MODULE DESCRIPTION FORM

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

16232 ENGINEERING MECHANICS 2

Module Registrar: Dr Reda Felfel reda.felfel@strath.ac.uk	**Taught To (Course): Cohorts for whom class is compulsory**		
Other Lecturers Involved: Mr D Johnston	**Credit Weighting: 20 (ECTS 10)**	**Semester: 1 and 2**	
Assumed Prerequisites: 16132	**Compulsory**	**Academic Level: 2**	**Suitable for Exchange: Y**

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

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	**Total**
62	26	4						108	200

Educational Aim

This module aims to:

Semester 1
To develop skills, knowledge and understanding in the areas of structural analysis and elementary stress analysis. The work is divided into 4 parts i) statics revision including shear force and bending moment diagrams ii) beams in bending iii) shear and torsion iv) 2D stress and strain.

Semester 2
To provide students with the basic skills to analyse dynamics problems, associated with bodies and simple mechanisms, from first principles. The work is divided into 3 sections: i) kinetics and kinematics of particle motion, ii) rigid body motion and an introduction to simple vibratory motion, and iii) dynamic equivalence in connected systems.

Learning Outcomes

On completion of the module the student is expected to be able to:

LO1 understand the principles of dynamical analysis and be able to apply this understanding to the analysis of simple mechanical systems

LO2 understand and apply linear vibration theory.

LO3 have a basic understanding of elementary strength of materials with applications to simple determinate and indeterminate systems

LO4 have an understanding of equilibrium and compatibility in relation to 2-dimensional stress and strain be able to apply this knowledge to problems involving the analysis of stress and strain in the context of elementary design of engineering components.

Syllabus

The module will teach the following:

Semester 1
Tensile test – uniaxial systems, temperature and pre-load effects. Engineers' theory of bending. Direct and bending effects. Shear stress due to torsion and bending. Two dimensional stress including Mohr's circle for stress and Von Mises and Tresca yield criterion.

Semester 2
Rectilinear and angular motion where acceleration is a function of time, displacement and velocity. Centre of mass and moment of inertia of a composite object. Dynamic equivalence and connected systems. Free vibration analysis of an undamped single degree of freedom system – Simple Harmonic Motion.

Assessment of Learning Outcomes

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

LO1
C1 participation in the use of classroom communication system, classroom questions and discussions
C2 able to answer concept questions in the class
C3 in examinations and tutorials identify key aspects of the problem, identify relevant assumptions, draw correct free body diagrams, schematic diagrams and apply relevant mechanical principles including the use of calculus or conservation of energy to solve engineering problems.

LO2
C1 participation in the use of classroom communication system, classroom questions and discussions
C2 able to answer concept questions in the class
C3 in examinations and tutorials identify key aspects of the problem, identify relevant assumptions, draw correct free body diagrams and apply relevant mechanical principles leading to the generation of relevant differential equations of motion and the solution thereof.
C4 undertake lab experiments in a proficient manner and produce a clear readable lab report.

LO3
C1 in examinations, coursework and tutorials identify key aspects of the problem, identify relevant assumptions, draw correct free body diagrams and apply relevant mechanical principles
C2 undertake lab experiments in a proficient manner and produce a clear readable lab report. (Note:

LO4
C1 in examinations, coursework and tutorials identify key aspects of the problem, identify relevant assumptions, and apply relevant mechanical principles.

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/professionalservices/staff/policies/academic/)

Feedback relating to summative assessments:

- Feedback will be provided by the return of examination marks to students after assessment. After the December examination, verbal feedback will be given in class to talk through generalised points.
- Feedback relating to laboratory report submissions will be given in 2 forms: students receive feedback via rubric-based comments on their reports - visible via MyPlace. Verbal feedback will also be given in class following the release of assessment marks to talk through generalised points.

Formative feedback will be provided at tutorial and laboratory sessions primarily through individual or group discussion of work prepared in advance by students (note: to receive this feedback, students should participate in these tutorials but attendance is not mandatory).

Immediate self-directed feedback through in-class polling systems.

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

Examination				**Coursework**		**Practical**		**Project**	
Number	Month(s)	Duration	***Weighting***	Number	***Weighting***	Number	***Weighting***	Number	***Weighting***
2	Dec Apr/May	1.5hrs 1.5hrs	45% 45%	2	5% Dyn Lab 5% Stru Lab				
* All				* All		*		*	

* ***L/Os:*** *Indicate which Learning Outcomes (L01, L02, etc) are to be assessed by exam/coursework/practical/project as required.*

Coursework / Submissions deadlines (*academic weeks*):
Lab reports submitted 5/6 weeks after laboratory in semester 2. (Note: the laboratories will take place during Consolidation Week, prior to teaching week 1 of the second semester)

Resit Assessment Procedures:
3hr examination in July/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 July/August diet. This re-examination will consist entirely of exam. No marks from any previous attempts will be transferred to a new resit attempt.

Recommended Reading

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

Semester 1
**Mechanics of Engineering Materials" by Benham, Crawford and Armstrong.

Semester 2
***"Vector Mechanics for Engineers - Dynamics" by F P Beer, E R Johnston and W E Clausen, McGraw Hill. 11th Edition in SI Units

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

Date	Time	Room No
		Check timetable webpages for details of tutorial sessions.

Session: 2024/25

Approved:

Programme Lead/Director Signature: Dr A McLaren and Dr G Houston-Scott

Date of Last Modifications: 02/08/2024

(MAE template updated July 2024)

MODULE TIMETABLE

Module Code:	**16232**	**Module Title:**	**Engineering Mechanics 2**

Brief Description of Assessment:

1.5hr exam Dec (45%), 1.5hr exam May (45%), 2 lab reports (10% total).

Submission of lab reports in semester 2 week 5 and week 6 after laboratory.
(Note: the laboratories will take place during Consolidation Week, prior to teaching week 1 of the second semester)

Note: Laboratories are usually in January Consolidation Week, prior to the start of semester 2. Specific arrangements will be given to students during semester 1.

Assessment Timing:-

Indicated on the table below are the start/submission dates for each assignment/project and the timing of each exam/assessment.

Please note: Timings could change during unforeseen periods of disruption; this should only be used as a guide.

Semester One	W&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Exam

Semester Two	C&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Lab Lab	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Lab Report Submission	Lab Report Submission	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Exam