Liverpool John Moores University

Title:	MECHANICS AND PROPERTIES OF MATERIALS
Status:	Definitive
Code:	**6065ENG** (105839)
Version Start Date:	01-08-2016
Owning School/Faculty:	Maritime and Mechanical Engineering
Teaching School/Faculty:	Maritime and Mechanical Engineering

Team	Leader
Glynn Rothwell	Y

Academic Level:	FHEQ6	**Credit Value:**	12	**Total Delivered Hours:**	69
Total Learning Hours:	120	**Private Study:**	51		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	40
Practical	6
Tutorial	20

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	3
Essay	AS2	Laboratory based assignment 1	15	
Essay	AS3	Laboratory based assignment 2	15	

Aims

To enable students to develop an advanced understanding of the analysis and expected performance of engineering materials.

Learning Outcomes

After completing the module the student should be able to:

1 Apply energy principles to analyse engineering structures subjected to complex loading.
2 Apply the general equations of linear elasticity to the solution of axisymmetric stress problems.
3 Undertake limit load and plastic analysis of engineering structures.
4 Apply the principles of fracture mechanics and fatigue theory to engineering structures.
5 Apply a range of techniques for improving engineering properties of materials.
6 Analyse the mechanisms involved in the common modes of material failure.
7 Relate how the properties and behaviour of materials govern their design and manufacture through consideration of the basic mechanisms involved.
8 Evaluate alternative and novel material processing methods.

Learning Outcomes of Assessments

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

EXAM	1	2	3	4	5	6	7	8
CW	1	2	3	4				
CW	5	6	7	8				

Outline Syllabus

Energy methods, principle of virtual work - application to frameworks and flexurally loaded members.
General theory of linear-elasticity and its application to axisymmetric problems.
Plastic analysis of structures, limit loads.
Fracture mechanics, energy approach and stress intensity factor approach, plastic correction, sub-critical crack growth, post yield fracture, test methods, failure assessment diagrams.
Strengthening effects in materials, developments in alloying heat treatment, high performance alloys.
Structure, properties and application of engineering polymers, composite and ceramic materials. Performance of materials in service and structural considerations.
Characteristics of failures in materials, ductile/brittle transition, oxidation and corrosion, stress corrosion, corrosion fatigue, liquid metal embrittlement, crazing and degradation of polymers, creep, stress relaxation.
Advances in materials processing and joining, design for shape and joining.

Learning Activities

Lectures, tutorials and practicals.

Notes

The module will provide an in depth understanding of the analysis and performance of materials.