

Module Details	
Module Title	Fundamentals of Materials
Module Code	MAE3003-B
Academic Year	2020/1
Credits	20
School	Department of Mechanical and Energy Systems Engineering
Subject Area	Mechanical and Automotive Engineering
FHEQ Level	RQF Level 3
Pre-requisites	N/A
Co-requisites	N/A

Contact Hours	
Type	Hours
Online Lecture (Synchronous)	36
Online Tutorials (Synchronous)	24
Laboratories	16
Directed Study	124

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Academic Year
BDA	University of Bradford / Semester 2

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 (K_c), Le Chateliers Principle, organic reaction mechanisms, simple reactions of alcohols, carboxylic acids & amines.

Learning Outcomes

Outcome Number	Description
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.
01	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.
02	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.
03	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	Coursework	Semester 1 week 11. Report based upon use of Software package and observation of testing methods 1500 Words	N/A	20%
Summative	Classroom test	Test during January assessment period	1 hour 30 mins	30%
Summative	Presentation	Group presentation. Mid Semester 2	15 mins	15%
Summative	Coursework	Report based coursework to cover 2000 words	N/A	35%
Referral	Coursework	Report based coursework to cover 2000 words	N/A	100%

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.

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