

Title:	Building Thermal Dynamic Analysis	APPROVED
Long Title:	Building Thermal Dynamic Analysis	
Module Code:	BULD8021	
Credits:	5	
NFQ Level:	Advanced	
Field of Study:	Building Science	
Valid From:	Semester 1 - 2009/10 (September 2009)	
Module Delivered in	3 programme(s)	
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Module Description:	This module looks at all the components that contribute to heat gain in a building. Quantification of solar gain and internal gain is undertaken. Coling loads are calculated using dynamic modelling. Methodolgies such as shading and use of exposed thermal mass to minimise the cooling load are explored.	
Learning Outcomes		
On successful completion of this module the learner will be able to:		
LO1	Analyse the components of heat gain that contribute to building cooling load.	
LO2	Select and apply an appropriate form of modelling for cooling load calculations	
LO3	Apply dynamic analysis in the calculation of the peak cooling loads and maximum summer internal temperatures of a building.	
LO4	Propose methodologies to reduce peak cooling load.	
Pre-requisite learning		
Module Recommendations		
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).		
No recommendations listed		
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

Modelling

Description of steady state and dynamic models for cooling load calculations, applicability and limitation of models. Properties of structures that affect the dynamic analysis such as thermal transmittance, thermal admittance, time lag, decrement factor and response factor.

Solar Gains

Calculation of solar gain through glazing, solar irradiance, altitude and azimuth angles, estimation of solar cooling loads using empirical tables.

Internal gains

Determination of lighting load due to lux levels and lamp type, estimation of occupation rates and associated sensible and latent heat gains, assessment of loads from business machines, laboratory equipment etc. Heat loads from industrial equipment.

Cooling load calculations

Use of dynamic model equations (CIBSE admittance procedure) to calculate the summer cooling load and peak summer internal temperatures in a building.

Load minimisation strategies

External shading devices, glazing treatment, internal binds, reduction in glazing area, thermal mass, night cooling.

Assessment Breakdown

%

Course Work

100.00%

Course Work

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	Cooling load calculation for model building	1,2	80.0	Week 8
Written Report	Cooling load minimisation	1,3,4	10.0	Week 12
Open-book Examination	In class exam based	1,2	10.0	Week 6

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	4.0	Every Week	4.00
Independent & Directed Learning (Non-contact)	Study & assessments	3.0	Every Week	3.00
Total Hours				7.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				4.00

This module has no Part Time workload.

Module Resources
<i>Recommended Book Resources</i>
<ul style="list-style-type: none"> • W.P. Jones 2001, <i>Air Conditioning Engineering</i>, 5th Ed., Butterworth Heinemann Oxford [ISBN: 0 7506 5074 5] • CIBSE 2006, <i>Guide A - Environmental Design</i>, 7th Ed., CIBSE London [ISBN: 1-903287-66-9]
<i>Supplementary Book Resources</i>
<ul style="list-style-type: none"> • BSRIA 2003, <i>Rules of Thumb</i>, 4th ed Ed., BSRIA UK [ISBN: 0 86022 626 3] • ASHRAE 2005, <i>Fundamentals</i>, 30, ASHRAE USA
<i>This module does not have any article/paper resources</i>
<i>This module does not have any other resources</i>

Module Delivered in			
Programme Code	Programme	Semester	Delivery
CR_EBENS_8	B Eng (Hons) in Building Energy Systems (Ab Initio)	7	Mandatory
CR_EBESY_8	BEng (Hons) in Building Energy Systems	1	Mandatory
CR_CARCT_9	Master of Science in Architectural Technical Design	1	Elective