

WM9SD-15 Solar Energy Engineering

26/27

Department

WMG

Level

Taught Postgraduate Level

Module leader

Borislav Dimitrov

Credit value

15

Module duration

4 weeks

Assessment

100% coursework

Study location

University of Warwick main campus, Coventry

Description

Introductory description

This module provides students with sufficient knowledge, understanding and analytical skills to underpin their professional development as they progress towards becoming an expert engineer in one of the current core technology disciplines of renewable energy, specifically solar energy engineering. This module will typically focus on the current technologies available but will also explore emerging technologies under development.

Module aims

The principal aims of this module are:

Provide students with the analytical skill to understand the principles of solar energy and the technical concepts of solar products to enable the application of technology into design, installation and operation of solar energy facilities.

Ensure students have the technical ability to critically analyse the opportunities and threats associated with the solar energy portfolio both on a micro and macro scale

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Solar radiation characteristics and calculations

Photovoltaic materials, cells and panel design and efficiencies

Panel and array configurations and locations

Solar farm operations and maintenance

Principles of solar radiations

Sun-earth geometry relations

Concentrating solar thermal systems

Thermodynamics of solar thermal systems

Optics of CSP systems

The photoelectric effect and solar cells

Passive and active solar heating and cooling

Thermal and seasonal energy storage systems

Environmental and social concerns associated with solar energy systems.

Learning outcomes

By the end of the module, students should be able to:

- Critically analyse solar energy systems and technologies using the principles of solar energy
- Apply relevant solar energy technologies to design and implement solar energy solutions for specific scenarios in both micro and macro scales
- Critically evaluate the performance of solar energy systems using theory and relevant data
- Assess the sustainability of utilising solar energy for heat and energy for both direct use and integration into the relevant grid system.
- Critically analyse the emerging solar technologies that are under development and at the forefront of the solar energy engineering sector.

Indicative reading list

[Reading lists can be found in Talis](#)

[Specific reading list for the module](#)

Subject specific skills

Interpretation of energy engineering data

Energy performance calculations

Undertake engineering activities associated with solar energy systems, safely and reliability
Renewable energy engineering technology selection
Solar energy technologies performance and efficiency calculations
Solar energy and solar energy farm engineering design

Transferable skills

Evaluation and judgement
Communication
Critical thinking
Decision making
Systems thinking
Problem solving
Presentation of highly complex technical data.

Study

Study time

Type	Required
Lectures	15 sessions of 1 hour (10%)
Tutorials	15 sessions of 1 hour (10%)
Online learning (independent)	15 sessions of 1 hour (10%)
Private study	45 hours (30%)
Assessment	60 hours (40%)
Total	150 hours

Private study description

Details of private study and independent learning
Students receive additional readings and workbooks to support their learning in the module. This enables students to build their foundational knowledge or go deeper into the application and evaluation of knowledge presented in the module.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A

	Weighting	Study time	Eligible for self-certification
Assessment component			
Assessment One - Written report	70%	42 hours	Yes (extension)
An individual report addressing all the relevant learning outcomes. The report will explore current theory and practice within the solar energy portfolio and investigate some elements of emerging solar technologies			

Reassessment component

Assessment One - Written report	No
An individual report addressing all the relevant learning outcomes. The report will explore current theory and practice within the solar energy portfolio and investigate some elements of emerging solar technologies	

Assessment component

Emerging Solar Energy Technologies	30%	18 hours	Yes (extension)
The presentation includes the design of the main sub-systems in either a grid-connected or stand-alone power plant, covering PV array sizing, cabling, inverter selection, back-up battery, protections, and more. It is not a face-to-face presentation but a submitted PowerPoint file with voice-over.			

Reassessment component

Emerging Solar Energy Technologies	No
The report includes the design of the main sub-systems in either a grid-connected or stand-alone power plant, covering PV array sizing, cabling, inverter selection, back-up battery, protections, and more.	

Feedback on assessment

Students will be provided individual and class feedback and feed-forward on their assessments.

Availability

There is currently no information about the courses for which this module is core or optional.