Module Code: CE7J02

Module Name: J2: Solar Energy Conversion & Applications

ECTS Weighting: 5 ECTS

Semester taught: Semester 1

Module Coordinator/s: Assoc. Prof. Sarah McCormack (Sarah.McCormack@tcd.ie)
Lecturer(s): Prof. Laurence Gill (Laurence.gill@tcd.ie)

Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline:

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

LO1. Describe the function and design of difference system types of (i) solar thermal including the flat plate, evacuated tube, thermosiphon and integrated collector store systems and (11) photovoltaic including monocrystalline silicon, amorphous, thin film and multijunction modules and emerging technologies.

LO2. Calculate optical properties of material for solar energy systems based on spectral measurements.

LO3. 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.

LO4. Clarify which materials are best suited for use in solar panels as well as explain what surface treatments can be used to enhance thermal and electrical performance.

LO5. Describe the function of the most important components necessary in a solar energy system.

LO6. Describe the state of the art in thermal and photovoltaic technologies as well as show an insight into future trends and advances.

Graduate Attributes: levels of attainment

To act responsibly - Enhanced
To think independently - Enhanced
To develop continuously - Enhanced
To communicate effectively - Enhanced
Module Content

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 dept 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.

Teaching and Learning Methods

A combination of lectures, tutorials and laboratories.

Assessment Details

Please include the following:

- Assessment Component
- Assessment description
- Learning Outcome(s) addressed
- % of total
- Assessment due date

<table>
<thead>
<tr>
<th>Assessment Component</th>
<th>Assessment Description</th>
<th>LO Addressed</th>
<th>% of total</th>
<th>Week due</th>
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<tbody>
<tr>
<td>Online Examination</td>
<td>3 hour examination</td>
<td>ALL</td>
<td>50%</td>
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<tr>
<td>Continuous Assessment</td>
<td>Group work – designing solar PV and thermal systems</td>
<td>LO1,3,5</td>
<td>50%</td>
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Reassessment Requirements

None

Contact Hours and Indicative Student Workload

- **Contact hours**: 33 hrs
- **Independent Study (preparation for course and review of materials)**: 45 hrs
- **Independent Study (preparation for assessment, incl. completion of assessment)**: 45 hrs
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<tbody>
<tr>
<td><strong>Module Pre-requisite</strong></td>
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<td><strong>Module Co-requisite</strong></td>
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<tr>
<td><strong>Module Website</strong></td>
<td><a href="https://www.tcd.ie/courses/postgraduate/az/course.php?id=DPTEG-ENSE-1F09">https://www.tcd.ie/courses/postgraduate/az/course.php?id=DPTEG-ENSE-1F09</a></td>
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<td><strong>Are other Schools/Departments involved in the delivery of this module?</strong></td>
<td>No</td>
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<td><strong>Module Approval Date</strong></td>
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<td><strong>Approved by</strong></td>
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<tr>
<td><strong>Academic Start Year</strong></td>
<td>28th September 2020</td>
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<tr>
<td><strong>Academic Year of Date</strong></td>
<td>2020/2021</td>
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