

ENGG 130A Engineering Mechanics I

3 Credits, 3 hours lecture. 2 hours lab, 4.0 Engineering Units for U. Alberta

This course focuses on static equilibrium of forces, principles of two and three dimensional equilibrium, analysis of statically determined structures, trusses and frames, and principles of friction and virtual work.

Prerequisites MATH 30-1, MATH 31, PHYS 30

Co-requisites: MATH 100

NOTE: ENGG 130 is restricted to Engineering Students

Instructor

Jean-Pierre De Villiers

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Office Hours

Monday 10:00 – 10:50

Tuesday 10:00 – 10:50

Wednesday 14:00 – 14:50

Thursday 10:00 – 11:50

Friday 10:00 – 10:50

Hours of Instruction

Monday 15:00 – 16:30

Thursday 11:00 – 12:30

Wednesday 09:00 – 10:50 (Lab)

Required Resources

Engineering Mechanics: Statics and Dynamics, R.C. Hibbeler. Singapore – Pearson, 2015 (14th edition, with Mastering Engineering)

Engineering notepad for tutorials

Lecture Notebook and separate bound notebook for assignments

Course Outcomes

Upon successful completion of the course, students will be able to:

- Carry out idealization of a physical system, and know how to set up and solve the equations to solve a statics problem.
- Resolve forces in planar and three-dimensional space.
- Draw a free-body diagram of a rigid body and develop the equations of equilibrium.
- Calculate a moment about an axis in 2D and 3D and to reduce a simple distributed loading to a resultant force having a specified location.
- Apply equilibrium concept/techniques to solve simple 2D structural problems

- Analyze friction forces.
- Compute the centre of mass for discrete systems and continuous bodies of arbitrary shape in 2D
- Calculate the moment of inertia for a simple planar object..

Evaluation

Assignments	5%
Tutorials	15%
Midterm Exam	35%
Final Exam	45%
Total	100%

A grade of C- is required for progression or transfer.

Engineers are problem solvers. If you want to succeed in engineering it is important you learn how to organize your thoughts, to analyze, set up, and solve problems and to experience the often frustrating trials that arise in doing so. The best way to learn and retain knowledge is by practicing; the more problems you attempt and complete, the more experienced and confident you will become. Engineering is a demanding profession: you must be able to clearly articulate solutions to complex problems in a timely manner. This course will encourage you to develop the work habits and skills necessary to submit clear and concise work on deadline. To reinforce this, keep in mind that sloppy work will not be graded in any component of this course, and late work will also not be accepted. Teamwork is pervasive in engineering, but this is an activity that takes place among competent peers. Teamwork is a privilege that comes with competence. It is not a way to get by when you lack the skills to do the work yourself. In this course, working in groups can be helpful and is not discouraged, but you must be careful not to use teamwork to coast through an assignment or project; any work that you turn in must be your own (see rules on plagiarism below).

iLearn and Lecture Notes

You are responsible for keeping a complete record of classroom work (lecture notes, interactive problems, classroom exercises) in a proper notebook. Lecture notes are posted to iLearn at the end of each week and do not constitute a complete record of lecture materials.

Mentoring

All engineering students will be assigned a mentor (a faculty member). Brief meetings between student and mentor will take place at regular intervals, usually weekly, to help students manage the demands of the engineering program. Typical topics discussed with a mentor include study strategies, guidance, monitoring academic progress, among others.

Assignments

It is important to start the problems early and not put them off until the day before they are due. This course uses web-based assignments: you will need to use the Mastering Engineering access kit purchased with your textbook to access the assignments; instructions will be provided in the first lecture. Assignments must be completed via the Mastering Engineering web site before the posted due dates; partially completed assignments receive the score achieved before the due date.

- You are expected to keep fully worked out solutions to your assignments in a bound notebook; your instructor may ask to see these solutions at any time, and you should be prepared to produce these solutions when demanded. The best approach is to have your solution book with you during lectures, labs, and tutorials.
- You may rework assignments after the due date for practice purposes; this will have no effect on

your score.

- Accurate sketches and correct free body diagrams (FBDs) are a must and are emphasized in all work. The FBD is the single most important tool for the solution of mechanics problems. The important elements of a good problem-solving technique are:
 - correct problem set-up with the assumptions and what is sought,
 - correct analysis with appropriate diagrams,
 - correct numbers and units, and
 - proper interpretation of the solution in both units and directions.

NOTE: missed or incomplete assignments may result in a grade of F for the course.

Exams

There will be one midterm exam and a final exam in this course. The midterm exam takes place during a lab period in the seventh week. The midterm will cover all topics covered up to the date of the exam. The three-hour final exam will take place during the exam period at the end of the term. The final exam is a closed book test where you are expected to demonstrate mastery of the subject. You will be expected to solve a set of problems, some similar to work you have previously done, some more challenging. The assignments and labs are designed to help you prepare for this examination, so make sure you take full advantage of these exercises to prepare for the final.

For all exams, you are expected to know fundamental relations and physical laws. No formula sheet will be supplied, although some hints may be given in some problems where a specialized identity or relation may be required. Only simple scientific calculators are allowed during examinations.

Labs/Tutorials: YOU MUST BRING YOUR TEXTBOOK TO ALL TUTORIAL PERIODS

Two hours per week will be used for laboratory/tutorial exercises. Tutorials are designed to help you develop your problem solving skills by having you work out a complete, written solution to a textbook problem or selected reading from your text under the guidance of your instructor. Assessment of this component will be based on the quality and clarity of the written solution (getting the correct answer is not a significant component of the assessment). Tutorial assignments are due at the end of the tutorial period, unless otherwise indicated. You are expected to work on tutorial problems by yourself, though you may discuss your work with your instructor or a classmate; collaborative solutions are not allowed unless explicitly stated by your instructor.

