UNIVERSITY of BRADFORD

Module Descriptor

Engineering Statics and Dynamics

Module Code:	ENM5006-B
Academic Year:	2018-19
Credit Rating:	20
School:	Department of Mechanical and Energy Systems Engineering
Subject Area:	Engineering Mathematics
FHEQ Level:	FHEQ Level 5
Module Leader:	Dr Jian Li

Additional Tutors:

Pre-requisites:

Co-requisites:

Contact Hours

Type	Hours
Lectures	30
Tutorials	20
Laboratory	18
Directed Study	130
Examinations DO NOT USE	2

Availability Periods

Occurrence	Location/Period
BDA	University of Bradford / Academic Year (Sept - May)

Module Aims

(1) To evaluate the concepts of a general three-dimensional stress and strain state and to relate these concepts to the behaviour of actual materials and structural elements.
(2) To establish knowledge of the concepts, design, analysis and application of machine

dynamics.

(3) To be able to use Adams to analyse and design dynamics of mechanical systems.

Outline Syllabus

(1) Fundamental assumptions of solid mechanics. Stress state; principal stresses, maximum shear stress, two-dimensional stress states, plane stress and plane strain. Mohr`s circle of stress. Torsion - the torsion equation. Work of external loads. Total potential energy. Strain energy methods. Unit load method for calculating deflections. Thick cylinder. Elasticity and plasticity. Yield criteria and their application. Buckling instabilities - the Euler criterion. Brittle and ductile behaviour. Fundamentals of fracture mechanics - stress intensity, strain energy release rate, plastic zone size.
(2) Planar kinematics of rigid bodies: translation; rotation about a fixed point; time derivatives of vectors, general motion; relative motion; instantaneous centre, gears motion, sliding motion.
(3) Kinetics of rigid bodies: moments of inertia; equations of motion; general plane motion; work & energy; impulse and momentum.
(4) Three dimensional analysis of rigid body motion: rotation; general motion; relative motion; angular momentum; gyroscopic motion.
(5) Free Vibration of single degree of freedom systems.
(6) Machines dynamics analysis using ADAMS tools: dynamic simulation techniques; linkage design, joints and motion constraints, design and analysis of machines and systems dynamics.

Module Learning Outcomes

On successful completion of this module, students will be able to...

1 1.1 Understand the fundamental principles of machines design and machines dynamic analysis.
1.2 Solve engineering problems relating to stress and strain analysis.
1.3 Apply the formulation of the governing equations of motion of mechanical systems.

2 2.1 Relate analytical and computer representation to the design, modelling and analysis of mechanics and dynamics.
2.2 Use computer tools for the design and analysis of machines and systems.

3 3.1 Carry out systematic problem solving.

Learning, Teaching and Assessment Strategy

Concepts are introduced using formal lectures. Deeper understanding is developed during problem-solving classes, and further enhanced using the laboratory class. Oral feedback is given during the laboratory sessions and problem-solving classes. Written assessment will concern the application of practical skills to the knowledge base of the module and the formal examination will assess the wider learning outcomes expressed in the descriptor.

Mode of Assessment

Type	Method	Description	Length	Weighting	Final Assess'
Summative	Examination - closed book	Examination - closed book	2 hours	70%	No
Referral	Examination - closed book	Supplementary: Examination - closed book	2 hours	100%	No
Summative	Coursework	Design group project	0 hours	30%	Yes

Legacy Code (if applicable)

ENG2315L

Reading List

To view Reading List, please go to **rebus:list**.