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MODULE DESCRIPTOR

Module Title

Advanced Solar Technology

Reference	ENM293	Version	1
Created	August 2017	SCQF Level	SCQF 11
Approved	January 2018	SCQF Points	15
Amended		ECTS Points	7.5

Aims of Module

The aim of this module is to prepare each student for completing an individual project on Solar Energy systems. The students will gain extensive, detailed and critical knowledge and understanding on all aspects related to designing a solar energy system. This will be achieved by working on the design of complex solar energy systems starting with given specifications.

Learning Outcomes for Module

On completion of this module, students are expected to be able to:

1	Demonstrate strong analytical skills and ability to independently size PV systems based on the design requirements.
2	Demonstrate strong analytical skills and ability to independently size STS based on the design requirements.
3	Identify and analyse critically the strategies for integrating the solar PV and thermal systems in buildings.
4	Develop extensive, detailed and critical knowledge and understanding of the policies and regulations as well as financial incentives to stimulate solar technology.
5	Critically evaluate work undertaken and present findings orally.

Indicative Module Content

Overview of the electricity production using photovoltaic modules in off-grid, grid-connected and/or hybrid systems. Sizing and designing of components and complete PV and hybrid systems. Hot water production using solar thermal system (STS). Sizing and designing of components and complete STS systems. Computer simulation and design programmes such as PVsyst, TRNSYS and/or Homer. Building integration; advantages and disadvantages; challenges and barriers; ways to integrate in buildings; market trends and case studies. Policies and regulations, incentives, tax policies, financing models, etc., on the deployment of solar technology systems.

Module Delivery

This module is delivered by means of lectures and self guided study. Each student will develop an individual design of one solar energy system for given specifications. As part of the learning plan, students will be supervised by academic staff in the development of the aforementioned individual design.

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Indicative Student Workload	Full Time	Part Time
Contact Hours	50	50
Non-Contact Hours	100	100
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	150
Actual Placement hours for professional, statutory or regulatory body		

ASSESSMENT PLAN

If a major/minor model is used and box is ticked, % weightings below are indicative only.

Component 1

Type:	Coursework	Weighting:	80%	Outcomes Assessed:	1, 2, 3, 4
Description:	Progress report.				

Component 2

Type:	Coursework	Weighting:	20%	Outcomes Assessed:	5
Description:	Presentation.				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

In order to pass the module, students should achieve a mark of at least 40% in each component (which has a weighting of 30% or more) and an overall grade of D or greater

Module Grade	Minimum Requirements to achieve Module Grade:
A	Greater than or equal to 70%
B	In the range 60% to 69%
C	In the range 55% to 59%
D	In the range 50% to 54%
E	E In the range 40% to 49%
F	Less than 40%
NS	Non-submission of work by published deadline or non-attendance for examination

Module Requirements

Prerequisites for Module	Normally a 2.2 UK honours degree in Engineering or a related discipline, and proficiency in English language for academic purposes (or IELTS score of 6.5 or equivalent).
Corequisites for module	None.
Precluded Modules	None.

INDICATIVE BIBLIOGRAPHY

1	BOXWELL, M.,2017. The Solar Electricity Handbook: A Simple, Practical Guide to Solar Energy: How to Design and Install Photovoltaic Solar Electric Systems 2017. Greenstream Publishing Publication. ISBN-13: 9781907670657.
2	PARKIN R.E., 2017. Building-Integrated Solar Energy Systems. CRC Press.
3	KOMARNICKI, P. LOMBARDI, P. and STYCZYNSKI, Z., 2017. Electric Energy Storage Systems: Flexibility Options for Smart Grids. Springer.
4	KALOGIROU, S.A., 2014. Solar Energy Engineering: Processes and Systems. Elsevier.
5	NERSESIAN, R., 2016. Energy Economics: Markets, History and Policy. Routedge
6	DGS., 2010. Planning and Installing Solar Thermal Systems: A Guide for Installers, Architects and Engineers. Earthscan. ISBN-10: 1844071251
7	AYOMPE, L.M., 2016 Solar Thermal Systems. In: BOEMI SN., IRULEGI O., SANTAMOURIS M. (eds) Energy Performance of Buildings. Springer, Cham. DOI https://doi.org/10.1007/978-3-319-20831-2_17
8	SERRANO, R and ISABEL, M., 2017,Concentrating Solar Thermal Technologies: Analysis and Optimisation by CFD Modelling. Springer. ISBN 978-3-319-45883-0