

Module specification

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Module Code	AUR699
Module Title	Advanced Materials
Level	6
Credit value	10
Faculty	Faculty of Arts, Computing & Engineering
HECoS Code	101217
Cost Code	GABE

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BEng (Hons) Civil Engineering Degree Apprenticeship	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	12hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	8 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	20 hrs
Placement / work-based learning	0 hrs
Guided independent study	80 hrs
Module duration (total hours)	100 hrs

For office use only	
Initial approval date	3 rd July 2024
With effect from date	September 2024



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Date and details of revision	
Version number	1

Module aims

To provide students with a knowledge of the structure, properties, processing, and applications of composite materials.

The module covers polymer, ceramic and metal matrix composites, and advanced materials to enable student to apply the knowledge in a wide range of applications.

Module Learning Outcomes - at the end of this module, students will be able to:

1	Apply knowledge and demonstrate a critical understanding of the properties of engineering composite materials.
2	Demonstrate the understanding of knowledge and application of the principles, theory of modern engineering materials and evaluate methods for determining mechanical properties.

Assessment

Indicative Assessment Tasks:

This section outlines the type of assessment task the student will be expected to complete as part of the module. More details will be made available in the relevant academic year module handbook.

Assessment One: Individually prepared coursework on the use of composite materials in a given engineering context. (indicative word count: 2,000 words)

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1 & 2	Coursework	100

Derogations

None

Learning and Teaching Strategies

The module will be presented to students through planned lecture series, combined with interactive sessions, workshops and tutorials. An active and inclusive approach is used to engage students in the topics and will involve individual, group work and flipped learning experiences aligned to the university's Active Learning Framework (ALF). The approach offers students a flexible and adaptive learning experience that can accommodate a range of options that includes both on campus learning and remote learning where appropriate.



The Moodle VLE and other on-line materials and resources will be available to support learning. ALF offers a balance between the classroom elements and digitally enabled activity incorporating flexible and accessible resources and flexible and accessible feedback to support learning.

Tutorials – Close interaction with students ensuring that the work presented during lectures has been understood, with specific help being given to overcome any learning problems, should they occur.

Indicative Syllabus Outline

Introduction to composite materials Basic definitions, history of composites, classification, definitions, and scope of composite materials.

Composite materials Polymer-, metal- and ceramic matrix composites. Reinforcements, matrices, and their properties.

Mechanical performance and properties of composites

Mechanical testing and data generation.

Composite failure mechanisms and prediction Basic definitions, failure mechanisms, and ways of predicting a failure.

Composites and environment.

Indicative Bibliography:

Please note the essential reads and other indicative reading are subject to annual review and update.

Essential Reads

Callister, W. (2020), *Materials Science and Engineering*. John Wiley and Sons. 10th Ed.

Other indicative reading

Askeland, D. (2013), *Essentials of Materials Science and Engineering*. SI Edition. Cengage Learning Ed.

Harper, C.A. (2002), *Handbook of Plastics, Elastomers and Composites*. 4th Edition. McGraw Hill.

Mitton, G. (2002), *Theory of Composites*. Cambridge University Press.

Vasiliev, V. (2013), *Advanced Mechanics of Composite Materials and Structural Elements*. 3rd Edition. John Wiley and Sons.

Journal of Materials: Design and Applications IMechE

Journal of Advanced Materials. Wiley

Other indicative reading

Chartered Institute of Architectural Technologists www.ciat.org.uk

Chartered Institute of Building www.ciob.org.uk



Ordnance Survey www.ordnancesurvey.co.uk/

Royal Institution of Chartered Surveyors www.rics.org

Institution of Civil Engineers www.ice.org.uk

Royal Institute of British Architects www.architecture.com

Designing Buildings Wiki www.designingbuildings.co.uk

Institution of Structural Engineers (www.istructe.org.uk)

Other sources:

IHS Database www.ihsti.com