Liverpool John Moores University

Title:	Thermodynamics and Fluid Mechanics
Status:	Definitive
Code:	**4504MTC** (125780)
Version Start Date:	01-08-2019
Owning School/Faculty:	Maritime and Mechanical Engineering
Teaching School/Faculty:	Maritime and Mechanical Engineering

Team	Leader
Jack Mullett	Y

Academic Level:	FHEQ4	**Credit Value:**	20	**Total Delivered Hours:**	48
Total Learning Hours:	200	**Private Study:**	152		

Delivery Options
Course typically offered: Non Standard Year Long

Component	Contact Hours
Online	36
Tutorial	10

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS2	Examination	60	2
Test	AS1	Virtual learning environment tests	40	

Aims

To introduce the essential principles of Thermodynamics and Fluid Mechanics

Learning Outcomes

After completing the module the student should be able to:

1	Apply the laws of thermodynamics to open and closed systems
2	Analyse heat and work transfers during Thermodynamic processes and cycles.
3	Analyse hydrostatics and fluid flow.
4	Apply the governing equations of fluid dynamics for simplified flow.

Learning Outcomes of Assessments

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

Examination	1	2	3	4
V.L.E. test	1	2	3	4

Outline Syllabus

Thermodynamic definitions:- states, processes, paths, cycles, open and closed systems, pressure, temperature, energy-heat and work transfers.
Concepts of work, energy and power.
Zeroth and First Laws of Thermodynamics, application of the First Law - Non Flow and Steady Flow Energy Equations (NFEE & SFEE), internal energy, enthalpy.

Equations of state of perfect gases and real gases.
Analysis of Thermodynamic processes.
Properties of mixtures, Gibbs-Dalton laws.
Properties of vapours, steam calculations using tabulated data and charts.
Brief introduction to the Second Law of Thermodynamics and entropy.

Fluid Mechanics definitions:- pressure, density, dynamic/kinematic viscosity, static and dynamic fluid flow.
Hydrostatics:- manometry, forces of submerged surfaces, buoyancy.
Introduction to fluid dynamics and dimensional analysis.
Visualisation methods of fluid flow, stream lines and stream tubes.

Bernoulli's equation and continuity of flow for incompressible fluids.
Laws of conservation applied to Fluid Flow.
Applications of conservation of energy, conservation of mass and conservation of momentum equations.
Brief introduction to losses in pipe fluid flow.

Learning Activities

A combination of online lectures and tutorials and campus based tutorials.

Notes

This module introduces some of the most important fundamental ideas behind the development of core engineering disciplines of thermodynamics and fluid mechanics.

The module runs as a non-standard year long module, specifically over semesters 2 and summer.