

## Liverpool John Moores University

Title: Thermodynamics and Fluid Mechanics 1  
Status: Definitive  
Code: **4509USST** (126435)  
Version Start Date: 01-08-2021

Owning School/Faculty: Engineering  
Teaching School/Faculty: University of Shanghai For Science and Technology

Team	Leader
Jack Mullett	Y

**Academic Level:** FHEQ4      **Credit Value:** 20      **Total Delivered Hours:** 68  
**Total Learning Hours:** 200      **Private Study:** 132

### Delivery Options

Course typically offered: Semester 2

Component	Contact Hours
Lecture	44
Tutorial	22

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS2	Examination	60	2
Test	AS1	In course 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
In course tests	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 lectures, tutorials and practical demonstrations.

## Notes

This module introduces some of the most important fundamental ideas behind the development of core engineering disciplines of thermodynamics and fluid mechanics. The content sets the framework for further study during levels 5, 6 & 7.

The module is supported by tutorial work which will help develop the necessary understanding and skill required of an engineering student.