Module Descriptor Form

Civil and Environmental Engineering

CL132 - Engineering Mechanics 1

Module Code	CL132	**Module Title**	Engineering Mechanics 1				
Module Registrar	Amabile, Dr Alessia						
Other Staff Involved	Dr Kamila Nieradzinska (Lecturer)						
Credit Weighting	20	**Semester**	1	**Elective**	No	**Academic Level**	1
Pre-requisites							
Required for							

Module Format and Delivery (hours):

Lectures	Tutorials	Assignments	Labs	Private Study	Total
20	24	20	2	134	200

Educational Aim

This module aims to:

This module provides an introduction to many of the basic concepts used by civil engineers to solve problems in structures, geotechnics, materials and hydraulics. By introducing the concepts of forces and reactions and the laws of physics governing the interaction between rigid bodies, the module is a foundation for subsequent classes in structural analysis. This module provides a basic introduction to fluid mechanics and lays the foundation for subsequent classes in water engineering by developing an understanding of the water systems at work in the environment and the role of water engineers in practice.

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Syllabus

This module will teach the following:

Weeks 1-5
-Basic dimensions, units, conversion and dimensional analysis
-Forces and resultants
-Newton's laws
-Friction
-Resolution of forces
-Free body diagrams
-Equilibrium conditions
-Moments and couples
-Support reactions

Week 6-10
-Properties of Fluids including density, compressibility, viscosity, vapour pressures, surface tension and capillary action
-Pressure
-Pressure Measurement
-Hydrostatics, Pascal's Law, Fluid pressure, centre of pressure, centroid of area, hydrostatic forces on submerged plane and curved surfaces
-Stability of Floating Bodies: Archimedes Principle, Centre of Buoyancy, Meta-centric height

Learning Outcomes

On Completion of the module, the student is expected to be able to:

LO: 1	Derive and apply relationships between basic dimensions and convert their units
LO: 2	Find the resultant of a system of forces
LO: 3	Draw free body diagrams and analyse equilibrium for 2D systems
LO: 4	Understand the significance of fluid properties and how they define the application of fluid mechanics at work in water engineering systems
LO: 5	Analyse hydrostatic forces on simple floating bodies and structures surrounded by water

(UK SPEC suggests no more than 4 learning outcomes per module. Statements must be broad and be syllabus free and link in with the intended learning outcomes on the programme specifications.)

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Assessment of Learning Outcomes - Criteria

Learning Outcome: **1**

	Criteria
1	C1 Can do basic calculations involving basic and derived quantities
2	C2 Can convert and derive units of basic and derived quantities
3	C3 Can check equations are dimensionally correct

Learning Outcome: **2**

	Criteria
1	C1 Can find the resultant of a system of forces
2	C2 Can resolve a force in its components both graphically and analytically
3	C3 Can calculate moments and replace a force by a force – couple system.

Learning Outcome: **3**

	Criteria
1	C1 Can use trigonometry and geometry to draw free body diagrams of forces on different systems
2	C2 Can draw and interpret free body diagrams for bodies experiencing friction on level and inclined surfaces
3	C3 Can analyse equilibrium of simple mechanical systems including pulleys, inclines, levers, simple beams

Learning Outcome: **4**

	Criteria
1	C1 Ability to solve problems involving properties of fluids
2	C2 Ability to solve problems involving fluid properties, shear stress and viscosity
3	C3 Ability to use absolute and gauge pressures, piezometers and manometers

Learning Outcome: **5**

	Criteria
1	C1 Ability to understand and solve problems on the hydrostatic force on floating bodies
2	C2 Ability to understand and solve problems on the hydrostatic force on plane submerged surfaces
3	C3 Ability to understand and solve problems on the hydrostatic force on curved submerged surfaces

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Assessment Method(s) Including Percentage Breakdown and Duration of Exams

To Pass the module, students need to gain a summative mark of: 40%

Description	Semester	Start Week	Duration	Weight	Submission Week	Linked Criteria
Talles toy tower lab (group)	1	3		5%	5	LO 1: C1, C2, C3
Class test. Closed Book	1		2.00	35%	8	LO 1: C1, C2, C3 LO 2: C1, C2, C3 LO 3: C1, C2, C3 LO 4: C1, C2, C3
Centre of pressure lab (individual)	1	7		7%	9	LO 5: C1, C2, C3
9x weekly online quizzes	1	1		18%	10	LO 1: C1, C2, C3 LO 2: C1, C2, C3 LO 3: C1, C2, C3 LO 4: C1, C2, C3 LO 5: C1, C2, C3
Final exam in December diet. Closed Book	1		2.00	35%	E	LO 1: C1, C2, C3 LO 2: C1, C2, C3 LO 3: C1, C2, C3 LO 4: C1, C2, C3 LO 5: C1, C2, C3

Principles of Assessment Feedback

1. All assignments and assessments combine straightforward and challenging tasks.
2. Model solutions are provided for guidance.
3. Tutorial problems with answers to encourage and guide private study are provided .
4. A one-hour tutorial class is held every week for one-to-one interaction between instructors and students and timely feedback.

Additional Information

Attendance to the class test and exam is compulsory. Students who are absent from either the class test or the final examination will be marked as absent and will be required to resit the module as per the resit procedure.

Resit Procedure

Students must gain a summative mark of 40% to pass the module. Students who fail the module at the first attempt will be re-examined during the August diet. This re-examination will consist entirely of exam (2 hour duration). No marks from any previous attempts will be transferred to a new resit attempt. A mark of 40% in the resit exam is required to pass the module.

Recommended Reading

OpenStax College. University Physics, Volume 1. Rice University.
https://www.openstaxcollege.org/textbooks/university-physics

Hamil,L. (2011) Understanding Hydraulics, 3rd Ed, Palgrave MacMillan.

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Module Timetable

Week	Semester 1	Semester 2
0		
1		
2		
3		
4		
5	Lab 5%	
6		
7		
8	Test 35%	
9	Lab 7%	
10	Continuous 18%	
11		
E	Examination 35%	

Date of Last Modification

08-09-2025