

Liverpool John Moores University

Title: ENGINEERING PRINCIPLES
Status: Definitive
Code: **4019ENG** (105465)
Version Start Date: 01-08-2016

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

Team	Leader
Russell English	Y

Academic Level: FHEQ4 **Credit Value:** 24 **Total Delivered Hours:** 54
Total Learning Hours: 240 **Private Study:** 186

Delivery Options

Course typically offered: Semester 1

Component	Contact Hours
Lecture	24
Practical	4
Tutorial	24

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	50	2
Essay	AS2	Computer based assignments	30	
Essay	AS3	Integrating assignment	20	

Aims

To introduce the essential principles of engineering science and materials.

Learning Outcomes

After completing the module the student should be able to:

- 1 apply the principles of kinematics to problems of motion
- 2 apply Newton's laws of motion to the solution of problems in dynamics
- 3 apply the principles of work, energy and power to the solution of engineering problems
- 4 apply the principles of impulse and momentum to the solution of engineering problems
- 5 apply principles of steady state DC circuit analysis to resistive circuits
- 6 use complex notation in analysis of simple inductive and capacitive circuits
- 7 relate the properties of engineering materials to their basic structure
- 8 review the range of available materials and their engineering application

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	5					
CW	1	2	8					

Outline Syllabus

Kinematics of solid bodies. Linear and angular motion with uniform acceleration.

Graphical representation of data.

Dynamics of solid bodies. Newton's laws of motion. Application to linear and angular motion and connected systems.

Work, power and energy. Conservation of energy. Application to relevant problems.

Impulse and momentum. Conservation of momentum. Application to relevant problems.

Fundamental notations and relations. Ohms Law, measurement of voltage, current and resistance.

Kirchoff's laws, series and parallel circuit equivalences.

Semiconductors, intrinsic, P and N types, simple diode action.

Capacitance, Inductance, initial and steady state. Transformer action. Self inductance.

Alternating current fundamentals, period, frequency and angular frequency. Peak, rms and instantaneous values. Complex representation of sinusoidal quantities.

Phasors. Series and Parallel AC circuits, RL, RC and RLC circuits.

Structure of the atom, Bohr theory. Atomic bonding:- ionic, covalent, metallic.

Structure of materials: atomic and molecular structures - effects on microscopic and macroscopic properties. Classification of engineering materials - metals, ceramics and polymers.

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

Learning Activities

A series of lectures supported by tutorials and practical laboratory work.

Notes

This module covers the essential elements of engineering science and materials required by engineers in both electrical and mechanical engineering disciplines.