Liverpool John Moores University

Title:	Thermodynamics and Fluid Mechanics 2
Status:	Definitive
Code:	**5505USST** (126439)
Version Start Date:	01-08-2021
Owning School/Faculty:	Engineering
Teaching School/Faculty:	University of Shanghai For Science and Technology

Team	Leader
Allan Carrier	Y
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Academic Level:	FHEQ5	**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 provide an insight into thermal plant cycles and the physical behaviour of fluid flow and heat transfer by application of the theory to practical engineering examples.

Learning Outcomes

After completing the module the student should be able to:

1 Analyse thermal vapour plant cycles
2 Examine gas power plant cycles and combustion processes
3 Apply the governing equations for modes of heat transfer
4 Analyse flow in pipe networks and behaviour of compressible fluids

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

The second law of thermodynamics and entropy.
Steam power plant, energy balances and cycle improvements.
T-S diagrams and entropy changes for gases, vapours and liquids.
Refrigeration, heat pumps, properties of refrigerants and operating cycles.

Gas turbines cycle analysis, methods of efficiency improvements and application to combined heat and power plant.
IC Engines:- Spark/compression ignition, two/four stroke, operating cycles.
Stoichiometry:- combustion, exhaust emissions and associated pollution.

Modes of heat transfer:- conduction, convection and thermal radiation.
Multimode/2D heat transfer.
Introduction to types of heat exchangers:- plate, compact, shell and tube.
Log mean temperature difference (LMTD) method of heat exchanger analysis.

Laminar and turbulent pipe flow, friction and minor losses in pipes and pipe networks.
Pumps and pump characteristic curves.
Descriptive treatment of real fluid flow.
1-d compressible flow. Mach no., isentropic flow, stagnation conditions, use of tables. Flow through nozzles. Choked conditions. Critical pressure ratio.

Learning Activities

A combination of lectures and tutorials.

Notes

This module continues the development of the fundamental ideas behind the development of core engineering disciplines of thermodynamics and fluid mechanics.

Further the student will be exposed to real engineering calculation and the performance analysis of thermal plant.
The module is supported by tutorial work which will help develop the necessary understanding and skill required of an engineering student.