

Module Information

2022.01, Approved

Summary Information

Module Code	7111MECH
Formal Module Title	Advanced Materials and Manufacturing Processes
Owning School	Engineering
Career	Postgraduate Taught
Credits	20
Academic level	FHEQ Level 7
Grading Schema	50

Teaching Responsibility

LJMU Schools involved in Delivery
Engineering

Learning Methods

Learning Method Type	Hours
Lecture	22
Practical	6
Tutorial	22

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
SEP-CTY	CTY	September	12 Weeks

Aims and Outcomes

Aims	To provide a broad understanding of advanced materials, manufacturing technologies and their applications.
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After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Critically review the mechanical and functional performance and applications of a range of advanced materials
MLO2	2	Demonstrate knowledge of the structures, properties of composites and high performance alloys and new development
MLO3	3	Identify benefits and drawbacks of different manufacturing processes for various applications.
MLO4	4	Decide suitable manufacturing processes for given product materials and requirement.
MLO5	5	Select appropriate process conditions for the optimum manufacturing outcomes apply suitable process monitoring methods and control strategies.

Module Content

Outline Syllabus	Structure, properties and applications of engineering materials - metals, polymers, foams, rubbers and composites Advanced materials, applications: composites and high performance alloys The selection of materials on the basis of performance requirements: strength, stiffness, toughness, and energy absorption. New modern materials development Current developments, industrial and fundamental principles of advanced manufacturing technologies - abrasive machining, electrical discharge machining and laser processing. Abrasive machining - fundamentals of the mechanical material removal process, the general concepts of abrasive processing, the abrasive tools and their preparation, the mechanics and thermal behaviour of grinding, and the process monitoring and control strategies for abrasive machining. Electrical discharge machining (EDM) - the fundamental principles of EDM, the material removal mechanism of EDM, tool wear and influential operating parameters. Different implementations of EDM, such as Wire EDM, Sink EDM, and Micro EDM. Laser processing - introduction to the generation and properties of high power laser beams for materials processing, laser processing systems. Introduction to the range of possible laser processing applications. Detailed study of laser welding, laser micromachining and the laser processing of fibre reinforced composite materials.
Module Overview	This module will provide a broad understanding of advanced materials, manufacturing technologies and their applications.
Additional Information	The module is designed to provide broader understanding of advanced materials and manufacturing technologies. Students will appreciate the fundamental principles of these technologies and will be able to apply them in suitable industrial applications. Current development of these technologies will be reviewed in the course.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Centralised Exam	Examination	70	2	MLO1, MLO3, MLO4, MLO5, MLO2
Portfolio	Portfolio 1	30	0	MLO1, MLO4, MLO5

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Xun Chen	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings
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