

Module Code	Pre-requisite Module codes	Co-Requisite Modules code(s)	ISCED Code	Subject Code	ECTS Credits	NFQ Level
ENEN9107					5	9
<b>Module Title</b>	Thermal Bridge Assessment Fundamentals					

This Header should be repeated on each page of the Module

<b>School Responsible:</b>	Dublin School of Architecture
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### Module Overview:

The Thermal Bridge Assessment Fundamentals module is the first of three modules which comprise the NSAI-recognised DT775B CPD Diploma in Thermal Bridge Assessment programme. The Thermal Bridge Assessment Fundamentals precedes ENEN9106 Thermal Bridge Calculation for Building Performance (2D modelling) and ENEN9108 Thermal Bridge Assessment: 3D & Project.

The Thermal Bridge Assessment Fundamentals module enables the learner to develop an understanding of underlying building physics principles and calculation conventions to design building construction details which address and resolve thermal bridge assessment requirements, and to know when specialist guidance is needed.

The module is presented in four components. The first explores the NZEB legislation context relevant to thermal bridge assessment. The second provides a review of the arithmetic required for calculation. The third provides a comprehensive review of U Value calculation methods required for thermal bridge assessment aligned with the British Board of Agreement (BBA) conventions and methodologies. The fourth explores how specific calculation theories are used to achieve compliance with the Nearly Zero Energy Building (NZEB) performance standard and enables the learner to appraise and select from a range of calculation theories and methodologies used in energy modelling of building fabric.

### Learning Outcomes (LO):

On Completion of this module, the learner will be able to

1	Advise on the legislative framework, codes and standards appropriate to the role of the Registered Thermal Modeler.
2	Use a range of arithmetic techniques and conventions as the basis for carrying out U-value, psi-value and Chi-value calculations, and for carrying out quality assurance processes essential to the role of a thermal modeller.
3	Evaluate thermal performance requirements to British Board of Agreement (BBA) standard using a comprehensive range of detailed manual U Value calculation methods
4	Appraise and select from a range of calculation theories and methodologies used in energy modelling to achieve compliance with the NZEB performance standard in building fabric design.

### Indicative Syllabus:

Legislative framework

- EU EPBD EED
- Building Regulations, Part L, TGD L
- Thermal modelling scheme

Arithmetic

- All necessary methods and techniques
- Basic use of Microsoft Excel to carry out simple mathematical and thermal calculations.

BBA

- BR 443, Worked examples from BR 443, and IS EN ISO 6946:2007

Energy calculation theories

- Thermal calculations of the building fabric, including planar element heat loss (U-value), linear fabric heat loss ( $\gamma$  factor, Psi values), treatment of point thermal bridges (chi-values), surface condensation and mould (frsi);
- Calculation of Primary Energy contributions from thermal bridges in a DEAP calculation – primary energy conversion factors and calculations.

### Learning and Teaching Methods:

- Online lectures
- Interactive online webinars
- Web-based group work

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<ul style="list-style-type: none"> <li>College-based workshops and expert lectures</li> <li>On-line supportive community of learners and engagement with fellow learners</li> <li>Self-directed learning during and outside contact hours</li> <li>Scenario-based formative exercises</li> <li>Summative on-line assessments</li> </ul>	
<b>Total Teaching Contact Hours</b>	<b>H</b>
Online webinar workshops / Online lectures / College contact	
<b>Total Self-Directed Learning Hours</b>	<b>H</b>
Self-directed learning	
	80

### Module Delivery Duration:

The module is delivered over 8 weeks within a 30 week academic year.

Assessment		
Assessment Type	Weighting (%)	LO Assessment (No.)
Assessment 1: Online computer assessment	20%	1
Assessment 2: Online computer assessment	10%	2
Assessment 3: Online computer assessment	30%	3
Assessment 4: Online computer assessment	40%	4
<b>Module Specific Assessment Arrangements (if applicable)</b>		
(a) Derogations from General Assessment Regulations	50% pass mark for module. 80% pass mark for online multiple choice & calculation-based assessments.	
(b) Module Assessment Thresholds	60% threshold for on-line multiple choice & calculation-based assessments. 40% threshold in project assessments.	
(c) Special Repeat Assessment Arrangements	Online computer assessment repeat Week 15.	

### Essential Reading:

#### Building Regulations Part L: domestic

Anon, Department of the Environment, Heritage and Local Government, 2008. *Building Regulations 2008, Technical Guidance Documents* The Stationary Office.

#### U Value calc conventions and standards

Anderson B, Building Research Establishment Ltd (BRE), 2006, *BR 443: 2006 Conventions for U-Value Calculations* 2006 Edition, Watford: BRE Press

#### Linear Thermal Bridging conventions and standards

Ward T, Building Research Establishment Ltd (BRE), 2006, IP 1/06: *2006 Assessing the effects of thermal bridging at junctions and around openings*, Watford: BRE Press.

Ward, T and Sanders, C, 2007. *Conventions for calculating linear thermal transmittance and temperature factors*, BR497. Watford: IHS BRE Press.

ISO 10211: 2007, *Thermal bridges in building construction – Heat flows and surface temperatures – Detailed calculations*.

#### Hygrothermal conventions and standards

BS EN ISO 13788:2002, *Hygrothermal performance of building components and building elements. Internal surface temperature to avoid critical surface humidity and interstitial condensation. Calculation methods*.

BS EN 15026:2007, *Hygrothermal performance of building components and building elements. Assessment of*

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moisture transfer by numerical simulation.

BS5250:2011, Code of practice for control of condensation in buildings.

### Supplemental Reading:

#### DEAP workbook and associated manuals and guides

Anon, Sustainability Energy Authority of Ireland, September 2008. *Dwelling Energy Assessment Procedure (DEAP)* 2008 Edition, Version 3.1 Irish official method for calculating and rating the energy performance of dwellings. Wilton Place: SEAI

Anon, Sustainability Energy Authority of Ireland, January 2011. *Dwelling Energy Assessment Procedure (DEAP) Survey Guide*. Version 2.0. Wilton Place: SEAI.

#### General introduction to hygrothermal building physics and assessment

Little, J., Ferraro, C. and Arregi, B. (2015): *Technical Paper 15 – Assessing risks in insulation retrofits using hygrothermal software tools*. Historic Environment Scotland.

<b>Version No:</b>	1	<b>Amended By</b>	Cormac Allen Andy Lundberg
<b>Commencement Date</b>	September 2017	<b>Associated Programme Codes</b>	DT775B

# Modules that are to be offered as Stand-Alone CPD Programmes must have an NFQ level assigned

\*Details of the assessment schedule should be contained in the student handbook for the programme stage.

**Date of Academic Council approval** .....