



Title:	Thermofluids 3 APPROVED	
Long Title:	Thermofluids 3	
Module Code:	INTR7009	
Credits:	5	
NFQ Level:	Intermediate	
Field of Study:	Interdisciplinary Engineering	
Valid From:	Semester 1 - 2016/17 (September 2016)	
Module Delivered in	3 programme(s)	
Module Coordinator:	GER KELLY	
Module Author:	GER KELLY	
Module Description:	SFEE. Heat transfer and heat exchanger operations. Assessment of power systems, generation, fuels and energy conversion. Refrigeration and heat pumps. Flow Measurement. Hydraulic machinery turbines and pumps.	
Learning Outcomes		
<i>On successful completion of this module the learner will be able to:</i>		
LO1	Calculate the heat transfer rates from heat exchangers and other engineering applications.	
LO2	Examine by way of a written report the key factors affecting the selection of energy conversion mechanisms.	
LO3	Evaluate the operation and performance indicators of equipment associated with heating, cooling, ventilation and air conditioning thermofluid processes.	
LO4	Conduct lab experiments in thermofluids as part of a team in a safe and appropriate manner and produce individual professional reports detailing the results, analysis and conclusions which arise	
Pre-requisite learning		
Module Recommendations		
<i>This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named CIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).</i>		
9594	MECH6033	Thermofluids 2
Incompatible Modules		
<i>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.</i>		
No incompatible modules listed		
Co-requisite Modules		
No Co-requisite modules listed		
Requirements		
<i>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.</i>		
No requirements listed		
Co-requisites		
No Co Requisites listed		

Module Content & Assessment

Indicative Content

Heat transfer

Review of conduction, convection and radiation. Thermal Resistances. Radiative Properties.

Heat Exchangers

Types, construction, operational conditions. Selection. LMTD and NTU & E Methods.

Combustion and Fuels

Basic Equation. Reactants and Products.

Refrigeration and Heat Pumps

pH diagram. Cycles. COP. Refrigerants.

Energy Studies

Energy sources, uses and conversion. Energy Management. Future Options

Flow Measurement

Weirs, orifice plates, venturis, others.

Hydrodynamic Machinery

Introduction to pumps types, operation and performance. Turbine types.

Lab Programme

Report Writing. Experimental Methods. (Thermal Imaging, Heat Exchanger, Refrigeration, Pump, Flow Measurement.)

Assessment Breakdown

	%
Course Work	30.00%
End of Module Formal Examination	70.00%

Course Work

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	lab programme	3,4	10.0	Every Week
Presentation	energy options article/poster	2	10.0	Week 9
Short Answer Questions	mid semester test	1,3	10.0	Week 5

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	End-of-Semester Final Examination	1,3	70.0	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				
<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Lecture	3.0	Every Week	3.00
Lab	Lab programme	2.0	Every Second Week	1.00
Independent & Directed Learning (Non-contact)	No Description	3.0	Every Week	3.00
Total Hours				8.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				4.00

Workload: Part Time				
<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Formal Lecture	3.0	Every Week	3.00
Lab	Laboratory sessions	2.0	Every Second Week	1.00
Independent & Directed Learning (Non-contact)	Self Directed Learning	3.0	Every Week	3.00
Total Hours				8.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				4.00

Module Resources

Recommended Book Resources

- Yunus A. Cengel, Afshin J. Ghajar 2014, *Heat and mass transfer Fundamentals and Applications*, 5th Ed., McGraw-Hill New York [ISBN: 0077366646]
- Joel, *Engineering Thermodynamics*, 4th edition Ed., Longman Sc & Tech; [ISBN: ISBN-10: 0470210753]
- Eastop and McConkey 1996, *Thermodynamics for Engineers*, 5 Ed., Prentice Hall [ISBN: ISBN-10: 0582091934]
- Energy Systems 1996, *Boyle*, 1 edition Ed., Oxford University Press, USA; [ISBN: ISBN-10: 0198564511]
- Massey 1989, *Fluid Mechanics*, VNR [ISBN: 0278000479]

This module does not have any article/paper resources

Other Resources

- Website: *Student companion website*, McGraw Hill
http://highered.mheducation.com/sites/00_73398187/student_view0/index.html

Module Delivered in

Programme Code	Programme	Semester	Delivery
CR_ESENT_8	<u>Bachelor of Engineering (Honours) in Sustainable Energy Engineering</u>	5	Mandatory
CR_EMECH_7	<u>Bachelor of Engineering in Mechanical Engineering</u>	6	Mandatory
CR_EMECN_7	<u>Parttime - Bachelor of Engineering in Mechanical Engineering</u>	6	Group Elective 1