ENGY H2004: Thermodynamics 1

Module Title:	Thermodynamics 1
Language of Instruction:	English

Credits:	10

NFQ Level:	6

Module Delivered In	2 programme(s)

Module Aim:	To provide students with an understanding of the processes associated with the generation and consumption of energy in engineering systems

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Determine and describe the thermodynamic properties of fluids.
LO2	Apply the laws of thermodynamics to engineering problems.
LO3	Apply laws of heat transfer and conduction to engineering problems.
LO4	Analyse simplified thermodynamic models of representative systems in order to determine the steady state performance of such systems.
LO5	Quantify, by calculation and experimental measurement, the characteristics of thermodynamic processes.

Pre-requisite learning
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*
No recommendations listed
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*
No requirements listed

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Module Content & Assessment

Indicative Content
Thermodynamics Work, heat, energy. Thermodynamic properties, state of a gas, The gas laws. Steady state energy equation, Properties of fluids, Determining properties of fluids from charts and tables.
Steam Generation and Processes Boilers, Turbines, Condensers, Steam distribution and condensate recovery.
Fuels and combustion Stoichiometric combustion, Products of combustion and air-to-fuel ratio, Gaseous and liquid/solid fuels, Higher and lower calorific values, Effect of moisture content.
Heat Engines & Power Generation Carnot cycle, Rankine cycle, Brayton cycle, Gas turbines system, Steam Reheat & Regeneration cycles, Combined Heat and Power.
Refrigeration & Heat Pumps Simple and practical cycles, Refrigeration components.
Heat Transfer Newton's law of cooling, Fourier's law of conduction, Conductance of solid slab, Conductance of boundary layer, Heat losses from rooms and pipes.
Heat gains to buildings Heat gains and losses due to conduction and convection, Solar heat gains to buildings.

Assessment Breakdown	%
Continuous Assessment	10.00%
Practical	30.00%
End of Module Formal Examination	60.00%

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Examination	Class Test	1,2,4	10.00	Week 6

No Project

Practical

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Labs: Gas Laws, Themal Expansion, Conductivity, Radiation (leslie cube), Steam Generator efficiency, Steam Turbine, Refrigerator, Bomb Calorimeter, Surface heat transfer coefficient. Reports and Assessment	1,2,3,4,5	20.00	n/a
Practical/Skills Evaluation	Computer Competencies Assignment	1,2,3,4	10.00	n/a

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	n/a	1,2,3,4	60.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

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Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lecture	12 Weeks per Stage	6.00
Laboratory	12 Weeks per Stage	2.00
Independent Learning	15 Weeks per Stage	10.27
	Total Hours	250.00

Module Delivered In

Programme Code	Programme	Semester	Delivery
CW_EMMEC_B	Bachelor of Engineering (Honours) in Mechanical Engineering	4	Mandatory
CW_EEMEC_D	Bachelor of Engineering in Mechanical Engineering	4	Mandatory