

Materials Technology and Structural Mechanics

Module Code:	MAE4007-B
Academic Year:	2018-19
Credit Rating:	20
School:	(OUT OF USE FROM 2018/9) School of Engineering
Subject Area:	Mechanical and Automotive Engineering
FHEQ Level:	FHEQ Level 4
Module Leader:	Dr Mansour Youseffi

Additional Tutors:
Dr Elaine Brown, Dr Michael Martyn, Dr Michael Honnor

Pre-requisites:

Co-requisites:

Contact Hours

Type	Hours
Lectures	48
Tutorials	24
Laboratory	6
Directed Study	122

Availability Periods

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

Module Aims

Provide an introduction to engineering materials and their properties, with particular reference to their manufacturing technology, selection and different industrial applications.

Describe the concepts of stress, strain, equilibrium and deformation, and apply them in the analysis and understanding of simple engineering elastic structures.

Outline Syllabus

Materials:

Heat treatment (thermal processing) of ferrous and non-ferrous alloys; Metal forming and various casting techniques; Cast irons; Polymer structures; Ceramic structures; Bonding and their effect; Calculation of mechanical properties of metals, polymers and ceramics.

Structural Mechanics:

Definition of: force, resultant force, components of force, moment, equivalent force, stress, strain, elastic modulus, shear force and bending moment. Determination of support reactions for statically determinate structures. The elastic behaviour of bar in tension/compression. Statically determinate plane pin-jointed frames; external and internal forces. Bending moment and shear force diagrams for statically determinate beams subject to point and distributed loads. First and second moments of area. Bending stress due to bending moment - The Engineer's Theory of Bending. Deflections of beams including Macaulay's method for integrating the expression for bending moment. Laboratory experiment: Theory of Bending.

Module Learning Outcomes

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

- 1 1.1 Description of the production, properties and selection of materials in a wide range of engineering and technology applications.
1.2 Apply the equilibrium, compatibility and constitutive equations for elastic statically determinate pin-jointed frames and engineers' beams.
- 2 2.1 Justify the selection of materials. 2.2 Conduct mechanical evaluation tests. 2.3 Explain materials processing technology and properties. 2.4 Analyse statically determinate elastic beams and pin-jointed plane frames.
- 3 3.1 Presentation and interpret data; apply scientific method and solve problems systematically.

Learning, Teaching and Assessment Strategy

Lectures are used to introduce theoretical concepts which are then applied/practiced in tutorials and case studies for deeper/better understanding. Informal/interactive lectures and oral feedback are given during tutorials in smaller groups.

Mode of Assessment

Type	Method	Description	Length	Weighting	Final Assess'
Summative	Laboratory Report	Laboratory report for materials in Semester 1	500 words	15%	No
Summative	Examination -	Examination - closed book	2 hours	40%	Yes

	closed book	(structural mechanics in Semester 2)			
Referral	Examination - closed book	Supplementary assessment: Examination – Closed book	3 hours	100%	No
Summative	Classroom test	Closed book class test (one in Semester 1 for materials)	2 hours	35%	No
Summative	Classroom test	Classroom test for structural mechanics in semester 2		10%	No

Legacy Code (if applicable)

ENG1301L

Reading List

To view Reading List, please go to [rebus:list](#).