Grading System

Descriptor	Alpha Grade	4.0 Scale	Percent	Rubric for Letter Grades
Excellent	A+	4.0	> 92.9	Work shows in-depth and critical analysis, well developed ideas, creativity, excellent writing, clarity and proper format.
	A	4.0	85 – 92.9	
	A-	3.7	80 – 84.9	
Good	B+	3.3	77 – 79.9	Work is generally of high quality, well developed, well written, has clarity, and uses proper format.
	B	3.0	74 – 76.9	
	B-	2.7	70 – 73.9	
Satisfactory Progression	C+	2.3	67 – 69.9	Work has some developed ideas but needs more attention to clarity, style and formatting.
	C	2.0	64 – 66.9	
	C-	1.7	60 – 63.9	
Poor	D+	1.3	55 – 59.9	Work is completed in a general way with minimal support, or is poorly written or did not use proper format.
Minimum Pass	D	1.0	50 – 54.9	
Failure	F	0.0	< 50	Responses fail to demonstrate appropriate understanding or are fundamentally incomplete.

Proposed Schedule of Topics

Wk	Chapter	Main Topics	Lab/Tutorial
1	1.1-1.6	General Principles - units, procedures for analysis	
2	2.1-2.9	Force Vectors - Scalars and vectors, vector operations - Force vectors along a line	Selection of problems from Chapter 2
3	3.1-3.4	Equilibrium of a Particle - the free-body diagram, 2D and 3D force systems	Selection of problems from Chapter 3
4	4.1-4.5	Force System Resultants - Moments	Selection of problems from Chapter 4
5	4.6-4.9	Force System Resultants - Simplification of force/couple systems	Selection of problems from Chapter 4
6	5.1-5.6	Equilibrium of a Rigid Body	Selection of problems from Chapter 5
7		Midterm Review; Midterm	
8	6.1-6.6	Structural Analysis: simple trusses space trusses	Selection of problems from Chapter 6 - popsicle stick bridge activity
9	7.1-7.3	Internal Forces - Internal Loadings	Selection of problems from Chapter 7
10	7.1-7.3	Internal Forces - Shear and moment equations	Selection of problems from Chapter 7
11	8.1-8.3	Friction: - Dry friction; friction in various systems	Selection of problems from Chapter 8
12	9.1, 9.2, 9.4	Centre of Gravity and Centroid	Selection of problems from Chapter 9
13	9.1, 9.2, 9.4	Centre of Gravity and Centroid	Selection of problems from Chapter 9
14	10.3-10.5	Moments of Inertia	Selection of problems from Chapter 10

Please Note:

Date and time allotted to each topic is subject to change.

Performance Requirements

Student Responsibilities

It is your responsibility as a student to contact the Office of the Registrar to complete the forms for Withdrawal or Change of Registration, and any other forms. Please refer to the list of important dates as noted in the Academic Schedule in the Keyano College credit calendar.

More specific details are found in the Student Rights and Student Code of Conduct section of the Keyano College credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Student Code of Conduct Policies.

Laboratory Safety

In the science laboratories, safety is important.

Students must complete the *WHMIS for Students* online training course on Moodle before entering the science laboratories.

Students must comply with the mandatory laboratory safety rules for this course as provided in the laboratory manual. Failure to do so will result in progressive discipline such as a verbal warning, refused entry into the laboratory, or suspension from the College.

Student Attendance

Class attendance is useful for two reasons. First, class attendance maximizes a students' learning experience. Second, attending class is a good way to keep informed of matters relating to the administration of the course (e.g., the timing of assignments and exams). Ultimately, you are responsible for your own learning and performance in this course.

It is the responsibility of each student to be prepared for all classes. Students who miss classes are responsible for the material covered in those classes and for ensuring that they are prepared for the next class, including the completion of any assignments and / or notes that may be due.

Academic Misconduct

Students are considered to be responsible adults and should adhere to principles of intellectual integrity. Intellectual dishonesty may take many forms, such as:

- Plagiarism or the submission of another person's work as one's own
- The use of unauthorized aids in assignments or examinations (cheating)
- Collusion or the unauthorized collaboration with others in preparing work
- The deliberate misrepresentation of qualifications
- The willful distortion of results or data
- Substitution in an examination by another person
- Handing in the same unchanged work as submitted for another assignment
- Breach of confidentiality.

The consequences for academic misconduct range from a verbal reprimand to expulsion from the College. More specific descriptions and details are found in the Student Rights and Student Code of Conduct section of the Keyano College credit calendar. It is the responsibility of each student to be aware of the guidelines outlined in the Student Rights and Student Code of Conduct Policies.

In order to ensure your understanding of the concept of plagiarism, you must successfully complete the online tutorial found on ilearn.keyano.ca. Then print the certificate, sign it, and show it to each of your instructors. Your course work will not be graded until you show this signed certificate.

Specialized Supports

Counselling and Accessibility Services

Counselling Services provides a wide range of specialized counselling services to prospective and registered students, including personal, career and academic counselling.

SKILL Centre

The SKILL Centre is a learning space in the Clearwater Campus at Keyano College where students can gather to share ideas, collaborate on projects and get new perspectives on learning from our tutorial staff.

The SKILL Centre, through a variety of delivery methods, provides assistance in skill development to Keyano students. Assistance is provided by instructors, staff and student tutors. Individuals wishing to improve their mathematics, writing, grammar, study, or other skills, can take advantage of this unique service.

Authorization

This course outline has been reviewed and approved by the Program Chair.

Jean-Pierre De Villiers, Instructor

Louis Dingley, Chair

Date Authorized

Vincella Thompson, Dean

Date Authorized

Signed copies to be delivered to:

Instructor

Registrar's Office