MODULE DESCRIPTION FORM

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

16565 ENGINEERING COMPOSITES

Module Registrar: Dr Barbara A. Keating barbara.keating@strath.ac.uk	**Taught To (Course): Cohorts for whom class is compulsory / optional**		
Other Lecturers Involved:	**Credit Weighting: 10**	**Semester: 2**	
Assumed Prerequisites: Background knowledge of Engineering Materials, Advanced Mechanics of Materials.	**Compulsory/ optional/ class**	**Academic Level: 5**	**Suitable for Exchange: Y**

Module Format and Delivery (HOURS i.e. 1 credit = 10hrs of study):

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	**Total**
20	7				2			71	100

Educational Aim

Composite materials are the optimised combination of modern materials that can provide outstanding properties. This module aims to give a basic understanding of modern composite materials and an appreciation of predictive modelling and design implications when composites are applied to engineering structures. The main composite manufacturing processes will also be outlined.

Learning Outcomes

On completion of the module the student is expected to be able to:

LO1 understand the relationships between the constituents, structure, properties and processing techniques of composites.

LO2 understand micromechanics, classical laminate theory and some of the complexities of laminated systems.

LO3 understand the fundamentals of manufacturing defects, machining and joining, failure mechanisms and damage limitation and repair.

LO4 appreciate the development and use of SMART composites.

Syllabus

The module will teach the following:

Classification and definition of composites.
Fibres and matrices: fibre architecture; thermoplastic and thermosetting matrices.
Composite manufacturing: wet lay-up & compression moulding; filament winding & pultrusion; moulding (e.g. resin transfer moulding); pre-preg; choice of manufacturing route.
Micromechanics of a ply for weight and stiffness calculations as well as for strength calculation
3D constitutive equations and plane stress constitutive equations of a ply
Classical Laminate Theory, ABD matrices and coupling between strain terms
Composite failure mechanisms. Impact failure mechanisms & toughening of composites.
Manufacturing defects. Machining of composites and joint design. Damage limitation and repair.
Characterisation and NDT.
SMART composites.

Assessment of Learning Outcomes

Criteria

For each of the Module Learning Outcomes the following criteria will be used to make judgements on student learning:

LO1:
C1: Demonstrate an understanding of composite constituents: fibres and matrices, and their properties.
C2: The ability to critically evaluate manufacturing techniques and choose an appropriate manufacturing method.
C3: Assessment of the mechanical performance of composites from the given properties of the constituents.

LO2
C1 Describe and calculate the response of composite laminae and laminates to external loading via laminate theory involving matrix construction and manipulation.

LO3
C1 Demonstrate an understanding of manufacturing defects, machining of composites and joining methods.
C2 The ability to critically assess possible failure mechanisms and how failure can be prevented.

LO4
C1 Describe and explain developments in SMART composites.

The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

Principles of Assessment and Feedback
(within Assessment and Feedback Policy at: https://www.strath.ac.uk/staff/policies/academic/)

Immediate self-directed feedback through forums as well as during class discussions.
Feedback will be provided by the return of online quiz marks to students.
Feedback will also be provided at regular tutorial sessions primarily through verbal discussion with individuals or groups on tutorial exercises attempted in advance by students (Note: to receive this feedback, students should participate in these tutorials but attendance is not mandatory).

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

Examination				**PC-based quizzes**		**Practical**		**Project**	
Number	Month(s)	Duration	***Weighting***	Number	***Weighting***	Number	***Weighting***	Number	***Weighting***
1	Apr/May	2hrs	80%	1	20%				
* L01-L04				* LO1-LO4		*		*	

* ***L/Os:*** *Indicate which Learning Outcomes (L01, L02, etc) are to be assessed by exam/coursework/practical/project as required.*

Coursework / Submissions deadlines (*academic weeks*):
Quiz week 8.

Resit Assessment Procedures:
2hr examination in August diet.

PLEASE NOTE:
Students must gain a summative mark of 50% to pass the module. Students who fail the module at the first attempt will be re-assessed during the August diet. This re-assessment will consist entirely of an exam. No marks from any previous attempts will be transferred to a new resit attempt.

Recommended Reading

*****Purchase recommended **Highly recommended reading *For reference**

Please refer to the Reading List on MyPlace.

** "An Introduction to Composite Materials" by D Hull & Clyne T.W., Cambridge University Press

Additional Student Feedback
(Please specify details of when additional feedback will be provided)

Date	Time	Room No
		Check timetable webpages for details

Session: 2020/21

Approved:

Course Director Signature: **Dr Stuart Grey**
Date of Last Modifications: **17 August 2020**

(form Updated August 2020)

MODULE TIMETABLE

Module Code:	**16565**	**Module Title:**	**Engineering Composites**

Brief Description of Assessment:

Examination (80% of overall mark)
1 computer based quiz (via Myplace; 20% of overall mark)

Assessment Timing:-

Indicate on the table below the start/submission dates for each assignment/project and the timing of each exam/assessment using the dropdowns provided. Dropdowns can be left blank. Add extra notes below the dropdowns.

Please note: Timings can and will change, this should only be used as a guide.

Semester One	W&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item.

Semester Two	C&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Online Test	Choose an item. Choose an item.	Choose an item. Choose an item.	None	Exam