

Module Details	
Module Title	Materials And Manufacturing Technologies
Module Code	ENG5059-B
Academic Year	2020/1
Credits	20
School	Department of Mechanical and Energy Systems Engineering
Subject Area	Mechanical and Automotive Engineering
FHEQ Level	FHEQ Level 5
Pre-requisites	N/A
Co-requisites	N/A

Contact Hours	
Type	Hours
Independent Study	155
Online Lecture (Asynchronous)	8
Lectures	8 and 19 (face to face)
Laboratories	4 and 6 (computer)

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

Module Aims
To provide core technical knowledge of engineering materials and their associated manufacturing technologies for conversion into engineering products. To provide knowledge of pertinent material properties and their selection for manufacturing. To provide knowledge on the influence of thermal and mechanical manufacturing parameters on material structure. To build analytical skills and knowledge for the enhancement of material structure for engineering applications.

Outline Syllabus

Engineering Materials : Develop knowledge of materials selection, materials processing and product performance. Develop understanding on how materials properties and product performance may be changed by materials processing routes. Overview of plastic deformation in metals & alloys. Introduction to crystal defects, principles of alloying, brief overview of processes used to strengthen metals & alloys. Introduction to fracture; brittle & ductile fracture processes. Metal property manipulation through annealing, heat treatment and use of TTT & CCT transformation diagrams. Relationship between structure & mechanical properties in polymers. Composite materials (GRP, CRP, MMC, CMC), fibre reinforcement, effects of fibre orientation, volume fraction & aspect ratio Ceramic materials, related forming processes & their physical and mechanical properties.

Manufacturing Technologies:

Metal alloy casting technologies, metal deformation processes, polymer processing, powder metallurgy. Flexible Manufacturing Systems, Manufacturing Cells, Industrial Robots, Lean Manufacturing Principles, Process Improvement, Sustainable Manufacturing, Computer Simulation of Manufacturing Operations, and Industry 4.0.

Learning Outcomes

Outcome Number	Description
01	Define and evaluate physical processes underpinning the development of micro and macrostructures in metal, polymer and composite manufacturing processes.
02	Interpret constitutive materials data, evaluate processes and provide solutions to defined manufacturing problems.
03	Critically evaluate processing steps required to engineer, and process, materials with advanced structures and properties.
04	Demonstrate analytical skills, problem solving skills, design skills and practical skills in materials processing and manufacturing.

Learning, Teaching and Assessment Strategy

Online and face-to-face lectures are used to introduce theoretical concepts which are then applied/practiced in (online and face-to-face) tutorials and laboratory practicals for deeper and better understanding. Informal and interactive lectures with oral, formative, feedback are given during tutorials and laboratory practicals in smaller groups.

LO1,LO2,LO3 will be assessed via closed book examination 50%.

LO3, LO4 will be assessed via coursework 40%.

LO2, LO3, LO4 will be assessed via laboratory practical report 10% .

This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Third Edition (AHEP3) as published by The Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-SPEC). These outcomes specify six key areas of learning: Science and Mathematics (SM), Engineering Analysis (EA), Design (D), Economic, Legal, Social, Ethical and Environmental Context (EL), Engineering Practice (P) and Additional General Skills (G).

SM1b, SM2b, SM3b, EA1b, EA3b, EA4b, D1, D3b, EL2, EL3b, EL4, P1, P2, P3, P4, P7, P8, G1, G2, G3b, G4, SM1m, SM2m, SM4m, EA1m, EL5m, EL7m, P2m.

Further details of these learning outcomes can be found at <https://www.engc.org.uk/>

Mode of Assessment				
Type	Method	Description	Length	Weighting
Summative	Coursework	Material selection and processing 2500 words	N/A	60%
Summative	Coursework	Based on materials and manufacturing processes	N/A	40%

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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