Module Specification

Module Summary Information

1	**Module Title**	Thermodynamics and Fluid Mechanics
2	**Module Credits**	20
3	**Module Level**	5
4	**Module Code**	ENG5098

5	**Module Overview**

The module aims to provide a basic understanding of thermodynamic and fluid mechanic concepts. The understanding of the transfer of energy within thermodynamic systems and the incurred losses is vital to improve efficiencies of such systems, especially in light of growing environmental concerns and increased economic cost.

The knowledge and understanding will be gained through a balanced mixture of lectures and tutorials, whereby the learning will be supported by experiments.

6	**Indicative Content**

Introduction to Thermodynamic
Concepts and definitions, open and closed systems, state, process, properties, phases, units, 1st law of thermodynamic, energy conservation, enthalpy, 2nd law of thermodynamics, pure substance with / without phase change, ideal gases, specific heats, internal energy, enthalpy, entropy, process of ideal gases, gas laws

Heat Engines and Heat Pumps
heat engine concept, thermodynamic cycles for power and refrigeration (Carnot cycle), COP, thermodynamic cycles and processes, poly-tropic relations, adiabatic / reversible processes, efficiencies, air standard cycles (Carnot, Otto, Diesel, Dual), thermodynamic properties and diagrams. use of thermodynamic properties of fluid tables

Fluid Mechanics
flow energy, non-flow energy equation & steady flow energy equation, fluid motion and momentum, continuity and Bernoulli equation, fluid parameters and flow conditions, laminar and turbulent flow, flow in pipes, friction factors, head loss, pressure and temperature measurement

Heat Transfer
Heat transfer and heat exchangers

7	Module Learning Outcomes On successful completion of the module, students will be able to:	
	1	Calculate thermal properties and energy transfers for non-flow and steady flow processes.
	2	Apply the basic laws of thermodynamics to solve engineering problems involving energy conservation and heat transfer.
	3	Use laboratory instrumentation to measure characteristics of basic thermal systems.
	4	Understand the basic ideal cycles and the performance criteria for engines.

8	Module Assessment		
Learning Outcome			
	Coursework	Exam	In-Person
1-4		X	

9	Breakdown Learning and Teaching Activities	
Learning Activities		Hours
Scheduled Learning (SL) includes lectures, practical classes and workshops, peer group learning, Graduate+, as specified in timetable		48
Directed Learning (DL) includes placements, work-based learning, external visits, on-line activity, Graduate+, peer learning, as directed on VLE		0
Private Study (PS) includes preparation for exams		152
Total Study Hours:		200