



MODULE SPECIFICATION

Part 1: Information			
Module Title	Design, Materials and Manufacturing (Work Based Learning)		
Module Code	UFMF7C-30-1	Level	Level 4
For implementation from	2019-20		
UWE Credit Rating	30	ECTS Credit Rating	15
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Module type:	Standard		
Pre-requisites	None		
Excluded Combinations	Materials and Processes 2019-20		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description
<p>Overview: The disciplines of engineering are brought together with an understanding of materials to produce in the design and manufacturing process to complete the engineering task. This module is designed to capture and bring together these tasks.</p> <p>Educational Aims: See Learning Outcomes.</p> <p>Outline Syllabus: Classification of Materials: Introduction to Metals, Polymers, Composites and Ceramics. Atomic structure and bonding. Environmental impact of materials and manufacturing processes.</p> <p>Classification of Manufacturing: Job, Batch and Continuous manufacture. Economies of scale. Breakeven Analysis.</p> <p>Materials: Mechanical properties of materials and their measurement; e.g. tensile, hardness, impact. Introduction to primary and secondary bonding and the structure of materials.</p> <p>Metals: Crystal structures and crystal defects (point defects, dislocations, grain boundaries); strengthening processes: alloying, work hardening, grain refinement and heat treatment processes; phase diagrams, simple phase transformations and microstructures; basic heat</p>

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treatment; the heat treatment of steels.

Polymers: Classification, structure, properties and manufacturing of polymers.

Composites: Types, structure, properties and manufacturing of composites.

Primary Processes: Rolling, casting, extrusion and forging of metals.

Presswork and Associated Processes: Sheet metal blanking, piercing, shearing and forming. Press tools, drawing and extrusion.

Material Removal Processes: Conventional metal cutting processes. Turning, milling and grinding. CNC machining. Calculation of power required to cut and Taylor's tool life equation.

Introduction to assembly and joining techniques: Welding, adhesives and fasteners.

Design Methods: the design process, and the systematic approach to design problems: requirement analysis, problem identification, problem solving methods, problem solving tools, preparation of specifications, solution identification and design. Principles of embodiment design.

Engineering Drawing: principles of 3rd angle orthographic projection. Basic Standard conventions using BS 8888.

Use of 2D & 3D CAD tools.

Practical Skills: application of manufacturing and metrology techniques within the practical environment of an engineering workshop.

Teaching and Learning Methods: See assessment

Part 3: Assessment

Component A: A technical oral presentation has been chosen to assess how you can use and implement your understanding and knowledge of the fundamentals of materials and manufacturing to explain your experimental results and approach to finding some solutions for real-world materials and manufacturing problems. You will have 15 minutes to

1) present the experimental results of your tutorial lab work and explain your results based on your fundamental knowledge of materials and manufacturing, and

2) offer and discuss some solutions for a realworld materials and manufacturing problem proposed by the teaching team. Following your presentation, there will be a viva session based on your presentation for 15 minutes. Teaching team will ask some question to evaluate fundamental knowledge of every student in the group. The overall oral presentation (your presentation and viva session) will last for a maximum of 45 minutes.

Component B: The design project includes a 3D CAD model of an engineering system, 2D component drawings to BS 8888 and qualified choices of materials and manufacturing processes to test full comprehension of the syllabus and learning outcomes.

First Sit Components	Final Assessment	Element weighting	Description
Presentation - Component A	✓	50 %	Group presentation and viva session
Report - Component B		50 %	Group Coursework (Design and CAD report)

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Presentation - Component A	✓	50 %	Presentation and Viva session
Report - Component B		50 %	Individual Coursework (Design and CAD report)

Part 4: Teaching and Learning Methods																	
Learning Outcomes	<p>On successful completion of this module students will achieve the following learning outcomes:</p> <table border="1"> <thead> <tr> <th>Module Learning Outcomes</th> <th>Reference</th> </tr> </thead> <tbody> <tr> <td>Show an understanding of the design process and the ability to apply them and evaluate their effectiveness</td> <td>MO1</td> </tr> <tr> <td>Show a detailed knowledge and understanding of key principles in materials technology</td> <td>MO2</td> </tr> <tr> <td>Show an understanding of materials properties and the impact of the choice of material and processes on the environment</td> <td>MO3</td> </tr> <tr> <td>Communicate the design, material and manufacturing of products through the preparation and reading of Engineering Drawings to BS8888 through the medium of 2D and 3D CAD tools</td> <td>MO4</td> </tr> <tr> <td>Understand the relationship between material properties and their structure at the atomic/molecular level using general concepts and the impact of the choice of material and processes on the environment</td> <td>MO5</td> </tr> <tr> <td>Demonstrate skills to allow choice of material and manufacturing processes to meet specific design criteria with relationship to manufacturing volume, mechanical properties, cost, dimensional accuracy and automation</td> <td>MO6</td> </tr> </tbody> </table>	Module Learning Outcomes	Reference	Show an understanding of the design process and the ability to apply them and evaluate their effectiveness	MO1	Show a detailed knowledge and understanding of key principles in materials technology	MO2	Show an understanding of materials properties and the impact of the choice of material and processes on the environment	MO3	Communicate the design, material and manufacturing of products through the preparation and reading of Engineering Drawings to BS8888 through the medium of 2D and 3D CAD tools	MO4	Understand the relationship between material properties and their structure at the atomic/molecular level using general concepts and the impact of the choice of material and processes on the environment	MO5	Demonstrate skills to allow choice of material and manufacturing processes to meet specific design criteria with relationship to manufacturing volume, mechanical properties, cost, dimensional accuracy and automation	MO6		
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Reading List	<p>The reading list for this module can be accessed via the following link:</p> <p>https://uwe.rl.talis.com/modules/ufmf7c-30-1.html</p>																

Part 5: Contributes Towards

This module contributes towards the following programmes of study:

Aerospace Engineering (Manufacturing) {Apprenticeship} [Sep][PT][UCW][4yrs] BEng (Hons) 2019-20

Aerospace Engineering (Manufacturing) {Apprenticeship} [Sep][PT][UCW][5yrs] BEng (Hons) 2019-20