

Module Details	
Module Title	Fundamentals of Materials
Module Code	MAE3003-B
Academic Year	2022/3
Credits	20
School	Department of Mechanical and Energy Systems Engineering
FHEQ Level	RQF Level 3

Contact Hours	
Type	Hours
Online Lecture (Synchronous)	18
Tutorials	24
Laboratories	16
Directed Study	124
Lectures	18

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

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
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.
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.
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	Weighting
Summative	Coursework - Written	Semester 1 week 11. Report based upon use of Software package and observation of testing methods 1500 Words	20%
Summative	Examination - Closed Book	Test during January assessment period (1.5 Hrs)	30%
Summative	Presentation	Group presentation. Mid Semester 2 (15 Mins)	15%
Summative	Coursework - Written	Report based coursework to cover 2000 words	35%

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.