MODULE SPECIFICATION

Part 1: Information			
Module Title	Materials and Structures for Special Applications		
Module Code	UFMF7K-15-3	Level	Level 6
For implementation from	2020-21		
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 2020-21		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Educational Aims: See Learning Outcomes

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 superalloys, 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: Large group teaching session supported by small group tutorial sessions. Study time outside of contact hours will be spent on going through new material, exercises and example problems.

Scheduled learning includes teaching sessions and tutorials.

Independent learning includes hours engaged with essential reading and assessment preparation. These sessions constitute an average time per level as indicated in the table below. Scheduled sessions may vary slightly depending on the module choices you make.

Student contact time: 36 hours
Directed learning: 24 hours
Self-directed learning: 45 hours
Exam preparation: 45 hours
TOTAL: 150 Hours

Part 3: Assessment

Strategy:
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 an 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 (Online) - Component A	✓	100 %	Online Written examination
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Examination (Online) - Component A	✓	100 %	Online Written examination

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
Demonstrate knowledge of scientific principles and methods necessary to underpin their understanding of the role of materials science in their engineering education	MO1
Demonstrate knowledge and understanding of the scientific basis of structure property relationships in materials	MO2
Understand the importance and relevance of sandwich structures in the design of stiffness-limited structures	MO3
Apply relevant mathematical and engineering principles in the design and analysis of sandwich structures	MO4
Demonstrate knowledge and understanding of the scientific principles, applications and future potentials of smart materials	MO5
Critically analyse the inter-relationship between manufacturing process, properties and application of engineering ceramics	MO6
Demonstrate knowledge and understanding of microstructural manipulations and applications of nickel-base superalloys, titanium alloys and intermetallic compounds	MO7
Demonstrate an understanding of the principles underlying advancements in the applications of materials science in such areas as nanotechnology and biomedicine	MO8

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: Mechanical Engineering with Manufacturing {Apprenticeship} [Sep][PT][Frenchay][4yrs] BEng (Hons) 2018-19 Automotive Engineering [Sep][FT][Frenchay][4yrs] MEng 2018-19 Automotive Engineering [Sep][FT][Frenchay][3yrs] BEng (Hons) 2018-19 Mechanical Engineering [Sep][FT][Frenchay][4yrs] MEng 2018-19 Mechanical Engineering [Sep][FT][Frenchay][3yrs] BEng 2018-19 Mechanical Engineering with Manufacturing [Sep][PT][Frenchay][4yrs] BEng (Hons) 2018-19 Mechanical Engineering with Manufacturing {Apprenticeship} [Sep][FT][Frenchay][3yrs] BEng (Hons) 2018-19