

## Liverpool John Moores University

Title: MATERIALS AND MANUFACTURE  
Status: Definitive  
Code: **4004ME** (115880)  
Version Start Date: 01-08-2016

Owning School/Faculty: Maritime and Mechanical Engineering  
Teaching School/Faculty: Maritime and Mechanical Engineering

Team	Leader
James Ren	Y
Andy Pettit	

**Academic Level:** FHEQ4      **Credit Value:** 20      **Total Delivered Hours:** 76  
**Total Learning Hours:** 200      **Private Study:** 124

### Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	44
Practical	8
Tutorial	22

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	50	2
Report	AS2	Coursework - Materials Laboratory	25	
Report	AS3	Coursework - Manufacturing Laboratory	25	

### Aims

*To introduce the essential principles of materials science, applications and processing methods of different material groups.*

## Learning Outcomes

After completing the module the student should be able to:

- 1 Review the range of available materials, their applications, processing methods and demonstrate knowledge of the basic structures of different groups of materials
- 2 Relate the properties of engineering materials to their structures and factors affecting materials selection in design.
- 3 Review the range of metal casting processes and know the techniques for preventing defects.
- 4 Demonstrate knowledge of primary metal forming and removal processes including appropriate selection.

## Learning Outcomes of Assessments

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

EXAM	1	2	3
Materials Laboratory	1	2	
Manufacturing Laboratory	3	4	

## Outline Syllabus

*Structure of the atom, Bohr theory.*

*Atomic bonding: primary and secondary bonding and their effects on the material properties*

*Ideal crystalline solids:-basic crystallography and its influence on mechanical and physical properties.*

*Classification of engineering materials: metals, ceramics, polymers and composites and typical applications.*

*Mechanical properties: Destructive tests; tensile, hardness, ductile and brittle failure.*

*Analysis and interpretation of test data.*

*Material selection: Introduction to computer-based techniques for material selection.*

*Classification of materials processing methods: forming, shaping and processing.*

*Casting processes:-Fluid flow and solidification. Mould design. Prevention of casting defects. Developments in casting processes.*

*Metal cutting processes:-Milling, turning and grinding theory, preparation of data and tool selection.*

*Fundamentals of moulding processes of plastics and composites:*

## Learning Activities

A series of lectures supported by seminars, tutorials, practical laboratory work and group exercises.

## **Notes**

This module covers the essential elements of materials science and manufacturing technology required by engineers studying mechanical, marine, design and automobile disciplines