Title:	Thermofluids 2 APPROVED
Long Title:	Thermofluids 2

Module Code:	MECH6033	**Duration:**	1 Semester

Credits:	5
NFQ Level:	Fundamental
Field of Study:	Mechanical Engineering
Valid From:	Semester 1 - 2016/17 (September 2016)
Module Delivered in	**5 programme(s)**
Module Coordinator:	GER KELLY
Module Author:	MARIA KAVANAGH
Module Description:	This module offers the learner a comprehensive introduction to thermal processes and thermodynamic cycles. The module also covers the fundamentals of fluid flow.

Learning Outcomes	
On successful completion of this module the learner will be able to:	
LO1	Define performance characteristics of an internal combustion engine.
LO2	Calculate work and heat transfers in thermodynamic processes.
LO3	Describe the function of main components in a steam power plant.
LO4	Use Bernoulli's equation and calculate pressure drops in pipe flow.
LO5	Conduct lab experiments in thermofluids as part of a team in a safe and appropriate manner and produce individual reports.

Pre-requisite learning
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module. You may not earn additional credit for the same learning and therefore you may not enrol in this module if you have successfully completed any modules in the incompatible list.*
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. You may not enrol on this module if you have not acquired the learning specified in this section.*
No requirements listed
Co-requisites
No Co Requisites listed

Module Content & Assessment

Indicative Content
Internal combustion engines and combustion of fuels Engine types, performance assessment, thermal and mechanical efficiency, indicated and brake power, specific fuel consumption,indicator diagrams,Otto cycle. Fuels, basic combustion equations,air-fuel ratios, excess air.
Thermal processes and cycles Isothermal, adiabatic, polytropic,constant volume processes, work done and heat transfer. P-V diagrams. Thermodynamic cycles. Non flow eneregy equation. The concept of the heat engine. Carnot cycle. The First and Second Laws of Thermodynamics. Entropy.
Steam Power Plant Introduction to steam plant components and Rankine cycle. Superheating, steam tables, overall plant efficiency,
Fluid Flow Types of flow, continuity equation, Bernoulli's equation, viscosity, pressure drop in pipe flow.
Laboratory Programme Safety lecture. Report writing lecture. Practical experiments from the following list;Steam Plant Overview, Air Compressor, Refrigeration -Basic Cycle, Gear Pump, Venturi Meter,Pipe Losses.

Assessment Breakdown	%
Course Work	40.00%
End of Module Formal Examination	60.00%

Course Work

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Short Answer Questions	In class assessment	1,2	10.0	Week 6
Short Answer Questions	In class assessment	2,4	10.0	Week 11
Written Report	Lab experiments	5	20.0	Every Second Week

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	End-of-Semester Final Examination	1,2,3,4	60.0	End-of-Semester

Reassessment Requirement

Repeat examination
Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.

The institute reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time				
Workload Type	*Workload Description*	*Hours*	*Frequency*	*Average Weekly Learner Workload*
Lecture	Lecture	3.0	Every Week	3.00
Lab	Lab experiments	1.0	Every Week	1.00
Independent & Directed Learning (Non-contact)	Self directed learning and problem solving	2.0	Every Week	2.00
Tutorial	Tutorial	1.0	Every Week	1.00
			Total Hours	7.00
			Total Weekly Learner Workload	7.00
			Total Weekly Contact Hours	5.00

Workload: Part Time				
Workload Type	*Workload Description*	*Hours*	*Frequency*	*Average Weekly Learner Workload*
Lecture	Lecture	3.0	Every Week	3.00
Lab	Lab Experiments	1.0	Every Week	1.00
Independent & Directed Learning (Non-contact)	Self Directed Learning	3.0	Every Week	3.00
			Total Hours	7.00
			Total Weekly Learner Workload	7.00
			Total Weekly Contact Hours	4.00

Module Resources

Recommended Book Resources

- **Subrata Bhattacharjee 2015, *Thermodynamics: An Interactive Approach, Global Edition*, Global Edition Ed., Pearson Ed. [ISBN: 9781292113746]**
- **T. D. Eastop, A. McConkey 1996, *Applied thermodynamics for engineering technologists*, 5th Ed., Pearson Education Limited [ISBN: 9780582091931]**
- **Douglas, Gasiorek, Swaffield & Jack 2011, *Fluid Mechanics*, 6th Ed., Prentice Hall UK [ISBN: 13-273717720]**

Supplementary Book Resources

- **Yunus A. Cengel, Robert H. Turner 2011, *Fundamentals of thermal-fluid sciences*, 4th Ed., McGraw-Hill Education Boston [ISBN: 978-007742240]**

This module does not have any article/paper resources

This module does not have any other resources

Module Delivered in

Programme Code	Programme	Semester	Delivery
CR_ESENT_8	Bachelor of Engineering (Honours) in Sustainable Energy Engineering	4	Mandatory
CR_EMANF_7	Bachelor of Engineering in Manufacturing Engineering	4	Mandatory
CR_EMECH_7	Bachelor of Engineering in Mechanical Engineering	4	Mandatory
CR_EMECH_6	Higher Certificate in Engineering in Mechanical Engineering	4	Mandatory
CR_EMECN_7	Parttime - Bachelor of Engineering in Mechanical Engineering	4	Group Elective 1