

Title:	Degree Day Analysis APPROVED
Long Title:	Degree Day Analysis
Module Code:	MECH8027
Credits:	5
NFQ Level:	Advanced
Field of Study:	Mechanical Engineering
Valid From:	Semester 1 - 2016/17 (September 2016)
Module Delivered in	3 programme(s)
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Module Description:	This module uses the concept of Degree Days to estimate energy consumption and CO2 emissions for heating, cooling and energy recovery systems both for new build and for major refurbishments. Techniques for energy monitoring and forecasting are investigated.
Learning Outcomes	
<i>On successful completion of this module the learner will be able to:</i>	
LO1	Discuss the concept of degree days and its application in energy calculations.
LO2	Explain the underlying principles and theory of energy use calculations using Degree-days.
LO3	Apply Degree-day analysis to calculate the fuel consumption, CO2 emissions for a range of heating, cooling and energy recovery systems.
LO4	Develop models of engineering systems using industry-standard software tools
LO5	Model complex engineering problems having regard for the limitations, inherent assumptions and applicability of the model
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>	
No recommendations listed	
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

Degree day calculation

Introduction, calculating degree days, errors, base temperature corrections.

Energy estimation techniques

Heating applications, intermittent heating, accuracy, CO2 emissions, heat gains, cooling applications.

Energy management

Normalisation of energy performance, energy signatures, performance lines and degree days, diagnostics using performance lines, regression analysis.

Excel Models

Use of offset functions and defined names in excel, modelling within Excel

Assessment Breakdown

%

Course Work

100.00%

Course Work

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Written Report	Generation of degree day data by a number of methods and an assessment of error and confidence level associated with each method	1,2,3,4	25.0	Week 4
Project	Generation and analysis of performance lines, control charts and CUSUM plots. Data fitting by linear regression and determination of r^2	2,4	25.0	Week 7
Project	Application of degree days to energy consumption in heating/cooling/ventilation applications.	2,3,4,5	25.0	Week 11
Essay	Essay on the limitations and error analysis for degree day theory applications.	1,2,5	25.0	Sem End

No End of Module Formal Examination

Reassessment Requirement

Coursework Only

This module is reassessed solely on the basis of re-submitted coursework. There is no repeat written examination.

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	Course content	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	Study and assessment	4.0	Every Week	4.00
Lab	IT lab on advanced Excel functions	1.0	Every Week	1.00
Total Hours				7.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				3.00

Workload: Part Time

<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecturer-Supervised Learning (Contact)	Course content	2.0	Every Week	2.00
Lab	IT lab on advanced Excel functions	1.0	Every Week	1.00
Independent & Directed Learning (Non-contact)	Study and assessment	4.0	Every Week	4.00
Total Hours				7.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				3.00

Module Resources
<i>Recommended Book Resources</i>
<ul style="list-style-type: none"> • CIBSE 2006, <i>Degree Days: theory and application</i>, CIBSE London [ISBN: 1-903287-76-6] • Carbon Trust 2007, <i>Degree days for energy management - a practical introduction</i>
<i>Supplementary Book Resources</i>
<ul style="list-style-type: none"> • NSAI 2008, <i>IS ISO 13790 Calculation of energy use for space heating and cooling</i>, NSAI Dublin
<i>This module does not have any article/paper resources</i>
<i>Other Resources</i>
<ul style="list-style-type: none"> • Website: www.degreedays.net http://www.degreedays.net • Website: n/a http://www.mbaexcel.com/excel/how-to-build-an-excel-model-step-by-step/

Module Delivered in			
Programme Code	Programme	Semester	Delivery
CR_EBENS_8	B Eng (Hons) in Building Energy Systems (Ab Initio)	8	Mandatory
CR_EBESY_8	BEng (Hons) in Building Energy Systems	2	Mandatory
CR_CARCT_9	Master of Science in Architectural Technical Design	2	Elective