University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Materials and Contemporary Manufacturing			
Code: ENGG08001	**SCQF Level: 10 (Scottish Credit and Qualifications Framework)**	**Credit Points: 20**	**ECTS: 10 (European Credit Transfer Scheme)**
School:	School of Computing Engineering and Physical Sciences		
Module Co-ordinator:	Dr Asraf Uzzaman		

Summary of Module

The aim of this module is to provide an understanding in concepts of material science and engineering with reference to an essential element in mechanical design, materials and contemporary manufacturing process selection and the environment.

Students will investigate a range of different types of modern materials. However, emphasis is placed on steel due to its importance in building, automotive and aerospace industry.

An extensive laboratory exercise will be undertaken to determine how, through heat treatment the properties of steel can be modified.

The importance of quality systems is demonstrated in relation to material conformity and manufacturing processes. Whilst the concepts of Industry 4.0/5.0 and Smart Factory will be introduced to ensure the module reflects the most up to date manufacturing practices.

The module will be closely aligned to other Level 8 modules by utilising a real-world example that will be considered as a common theme across other Level 8 modules. The output from these modules will feed forward to further modules in Level 9. Thus, creating a holistic approach to learning within the programme.

During the course of this module students will develop their UWS Graduate Attributes. Academic Universal and Work- ready attributes: Students will gain knowledge and understanding of this important discipline as well as having the opportunity to develop a broad range of technical and transferable skills.

This module has been reviewed and updated, taking cognisance of the University's Curriculum Framework principles. Examples of this are found within the module such as active and engaging practical testing laboratories, module assessment which reflects industry design activities, learning synergies across modules and levels of study, recorded lecture content supporting students to organise their own study time and the use of real-world practical student generated data.

Module Delivery Method					
Face-To-Face	**Blended**	**Fully Online**	**HybridC**	**Hybrid 0**	**Work-Based Learning**
☒	☐	☐	☐	☐	☐
See Guidance Note for details.					

Campus(es) for Module Delivery						
The module will **normally** be offered on the following campuses / or by Distance/Online Learning: (Provided viable student numbers permit) (tick as appropriate)						
Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
☒	☐	☐	☐	☐	☐	

Term(s) for Module Delivery					
(Provided viable student numbers permit).					
Term 1	☐	Term 2	☒	Term 3	☐

Learning Outcomes: (maximum of 5 statements) At the end of this module the student will be able to:	
L1	L1. Apply a comprehensive knowledge of the structure of a variety of materials and explain how their properties may be varied though the addition of other materials or material processing.
L2	Use practical laboratory and workshop skills to investigate heat treatments, failure types and their mechanisms.
L3	Select and apply appropriate materials, engineering technologies and processes, recognising their limitations and the environmental and societal impact of solutions (including the entire life-cycle of a product or process) and minimise adverse impacts.
L4	Discuss the role of quality management systems and continuous improvement associated with materials and manufacturing quality assurance and efficiency.
L5	Communicate effectively on complex engineering matters with technical and non-technical audiences, evaluating the effectiveness of the methods used
Employability Skills and Personal Development Planning (PDP) Skills	

SCQF Headings	During completion of this module, there will be an opportunity to achieve core skills in:
Knowledge and Understanding (K and U)	SCQF Level **8** Demonstrate an extended knowledge of the different types and characteristics of engineering materials Demonstrate a knowledge of primary and secondary manufacturing processes Demonstrate a knowledge of appropriate tools used to monitor and confirm quality assurance and efficiency.
Practice: Applied Knowledge and Understanding	SCQF Level **8** Select appropriate materials and manufacturing methods for a range of consumer products Determine the appropriate method of manufacture for an engineering component Analyse how tolerancing affects assembly and the role quality systems have on the assurance of correct assembly. Analyse the role quality systems have on material conformity. Select and critically evaluate technical literature and other sources of information to solve complex problems
Generic Cognitive skills	SCQF Level **8** Use appropriate quantitative science and engineering tools to the analysis of basic engineering problems. Demonstrate the ability to monitor, interpret and apply the results of analysis and modelling
Communication, ICT and Numeracy Skills	SCQF Level **8** Demonstrate an understanding of the computer techniques available to enhance the communication of engineering ideas and concepts
Autonomy, Accountability and Working with others	SCQF Level **8** Develop an enhanced level of transferable skills that will be of value in working with others in more complex situations Recognise the role and contribution of team members when carrying out and evaluating tasks
Pre-requisites:	Before undertaking this module the student should have undertaken the following:

	Module Code:	**Module Title:**
	Other:	Or equivalent
Co-requisites	**Module Code:**	**Module Title:**

*Indicates that module descriptor is not published.

Learning and Teaching	
The learning and teaching activity for this module include lectures, tutorials and problem based learning.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture/Core Content Delivery	18
Tutorial/Synchronous Support Activity	18
Laboratory	1
Independent Study	163
	Hours Total 200

****Indicative Resources: (eg. Core text, journals, internet access)**
The following materials form essential underpinning for the module content and ultimately for the learning outcomes: Various handout materials Materials: Engineering Science Processing and Design by Michael Ashby et al, 4th Edition ISBN-13:978-0-08-102376-1 (2019) Elangovan, U. (2021). Industry 5.0: The Future of the Industrial Economy (1st ed.). CRC Press. https://doi.org/10.1201/9781003190677 Ajay, , Singh, H., Parveen, , & AlMangour, B. (Eds.). (2023). Handbook of Smart Manufacturing: Forecasting the Future of Industry 4.0 (1st ed.). CRC Press. https://doi.org/10.1201/9781003333760 Callister's Materials Science and Engineering 10th Edition ISBN 978-1-119-45391-8
(**N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements
In line with the Student Attendance and Engagement Procedure: Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time.

Equality and Diversity
The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code.
(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	Engineering and Physical Sciences
Assessment Results (Pass/Fail)	Yes ☐No ☒
School Assessment Board	Engineering
Moderator	Parag Vichare
External Examiner	P Lewis
Accreditation Details	This module is accredited by IMechE as part of BEng (Hons) Mechanical Engineering. and BEng (Hons) Aircraft Engineering programmes.
Changes/Version Number	2.18 (was 2.17) Change of module title to “Materials and Contemporary Manufacturing” to reflect the updating of the content. Module Delivery Changed to Face-To-Face from Hybrid C. Module summary updated to reflect the inclusion of Industry 4.0/5.0 and Smart Factory. Reading list updated to reflect the additional content.

Assessment: (also refer to Assessment Outcomes Grids below)
Assessment Category 1: Unseen Open Book Examination 60%
Assessment Category 2: Portfolio of practical work 40%

(N.B. (i) **Assessment Outcomes Grids** for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed.
(ii) An **indicative schedule** listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

Assessment Outcome Grids (See Guidance Note)

Component 1							
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Learning Outcome (5)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Unseen Closed Book Class Test	✓	✓	✓	✓		60	2

Component 2							
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Learning Outcome (5)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Laboratory/ Clinical/ Field notebook		✓			✓	40	2
Combined Total for All Components						**100%**	**4 hours**