Liverpool John Moores University

Title:	THERMODYNAMICS, HEAT PUMPS & ENGINES
Status:	Definitive
Code:	**4508NCCG** (129487)
Version Start Date:	01-08-2021
Owning School/Faculty:	Engineering
Teaching School/Faculty:	Nelson Campus

Team	Leader
Christian Matthews	Y

Academic Level:	FHEQ4	**Credit Value:**	20	**Total Delivered Hours:**	60
Total Learning Hours:	200	**Private Study:**	140		

Delivery Options
Course typically offered: S1, S2, Sum, NS2 (S2 for Jan)

Component	Contact Hours
Lecture	48
Practical	12

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	Assignment	Assignment	100	

Competency	NCC Group Pass/Fail

Aims

This module introduces students to the principles and concepts of thermodynamics and its application in modern engineering. On successful completion of this module students will be able to investigate fundamental thermodynamic systems and their properties, apply the steady flow energy equation to plant equipment, examine the principles of heat transfer to industrial applications, and determine the performance of internal combustion engines.

Learning Outcomes

After completing the module the student should be able to:

1 Investigate fundamental thermodynamic systems and their properties.
2 Apply the Steady Flow Energy Equation to plant equipment.
3 Examine the principles of heat transfer to industrial applications.
4 Determine the performance of internal combustion engines.

Learning Outcomes of Assessments

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

Assignment	2	3	4
NCC Group Pass/Fail	1		

Outline Syllabus

Revision: of energy, laws of thermodynamics, gas laws
Introduction to concept of entropy
Polytrophic processes: constant pressure, constant volume, adiabatic and isothermal systems
Diagramatic methods: PV and TS
Steady Flow Energy analysis
Heat transfer: modes, use of U and k values, heat exchangers, regenerators, heat losses from pipes, optimal lagging
Internal combustion engines: Otto, Diesel and Carnot cycles, applications of theory to practical applications, efficiency
Other devices: heat pumps, Stirling cycle

Learning Activities

Lectures

These will not normally be traditional didactic lectures in which the student plays little active part, but will be delivered in small groups of up to 20 students in which their interaction with their tutor is a key ingredient of their learning experience.

The material of this module requires the development of significant practical skill. This will be taught within the lecture time, making these sessions a blend of lecture and workshop time. The sessions will be timetabled in spaces with physical resources appropriate to the delivered content.

Students will receive approximately 30 hours of taught material, supported by in-class exercises and discussions designed to help student assimilate learning and to provide early informal feedback on their progress.

Practical Work

This module contains directed practical work that students will undertake under the supervision of teaching staff and/or technicians. Some elements of this practical work will form part of the assessment for this module.

Independent Study

Students are expected to undertake personal reading and research into topic areas that have been stimulated from the lectures and seminars. This reading will enhance their academic work and enable valid contribution to lectures and seminars.

VLE support

This will provide links to academic web-sites and on-line journals, facilitate group discussion outside of the classroom, access to outline lecture notes, and provide students with assessment details.

Notes

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