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MODULE DESCRIPTOR

Module Title

Solar Energy

Reference	ENM290	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 provide a detailed and critical knowledge and understanding of the essential principles of Solar Energy theory. This module focus on the understanding of the Sun-earth geometry and the interaction of the sun's position with the radiation level and the shadings produced. The main objective of this module is to equip the student to the theoretical knowledge and computational skill to model the solar resources for places where measurements are not carried out and for places where there are gaps in the measurement records. Solar radiation is now a mainstream source of energy. The student will be given an insight of the global solar energy policy within the context of the environment, society, and technology.

Learning Outcomes for Module

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

1	Demonstrate a critical knowledge and understanding of basic terms and concepts in solar radiation and foundations of radiative transfer across the broad spectrum.
2	Deal with complex geometry and concepts concerning solar motion and be able to calculate the effect of orientation of a surface on the incident solar energy.
3	Develop analytical tools necessary to understand the complex concepts of concentration of solar energy and the different solar collection systems.
4	Critically evaluate the global solar energy policy and the interactive systems of solar energy within the context of the environment, society, and technology.

Indicative Module Content

Sun-Earth geometry, shadows and tracking, characteristics of solar radiation, the measure and estimation of the solar resource, thermodynamics and light absorption, Concentrator optics, and global solar policy.

Module Delivery

This module is delivered by means of lectures, tutorials and student-centred learning activities.

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Indicative Student Workload	Full Time	Part Time
Contact Hours	48	48
Non-Contact Hours	102	102
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:	50%	Outcomes Assessed:	4
Description:	Analysis assignment.				

Component 2

Type:	Examination	Weighting:	50%	Outcomes Assessed:	1, 2, 3
Description:	Exams.				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

In order to pass, students should achieve a mark of at least 40% in each component (which has a weighting of 30% or more) and an overall grade 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	C In the range 55% to 59%
D	In the range 50% to 54%
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. MUNEER, T. GUEYMARD, C. and KAMBEZIDIS, H., Solar radiation and daylight models. Routledge, 2004.
2. DUFFIE, J.A. and BECKMAN, W.A., 2013. Solar Engineering of Thermal Processes. 4th ed. John Wiley & Sons.
3. BADESCU, V., 2008. Modeling Solar Radiation at the Earth's Surface. Springer.
4. SUNDARAM, S. BENSON, and MALLICK, T., 2016. Solar Photovoltaic Technology Production: Potential Environmental Impacts and Implications for Governance. Academic Press.
5. GONZALEZ, G.A., 2013. Energy and Empire: The Politics of Nuclear and Solar Power in the United States. State University of New York Press.
6. BRAUN, T. GLIDDEN, L., 2014. Understanding Energy and Energy Policy. Zed Books.
7. YONK, R.M. SIMMONS, R.T and C. STEED, B.C., 2014. Green vs. Green: The Political, Legal, and Administrative Pitfalls Facing Green Energy Production (Routledge Research in Environmental Policy and Politics. Routledge.
8. MIR-ARTIGUES, P. and DEL RIO, P., 2016. The Economics and Policy of Solar Photovoltaic Generation. Springer.