

Module Details	
Module Title:	Fundamentals of Materials
Module Code:	MAE3003-B
Academic Year:	2019-20
Credit Rating:	20
School:	Department of Mechanical and Energy Systems Engineering
Subject Area:	Mechanical and Automotive Engineering
FHEQ Level:	FHEQ Level 3
Pre-requisites:	
Co-requisites:	

Contact Hours	
Type	Hours
Lectures	36
Practical classes and workshops	14
Tutorials	12
Laboratory	16
Directed Study	122

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

Module Aims
To develop knowledge and understanding of the influence of material structure (from atomic through to microstructural) on the chemical and physical properties of materials.

Outline Syllabus
States of matter, Gas Laws & Avogadro constant, atom and electronic structure, primary and secondary bonding, polymorphism & carbon hybridisation, hard sphere modelling & crystal lattices & defects, mechanical properties, mechanisms for enhancing properties, thermal

properties.

Enthalpy: heats of formation & combustion, Hess' Law, catalysts and activation energy, equilibrium, constant (Kc), Le Chateliers Principle, organic reaction mechanisms, simple reactions of alcohols, carboxylic acids & amines.

Learning Outcomes

1	1.1 Confidently explain and discuss the nature of different properties of materials in relation to their structure. 1.2 Demonstrate a basic understanding of the chemical nature of materials and reaction kinetics.
2	2.1 Apply principles of theory to recommend suitable materials, based on their structure and properties, for engineering problems. 2.2 Perform elementary calculations using material properties 2.3 Apply the principles of chemical reactions to solve problems set in an engineering context.
3	3.1 Manage and interpret data. 3.2 Present technical data and analysis in formal reports. 3.3 Solve problems systematically using the scientific principles and theory. 3.4 Communicate technical information in a concise, confident, manner. 3.5 Work as part of a team.

Learning, Teaching and Assessment Strategy

Lectures, tutorials, laboratories.

Mode of Assessment

Type	Method	Description	Length	Weighting
Summative	Presentation	Group presentation. Mid Semester 2		15%
Referral	Examination - closed book	Supplementary	2 hours	100%
Summative	Examination - closed book	Semester 2	90 minutes	35%
Summative	Coursework	Semester 1 week 11. Report based upon use of Software package and observation of testing methods		20%
Summative	Classroom test	Class test during January assessment period		30%

Reading List

To access the reading list for this module, please visit <https://bradford.rl.talis.com/index.html>.

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.