Module Proforma

Approved, 2022.01

Summary Information

Module Code	4517USST
Formal Module Title	Thermodynamics and Fluid Mechanics 1
Owning School	Engineering
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 4
Grading Schema	40

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Dante Matellini	Yes	N/A

Module Team Member

Contact Name	Applies to all offerings	Offerings

Partner Module Team

Contact Name	Applies to all offerings	Offerings

Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

Partner Teaching Institution

Institution Name
University of Shanghai For Science and Technology

Learning Methods

Learning Method Type	Hours
Lecture	22
Tutorial	22

Module Offering(s)

Offering Code	Location	Start Month	Duration
JAN-PAR	PAR	January	12 Weeks

Aims and Outcomes

Aims	The module aims to introduce the essential principles of thermodynamics and fluid mechanics.

Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Apply the laws of thermodynamics to open and closed systems.
MLO2	Analyse heat and work transfers during thermodynamic processes and cycles.
MLO3	Analyse hydrostatics and fluid flow.
MLO4	Apply the governing equations of fluid dynamics for simplified flow.

Module Content

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 ideal/perfect gases and real gases, and 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, streamlines 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.

Module Overview

Additional Information
This module provides students with knowledge of the fundamental principles and theories of energy transfer and fluid phenomena. These concepts are applied in simplified examples of sustainable and renewable electrical energy generation that include Geothermal and Hydroelectric power stations. This module includes content which relates to the following UN Sustainable Development Goals: SDG7 – Affordable and Clean Energy SD13 – Climate Action

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping

Exam	Examination	60	2	MLO1, MLO2, MLO3, MLO4
Test	VLE Test	40	0	MLO1, MLO2, MLO3, MLO4