and in order to apply you must submit an the Academic Consideration Request Form through [STUDENT ABSENCE PORTAL](#).

PLEASE NOTE: It is the student's responsibility to check the date, time and location of the Special Examination.

III. Late Assignments:

1. Students must advise the course instructor if they are having difficulty completing an assignment on time (prior to the due date of the assignment).
2. Students should be prepared to submit the Academic Consideration Request Form and provide documentation if requested to do so by the course instructor.
3. If granted an extension, a revised due date should be established with the course instructor. The approval of the Chair of your Department (or the Assistant Dean, First Year Studies, if you are in first year) is not required if assignments are completed prior to the last day of classes.
4. Extensions beyond the end of classes must have the consent of the instructor, the department Chair and the Associate Dean, Undergraduate Studies. Documentation is mandatory.

Note: Forged notes and certificates will be dealt with severely. To submit a forged document is a scholastic offence (see below).

IV. Medical Accommodation:

1. Requests for Academic Consideration Request Form through [STUDENT ABSENCE PORTAL](#).
2. Requests for academic consideration must include the following components:
 - a. Self-attestation signed by the student (*This is only accepted for the first/one absence*)
 - b. Medical note
 - c. Indication of the course(s) and assessment(s) affected by the request
 - d. Supporting documentation as relevant
3. Requests without supporting documentation are limited to one per term per course.
4. **Students must request academic consideration as soon as possible and no later than 48 hours after the missed assessment.**
5. Once the request and supporting documents have been received and reviewed, appropriate academic consideration, if granted, shall be determined by the instructor in consultation with the academic advisor, in a manner consistent with the course outline. Academic consideration may include extension of deadlines, waiver of attendance requirements for classes/labs/tutorials, or re-weighting of course requirements. Some forms of academic consideration, such as arranging Special Examinations, assigning a grade of Incomplete, or granting late withdrawals without academic penalty, may only be granted by the Academic Advising office of the Faculty of Engineering.

V. Religious Accommodation:

When scheduling unavoidably conflicts with religious holidays, which (a) require an absence from the University or (b) prohibit or require certain activities (i.e., activities that would make it impossible for the student to satisfy the academic requirements scheduled on the day(s) involved), no student will be penalized for absence because of religious reasons, and alternative means will be sought for satisfying the academic requirements involved. If a suitable arrangement cannot be worked out between the student and instructor involved, they should consult the appropriate Department Chair and, if necessary, the student's Dean.

It is the responsibility of such students to inform themselves concerning the work done in classes from which they are absent and to take appropriate action.

VI. Academic Integrity:

In the Faculty of Engineering, we encourage students to create a culture of honesty, trust, fairness, respect, responsibility, and courage, befitting the professional degree you are pursuing. Please visit [Academic Integrity Western Engineering](#) for more information

VII. Academic Offences:

Plagiarism means using another's work without giving credit. The university has rules against plagiarism and other scholastic offences. Western Engineering has a zero-tolerance policy on plagiarism. The minimum penalty is zero on the course work and a repeat offence will earn you zero on the course. A third offence may lead to expulsion from the university.

[Scholastic Discipline for Undergraduate Students](#) & [Cheating, Plagiarism and Unauthorized Collaboration: What Students Need to Know](#)

Students must write their reports, essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. University policy states that cheating, including plagiarism, is a scholastic offence. The commission of a scholastic offence is attended by academic penalties, which might include expulsion from the program. If you are caught cheating, there will be no second warning.

All required papers may be subject to submission for textual similarity review to commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted will be included as source documents on the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between the University of Western Ontario and Turnitin.com (<http://www.turnitin.com>). Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, in the relevant section of the Academic Handbook:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

VIII. Faculty of Engineering AI Policy:

The use of generative Artificial intelligence (GenAI) tools won't be discouraged in the Faculty of Engineering. As we pride ourselves on building the future we can't hide from the use of GenAI tools to contribute to the understanding of the course materials. However, the use of GenAI tools in any assignment or contribution during the course will have to be disclosed, as a resource.

GenAI tools use won't be permitted in any type of examination or other assessments where the faculty have prohibited their use. If use of GenAI tools is detected by the instructor in these instances, academic offences penalties might be imposed against the student.

IX. Use of English Policy:

In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for improper use of English. Additionally, poorly written work except for the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

X. Accessibility:

Western is committed to achieving barrier free accessibility for persons with disabilities studying, visiting and working at Western. As part of this commitment, there are a variety of services, groups and committees on campus devoted to promoting accessibility and to ensuring that individuals have equitable access to services and facilities. To help provide the best experience to all members of the campus community, please visit the [Accessibility Western University](#) for information on accessibility-related resources available at Western.

Students with disabilities may arrange for academic accommodation at Western. For a more detailed explanation, please visit [Academic Support & Engagement -Academic Accommodation](#).

XI. Inclusivity, Diversity, and Respect:

The Faculty of Engineering at Western University is committed to creating equitable and inclusive learning environments that value diverse perspectives and experiences. We recognize that university courses often marginalize students based on social identity characteristics such as, but not limited to, Indigeneity, race, ethnicity, nationality, ability, gender identity, gender expression, sexuality, age, language, religion, and socioeconomic status. Understanding this, we strive to facilitate equitable experiences and inclusion within the classroom by respecting and integrating multiple ways of knowing, being, and doing. Please visit the [Office of Equity, Diversity and Inclusion](#).

XII. Health and Well-Being:

- [Health & Wellness Services – Students](#) - Offers appointment-based medical clinic for all registered part-time and full-time students.
- [Mental Health Support](#) - Provides professional and confidential services, free of charge, to students needing assistance to meet their personal, social and academic goals. Services include consultation, referral, groups and workshops, as well as brief, change-oriented psychotherapy.
- [Crisis Support](#) - For immediate assistance, please visit Thames Hall Room 2170 or call 519-661-3030. The crisis clinic operates between 11:00 am - 4:30 pm. For after-hours crisis support, click [here](#).
- [Gender-Based Violence and Survivor Support](#) - Western [is committed to reducing incidents of gender-based and sexual violence](#) and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced gender-based or sexual violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts, [here](#). To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Important Contacts:

Engineering Undergraduate Services	SEB 2097	519-661-2130	engugrad@uwo.ca
Civil & Environmental Engineering	SEB 3005	519-661-2139	civil@uwo.ca
Office of the Registrar/Student Central	WSSB 1120	519-661-2100	

Important Links:

- [WESTERN ACADEMIC CALENDAR](#)
- [ACADEMIC RIGHTS AND RESPONSIBILITIES](#)

Course breakdown:

50% Natural Science; 50% Engineering Science.

The document “INSTRUCTIONS FOR STUDENTS UNABLE TO WRITE TESTS OR EXAMINATIONS OR SUBMIT ASSIGNMENTS AS SCHEDULED” is part of this course outline.