STUDENT AND ACADEMIC SERVICES

MODULE SPECIFICATION

Part 1: Information			
Module Title	Materials and Structures for Special Applications		
Module Code	UFMF7K-15-3	Level	Level 6
For implementation from	2022-23		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Module type:	Standard		
Pre-requisites	Design, Materials and Manufacturing 2022-23		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Overview: This module provides an opportunity for engineering students to extend their materials science knowledge beyond the introductory (level 1) materials science. Students will encounter the use of advanced materials in variety of engineering applications and related design challenges. The module also Students will also learn about new and future frontiers in materials science and their potential contributions towards sustainability and environmental impact.

Educational Aims: This module provides specialist knowledge on the properties of advanced materials and their current and potential use in engineering applications

Outline Syllabus: Structure-property relations in materials: The atomic model of materials; Application of basic quantum mechanics principles to bonding theory; Levels of structure in materials; Examples of structure-property relations; Principles and processes for the manipulation and control of structure in materials; Failure processes and failure mechanisms in materials

Sandwich structures: Stiffness-limited design; Theory, design, manufacture and application of sandwich structures in motor vehicle and aerospace engineering

Smart materials and smart structures: Definition; Science and principles of smart materials; Smart materials in different materials systems; Current and future applications of smart materials and smart structures

Engineering ceramics: Fabrication, properties and applications; Designing with ceramics; Weibull statistics; Principles of material selection for ultra high temperature and hypersonic applications

Metallurgy of nickel-base super alloys, titanium alloys and intermetallic compounds: Processing, phase transformations, microstructural control and properties; titanium alloy compressor blades; diffusion bonding and superplastic forming; turbine blades; control of creep failure

New frontiers in materials science: Carbon science and technology; Graphene; Nano science and nano technology; Material science frontiers in medicine and biomedical engineering

Teaching and Learning Methods: Concepts and theory will delivered by a lecture to the entire cohort of students supported by small group tutorial sessions. The tutorial sessions will consist of practical materials science activities such as mechanical testing and optical microscopy. Some tutorial sessions will be used for solving tutorial questions, consolidation of theoretical principles using experimental data and for topical materials science discussions.

Part 3: Assessment

Strategy:
The assessment will be carried out under controlled conditions. The assessment questions will be designed to enable demonstration of learning outcomes by asking questions that will test candidates' understanding of relevant scientific and engineering principles. Candidates' understanding will be further tested by questions that involve the application of basic principles in solving both hypothetical and practical problems.

The assessment:
The module will be assessed by a three-hour end-of-semester written examination which will account for 100% of the module. The examination questions will be chosen to cover a broad range of the syllabus.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Examination - Component A	✓	100 %	Written examination (3 hours)
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Examination - Component A	✓	100 %	Written examination (3 hours)

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will achieve the following learning outcomes:

Module Learning Outcomes	**Reference**
Apply scientific principles and methods to identify specific material and structural properties for a range of engineering applications	MO1
Design and analyse sandwich structures using relevant mathematical and engineering principles	MO2
Describe and explain the future potential of smart materials within engineering with special reference to environmental impact and sustainability	MO3
Apply Webull statistics to the analysis of the inter-relationship between manufacturing process, properties and application of engineering ceramics	MO4
Appraise the properties and role of special materials in novel applications and processes	MO5

Contact Hours

Independent Study Hours:

	Independent study/self-guided study	114
	Total Independent Study Hours:	114
	Scheduled Learning and Teaching Hours:	
	Face-to-face learning	36
	Total Scheduled Learning and Teaching Hours:	36
	Hours to be allocated	150
	Allocated Hours	150
Reading List	*The reading list for this module can be accessed via the following link:* https://uwe.rl.talis.com/modules/ufmf7k-15-3.html	

Part 5: Contributes Towards
This module contributes towards the following programmes of study: Automotive Engineering {Foundation} [Sep][SW][Frenchay][6yrs] MEng 2018-19 Automotive Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19 Mechanical Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng 2018-19 Mechanical Engineering {Foundation} [Sep][SW][Frenchay][6yrs] MEng 2018-19