

## Liverpool John Moores University

Title: Materials and Manufacture  
Status: Definitive  
Code: **4502ENGICA** (119085)  
Version Start Date: 01-08-2018

Owning School/Faculty: Engineering  
Teaching School/Faculty: HICOM University College Sdn,Bhd

Team	Leader
Russell English	

**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
Essay	AS1	Materials Laboratory/Coursework.	25	
Essay	AS2	Manufacturing Laboratory/Coursework	25	
Exam	exam		50	2

### 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:

Materials	1	2		
Lab/Coursework				
lab/coursework	3	4		
exam	1	2	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.

<b>Course Material</b>	Book
<b>Author</b>	Callister,W.D. & Rethwisch, D.G.

<b>Publishing Year</b>	2009
<b>Title</b>	Materials science and engineering : an introduction
<b>Subtitle</b>	
<b>Edition</b>	8th
<b>Publisher</b>	Wiley
<b>ISBN</b>	9780470419977

<b>Course Material</b>	Book
<b>Author</b>	Bolton, W.
<b>Publishing Year</b>	1989
<b>Title</b>	Engineering Materials Technology
<b>Subtitle</b>	
<b>Edition</b>	3rd
<b>Publisher</b>	Heinemann Newnes
<b>ISBN</b>	0-434-90186-5

<b>Course Material</b>	Book
<b>Author</b>	John, V.
<b>Publishing Year</b>	1992
<b>Title</b>	Introduction to Engineering Materials
<b>Subtitle</b>	
<b>Edition</b>	3rd
<b>Publisher</b>	Macmillan
<b>ISBN</b>	0-333-12465-0

<b>Course Material</b>	Book
<b>Author</b>	Kalpakjian, S. and Schmid, S.R.
<b>Publishing Year</b>	2006
<b>Title</b>	Manufacturing Engineering and Technology
<b>Subtitle</b>	
<b>Edition</b>	5th
<b>Publisher</b>	Prentice Hall
<b>ISBN</b>	9780201361315

<b>Course Material</b>	Book
<b>Author</b>	Lindberg, R.A.
<b>Publishing Year</b>	1990
<b>Title</b>	Processes and Materials of Manufacture
<b>Subtitle</b>	
<b>Edition</b>	4th
<b>Publisher</b>	Allyn and Bacon
<b>ISBN</b>	0-205-12031-8

<b>Course Material</b>	Book
<b>Author</b>	Beddoes, J. and Bibby, M.J.
<b>Publishing Year</b>	1999
<b>Title</b>	Principles of Metal Manufacturing Processes

<b>Subtitle</b>	
<b>Edition</b>	
<b>Publisher</b>	Arnold
<b>ISBN</b>	0-201-51650-0

<b>Course Material</b>	Book
<b>Author</b>	Ashby M., Johnson K.
<b>Publishing Year</b>	2009
<b>Title</b>	Materials and design: the art and science of material selection in product design
<b>Subtitle</b>	
<b>Edition</b>	2nd
<b>Publisher</b>	Butterworth
<b>ISBN</b>	9781856174978

## Notes

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