Liverpool John Moores University

Title:	ENGINEERING MECHANICS
Status:	Definitive
Code:	**5509ENGHAL** (106672)
Version Start Date:	01-08-2016
Owning School/Faculty:	Maritime and Mechanical Engineering
Teaching School/Faculty:	Riverside College

Team	Leader
Russell English	Y

Academic Level:	FHEQ5	**Credit Value:**	24	**Total Delivered Hours:**	51
Total Learning Hours:	240	**Private Study:**	189		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	30
Practical	8
Tutorial	10

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	3
Essay	AS2	Laboratory report x 2 (thermofluids)	15	
Essay	AS3	Laboratory report x 2 (mechanical)	15	

Aims

To acquire the ability to appraise basic engineering structures, machine elements, thermal power producing plant and fluid flow regimes.

Learning Outcomes

After completing the module the student should be able to:

1	identify possible modes of failure associated with specific machine and structural elements in order to facilitate a safe design
2	employ stress/strain transformations in two dimensions to solve practical engineering problems.
3	predict failure of materials and structures under load.
4	employ the principles of mechanical vibrations for the appraisal of engineering problems.
5	recall the significance of the irreversibilities in thermodynamic processes.
6	calculate the change in entropy for reversible and irreversible processes.
7	use tables and charts of properties of vapours and employ them to solve thermodynamic problems
8	appraise the basic thermodynamic cycles with either gas, steam or refrigerant as the working fluid.
9	use dimensional analysis to simplify problems in fluid mechanics.
10	Calculate whether a flow is laminar or turbulent.

Learning Outcomes of Assessments

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

EXAM	1	2	3	4	5	6	7	8	9	10
CW	5	6	7	8						
CW	2	4								

Outline Syllabus

Overview of modes of failure : fracture due to static overload, yield under static loading (gross plastic deformation), buckling in columns, excessive deformation, fatigue fracture, creep failure, failure due to combined effect of stress and corrosion, failure due to impact loading or thermal shock.

Stress analysis : 2-d stress / strain transformation equations , Mohr's circles for stress and strain. Application to thin walled vessels.

Modes of failure: yielding (Rankine, Tresca, von Mises), fatigue (S-N curves, factors affecting endurance limit, effect of mean stress, effect of load spectrum on cumulative damage).

Mechanical vibrations : Free and forced vibrations. Effect of damping. Force transmissibility and vibration isolation. Suspension systems.

Thermodynamics : Brief introduction to the Second Law of Thermodynamics, Reversibility, Carnot Theorem, Entropy, Isentropic efficiency of turbines and compressors. Properties of vapours, use of property tables and charts. Introduction to cycles for power production, Carnot, Rankine, Joule cycles, criteria of

performance. Basic vapour compression refrigeration & heat pumps. Introduction to 1-D heat transfer (plane conduction & films).

Fluid Mechanics : Introduction to dimensional analysis, Rayleigh and Buckingham methods. model testing. Newton's Law of viscosity, dynamic and kinematics viscosity. Laminar and turbulent flow in pipes, Reynold's Number, friction factor, D'Arcy equation, Moody Chart.

Learning Activities

Lectures, tutorials and practical sessions

Notes

To acquire the ability to analyse basic engineering structures, machine elements, thermal power producing plant, heat transfer, refrigeration and fluid flow regimes.