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	2018-19		
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		
Contributes towards	Mechanical Engineering (Nuclear) - Not Running BEng (Hons) 2017-18 Electronic Engineering (Nuclear) [Sep][FT][Frenchay][5yrs] BEng (Hons) 2018-19 Aerospace Engineering Manufacturing [Sep][PT][UCW][4yrs] FdSc 2018-19 Mechanical Engineering [Sep][PT][UCW][3yrs] FdSc 2018-19 Mechatronics {Apprenticeship} [Sep][PT][UCW][3yrs] FdSc 2018-19 Mechanical Engineering [Sep][FT][BTC][2yrs] FdSc 2018-19 Mechanical Engineering [Sep][PT][BTC][3yrs] FdSc 2018-19 Mechatronics [Sep][PT][BTC][3yrs] FdSc 2018-19 Mechatronics [Sep][PT][GlosColl][3yrs] FdSc 2018-19 Aerospace Engineering (Manufacturing) {Apprenticeship} [Sep][PT][UCW][4yrs] BEng (Hons) 2018-19 Aerospace Engineering (Manufacturing) {Apprenticeship} [Sep][PT][UCW][5yrs] BEng (Hons) 2018-19		
Module type:	Standard		
Pre-requisites	None		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

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.

Educational Aims: See Learning Outcomes.

Outline Syllabus: Classification of Materials: Introduction to Metals, Polymers, Composites and Ceramics. Atomic structure and bonding. Environmental impact of materials and manufacturing processes.

Classification of Manufacturing: Job, Batch and Continuous manufacture. Economies of scale. Breakeven Analysis.

Materials: Mechanical properties of materials and their measurement; e.g. tensile, hardness, impact. Introduction to primary and secondary bonding and the structure of materials.

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 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 and 3D CAD tools.

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

Teaching and Learning Methods: Learning will be achieved through a combination of e-learning material and work based learning. The students are apprentices that receive a formal programme of work based learning that includes Performing Engineering Operations (PEO) and NVQ work based learning evidence, much of which is relevant to this module and hence provides industrial context for the syllabus.

The students will work through the e-learning material for design, materials and manufacturing and will draw on their work place experience in completing the assessments.

Formative feedback of learning will be provided through e-assessments and through tutorial sessions. Formative feedback will also be gained in the workplace through interaction with colleagues and their work placement mentors/supervisors.

Contact (see below): 36 hours

Assimilation and skill development: 162 hours
Project work: 102 hours
Total: 300 hours

The contact hours will be used to provide tutorials, mentoring and distance learning support.

Part 3: Assessment

Component A, a two hour end of module examination has been chosen to test the understanding and knowledge of the fundamentals of materials and manufacturing under controlled conditions.

Component B assessment is made up of a design project and e-assessment tests.

The e-assessments have been designed to encourage students to study materials and manufacturing fundamentals in smaller topic areas and timely feedback for formative as well as summative purposes.

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. The nature of the project may be tailored to suit the students' target award.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Project - Component B		45 %	Design and CAD assignment (project)
Online Assignment - Component B		15 %	E-assessment test 1
Online Assignment - Component B		15 %	E-assessment test 2
Examination - Component A	✓	25 %	Summer Examination (2 hrs) (Final Assessment)
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Project - Component B		75 %	Coursework
Examination - Component A	✓	25 %	Examination (2 hrs)

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will be able to:

	Module Learning Outcomes
MO1	Show an understanding of the design process and the ability to apply them and evaluate their effectiveness
MO2	Show a detailed knowledge and understanding of key principles in materials technology
MO3	Show an understanding of materials properties and the impact of the choice of material and processes on the environment
MO4	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
	MO5	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
	MO6	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

Contact Hours		
	Contact Hours	
	Independent Study Hours:	
	Independent study/self-guided study	264
	Total Independent Study Hours:	264
	Scheduled Learning and Teaching Hours:	
	Face-to-face learning	36
	Total Scheduled Learning and Teaching Hours:	36
	Hours to be allocated	300
	Allocated Hours	300

Reading List	*The reading list for this module can be accessed via the following link:* https://uwe.rl.talis.com/modules/ufmf7c-30-1.html