PROC H4603: Process Engineering

Module Title:	Process Engineering
Language of Instruction:	English

Credits:	5

NFQ Level:	8

Module Delivered In	No Programmes

Teaching & Learning Strategies:	Teaching will be conducted using lectures and tutorials using a mixture of presentations, example exercises, question and answer sessions, group discussions and online resources. Laboratory classes will be delivered to students working together in groups to obtain experimental data with subsequent individual reporting/assessment

Module Aim:	To provide students with specialised knowledge of the processes associated with the generation and consumption of fluids & energy in engineering systems

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Design pipe and duct networks for the distribution of liquids and air.
LO2	Determine the heat gains and losses from buildings leading to the design of air conditioning systems for commercial and industrial applications
LO3	Design and analyse industrial processes for drying, concentrating, heating and cooling of solids, fluids and mixtures
LO4	Describe and specify systems for the safe handling of bulk solids
LO5	Analyse thermodynamic models of representative systems in order to determine the steady state performance of such systems
LO6	Quantify, by calculation and experimental measurement, the characteristics of fluid dynamic and 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
• Computational Fluid Dynamics o Introduction to CFD o Navier–Stokes equations o The heat diffusion equation
• Analysis of pipe and conduit systems o Pressure drop in non circular ducts, o Duct design methodologies, - Constant velocity, - Constant pressure drop.
• Heat gains to buildings o Heat gains and losses due to conduction and convection, o Solar heat gains to buildings.
• Psychrometrics (Air/vapour mixtures) o Psychrometric properties of humid air, o Air conditioning processes: - Mixing, - Sensible heating, - Sensible cooling, - Humidification, - Dehumidification,
• Process Heating and Drying o Heating Technologies, o Mechanical vapour recompression, o Process drying, o Steam heating system design.
• Refrigeration & Cooling o Chillers, o Cooling towers.
• Heat transfer o Forced convection, o Internal flow, o External flow, o Condensation.
• Bulk Solids Handling o Characteristics of Bulk Solids o Storage & Feeding - Gravity flow in hoppers and chutes - Hopper Design - Feeding Discharge aids o Conveying - Pneumatic - Screw - Belt o Control & Instrumentation - Level detection - Batch & inline weighing o Safety & Environment - Dust Explosion hazards - Dust control

Assessment Breakdown	%
Continuous Assessment	20.00%
Practical	10.00%
End of Module Formal Examination	70.00%

Continuous Assessment

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Examination	Class Test: Duct Sizing & Design, Solar Gains, Air Conditioning Processes	1,2	10.00	Week 10
Project	Air Conditioning Assignment		10.00	n/a

No Project

Practical

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Practical/Skills Evaluation	Labs: Heat Transfer in a Steam Condenser, Cross Flow Heat Exchanger, Cooling Tower	5,6	10.00	n/a

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Assessment Date*
Formal Exam	A final written examination will assess the extent to which the student has achieved the module learning outcomes	1,2,3,4,5,6	70.00	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	Every Week	3.00
Estimated Learner Hours	Every Week	4.00
	Total Hours	7.00