MODULE DESCRIPTOR

Module Title

System Control, Monitoring and Maintenance

Reference	ENM285	Version	3
Created	August 2021	SCQF Level	SCQF 11
Approved	January 2018	SCQF Points	15
Amended	August 2021	ECTS Points	7.5

Aims of Module

The aim of this module is to critically understand the process of monitoring and maintenance activities involved around operating solar energy systems. Students will learn in detail about signals synthesis, techniques used to monitor, control and maintain the Solar Energy systems effectively over their life span.

Learning Outcomes for Module

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

1	Critically analyse the synthesis of signals from process variables in terms of their generation, processing, analysis and transmission.
2	Demonstrate significant understanding of solar energy systems monitoring.
3	Critically analyse the practices in solar energy systems operation and maintenance and safety.
4	Demonstrate significant understanding of solar energy systems control.
5	Apply extensive and detailed knowledge of sensors, transducers, actuators and control systems.

Indicative Module Content

Overview of signal synthesis in terms of their generation, processing, analysis and transmission. Use of meteorological devices used in monitoring system: pyranometer, pyrheliometer, temperature sensors, etc. Testing and inspection methods for solar energy systems. Operation and Maintenance of Solar Energy systems. Sensors and actuators. Signal transmission, command and control units. Monitoring systems for Industrial and residential systems. Non-destructive testing and condition monitoring techniques for solar energy industrial assets. Safety and security. solar energy systems control: tracking systems and solar thermal systems.

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	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:	100%	Outcomes Assessed:	1, 2, 3, 4, 5
Description:	Coursework.				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

Component 1 comprises 100% of the module grade. To pass the module, a D grade is required.

Module Grade	Minimum Requirements to achieve Module Grade:
A	A
B	B
C	C
D	D
E	E
F	F
NS	Non-submission of work by published deadline or non-attendance for examination

Module Requirements

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

INDICATIVE BIBLIOGRAPHY

1. BHATTACHARYYA, S.S., DEPRETTERE, E.F., LEUPERS, R., and TAKALA, J., 2010. Handbook of Signal Processing Systems. Springer. ISBN 978-1-4419-6345-1
2. RICHARD, G. LYONS, D. and FUGAL, L.,2014. The Essential Guide to Digital Signal Processing. Pearson Education (US). ISBN: 9780133804423
3. VIGNOLA, F. MICHALSKY, J. and STOFFEL, T., 2017.Solar and Infrared Radiation Measurements. CRC Press. ISBN 9781138075528
4. KOMARNICKI, P. LOMBARDI, P. and STYCZYNSKI, Z., 2017. Electric Energy Storage Systems: Flexibility Options for Smart Grids. Springer. ISBN 978-3-662-53275-1
5. NEILL, S., STAPLETON, G., and MARTELL, C., 2017. Solar farms: the Earthcan expert guide to design and construction of utility-scale photovoltaic systems. Routledge