MODULE DESCRIPTION FORM

DEPARTMENT OF CIVIL AND ENVRIONMENTAL ENGINEERING

CL134: Engineering Mechanics 2

Module Registrar: Mr. Neil Cochrane	**Taught To (Course):** BEng Hons / MEng Civil Engineering BEng Hons / MEng Civil & Environmental Engineering		
Other Lecturers Involved:	**Credit Weighting:** 20	**Semester:** 2	
Assumed Prerequisites: CL132: Engineering Mechanics 2 SQA Higher Mathematics (or equivalent)	**Compulsory class**	**Academic Level:** 1	**Suitable for Exchange:** N

Module Format and Delivery (HOURS i.e. 1 credit = 10hrs of study):

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	**Total**
10	20	10	20	-	20	-	40	80	200

Educational Aim

This module aims to provide a basic introduction to structural engineering, including the concepts of equilibrium, internal forces, pin-jointed trusses. These lay the foundation for subsequent classes in structures.

Learning Outcomes

On completion of the course the student is expected to be able to

LO1	Find the resultant & equilibrant of a system of forces
LO2	Understand the equilibrium of rigid bodies and multi-part structures
LO3	Resolve forces in pin-jointed frames in two dimensions
LO4	Calculate internal action diagrams for statically determinate structures

Syllabus

The module will teach the following:

Equilibrium

- Concept of force and moment
- Equilibrium of a particle
- Equilibrium of a rigid body
- Equilibrium of multipart structures

Internal actions

- Axial force, shear force, and bending moments
- Internal action diagrams for statically determinate structures

Analysis of pin-jointed trusses

- Internal forces in pin-jointed frame systems
- Method of joints
- Method of sections

Assessment of Learning Outcomes

For each of the Course Learning Outcomes the following criteria will be used to make judgements on student learning:

LO1	**Find the resultant & equilibrant of a system of forces**
C1	Ability to plot forces, moments, and resultants
C2	Ability to apply Newton's laws of motion.
C3	Ability to describe the equilibrium condition for concurrent and coplanar forces

LO2	**Understand the equilibrium of rigid bodies and multi-part structures**
C1	Ability to evaluate if a structure is statically determinate
C2	Ability to evaluate the support reactions in statically determinate structures
C3	Ability to use trigonometry and geometry to draw the free body diagram of forces acting on rigid bodies of systems of rigid bodies.

LO3	**Resolve forces in pin-jointed frames in two dimensions**
C1	Ability to use the method of joints to compute internal forces in pin-joined frames.
C2	Ability to use the method of sections to compute internal forces in pin-joined frames.

LO4	**Calculate internal action diagrams for statically determinate structures**
C1	Ability to use free-body diagram to calculate shear forces and bending moment.
C2	Ability to take equilibrium at any location to predict the math expressions for BM and SF
C3	Ability to draw internal force diagrams and validate the results by using different methods
C4	Ability to evaluate internal force diagrams for basic structures

The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

Principles of Assessment and Feedback

(within Assessment and Feedback Policy at:
*https://www.strath.ac.uk/staff/policies/academic/*http://www.strath.ac.uk/learnteach/informationforstaff/staff/assessfeedback/

- The assessment of the module has been designed to encourage student engagement and understanding of this topic. assessment methods are used: examination, online quizzes, peer analysis and verification, and lab report submission. are at individual level, the latter are a group submission.
- Assessments and methods are clearly explained to students at the start of the course.
- All assessments are marked in an appropriate, fair and transparent way with pre-specified marking criteria.
- Timely, constructive, and supportive feedback is given to students to help them understand the extent to which they ha assessment criteria and support future development of their work.
- Tutorial classes are held regularly for one-to-one interaction between instructors and students and timely feedback.
- The course is reviewed every year, based on feedback from students collected in the form of a mid-term and one end-t questionnaire. Any recommended changes are reviewed and implemented in the next academic year.

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

	Examinations				Coursework		Laboratory	
	Number	Month(s)	Duration	***Weighting***	Number	***Weighting***	Number	***Weighting***
	1	S2 Exam Diet	2	60^	4	30%	2	10%
L/Outcomes	LO1, LO2, LO3, LO4				LO1, LO2, LO3, LO4		LO1, LO2, LO3	

Coursework / Submissions deadlines (*academic weeks*):

PLEASE CHECK MYPLACE FOR ANY CHANGES TO THESE DEADLINES

EM2-1: Online Test	**5**	**EM2-5:** Lab A	**6**
EM2-2: Online Test	**7**	**EM2-6:** Lab B	**10**
EM2-3: Paired Analysis / Verification	**9**	**EM2-7:** Examination	**-**
EM2-4: Class Test	**11**		

Resit Assessment Procedures:

2-hour examination in August diet

PLEASE NOTE:

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. No marks from any previous attempts will be transferred to a new re-sit attempt.

Recommended Reading

*****Purchase recommended **Highly recommended reading *For reference**

***	Hibbeler, R.C.	(2020)	***Structural analysis***	978-1292247236
**	Megson, T.H.G.	(2019)	***Structural and stress analysis***	978-0081025871
*	Williams, M. & Todd, J.D.	(2020)	***Structures: theory and analysis***	978-0333677605
*	Hannah, J. & Hillier, M.J.,	(1995)	***Applied mechanics,***	978-0582256323
*	Gere, J.M. & Goodno, B.J.	(2013)	***Mechanics of materials***	978-1111577742
*	Millais, M.	(2017)	***Building structures***	978-1315652139
*	Brohn, D.	(2005)	***Understanding structural analysis***	978-0955631108
*	Smith, P	(2001)	***An introduction to structural mechanics***	978-0333962558
*	Gordon, J.E	(1991)	***Structures, or, Why things don't fall down***	978-0306812835
*	Gordon, J.E	(1991)	***The new science of strong materials: or, Why you don't fall through the floor***	978-0140135978

Please consult the reading list on MyPlace for other texts.

Additional Student Feedback

(Please specify details of when additional feedback will be provided)

Date	Time	Room No
Weeks 6 & 11	N/A	N/A - online

Session: AY 2022-23

Approved:

Course Director Signature:

Date of Last Modifications: 22-August-2022

(Updated May 2018)

MODULE TIMETABLE

Module Code:	**CL134**	**Module Title:**	**Engineering Mechanics 2**

Brief Description of Assessment:

- Assignments 1 & 2 are online assessments, issued in weeks 3 and 5 and due in weeks 5 and 7. Both are worth 5%.
- Assignment 3 is a coursework task where you will work in pairs to evaluate the internal forces in a structure using either the method of sections or method of joints. You will then verify your partners work to see if you get the same results using different methods. This is worth up to 10% of the total grade.
- Assignment 4 is a class test. This will take place in class in week 11 and will have a similar format to the exam. This is also worth up to 10% of your final grade.
- Labs A and B are practical group activities in week 4 and 8. Your individual submission are due two weeks later. Attendance at the lab session and complete, original lab reports each contribute up to 5% of the total grade.
- The final exam will take place during the exam period. This accounts for up to 60% of the overall mark in this module.

Assessment Timing: -

Semester Two		C&D Wk.	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Issued -				EM2-1 *Quiz*	EM2-5 *Lab A Practical*	EM2-1 *Quiz*	EM2-3 *Hand Calcs*		EM2-6 *Lab B Practical*			**EM2-4** Class Test	**EM2-7** Examination
	Due -						**EM2-1** Due	**EM2-5** Due	**EM2-2** Due		**EM2-3** Due	**EM2-6** Due		

Please note: Timings can and will change, this should only be used as a guide.