CE7J02: J2 – Solar Energy Conversion & Applications [5 credits]

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Module organisation
Department of Civil, Structural and Environmental Engineering

Module description, aims and contribution to programme
This module introduces a range of topics in the advanced physics and technology of solar energy conversion and materials, devices and applications. Participants will gain an in depth knowledge of current advances in solar energy, principles of operation of solar thermal and photovoltaic devices, technological challenges and their applications. The module also provides an introduction into next generation technologies. The aim of this module is to give the students an extended foundation of the main concepts of solar energy and to enable them to practically apply their knowledge in research and development.

Learning outcomes
On successful completion of this module, students should be able to:

1. Describe the function and design of different system types of (i) solar thermal including flat plate, evacuated tube, thermosiphon and integrated collector store systems and (ii) photovoltaic including monocrystalline silicon, amorphous, thin film and multijunction modules and emerging technologies.
2. Calculate optical properties of materials for solar energy systems based on spectral measurements.
3. Explain how the performance of solar energy systems varies annually and diurnally, depending on location, sky conditions, device and application type and load/user behaviour.
4. Clarify which materials are best suited for use in a solar panels as well as explain what surface treatments can be used to enhance thermal and electrical performance.
5. Describe the function of the most important components necessary in a solar energy system.
6. Describe the state of the art in thermal and photovoltaic technologies as well as show an insight into future trends and advances.

Module content

Teaching strategies
A combination of lectures, tutorials and laboratories.
**Assessment**
Examination 50%, Continuous Assessment 50%.

**Required textbook**

**Further information**
School of Engineering weblink.