Liverpool John Moores University

Title:	Advanced Materials and Manufacturing Processes
Status:	Definitive
Code:	**7111MAN** (121995)
Version Start Date:	01-08-2021
Owning School/Faculty:	Engineering
Teaching School/Faculty:	Engineering

Team	Leader
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Academic Level:	FHEQ7	**Credit Value:**	20	**Total Delivered Hours:**	52
Total Learning Hours:	200	**Private Study:**	148		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	22
Practical	6
Tutorial	22

Grading Basis: 50 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS2	Examination	70	2
Portfolio	AS1	Portfolio	30	

Aims

To provide a broad understanding of advanced materials, manufacturing technologies and their applications.

Learning Outcomes

After completing the module the student should be able to:

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

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Examination	1	3	4	5	2
Portfolio 1	1	4	5		

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.

Learning Activities

A combination of lectures, tutorials and practical sessions.

Notes

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.