**Solar Energy Technology Training (SETechTra) course information**

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## Introduction

Solar Energy (SE) is recognised as central to the delivery world green energy production, security, economic, and climate goals leading to an increase in the EU’s 2030 solar targets to 740 GWdc. This represents a double-edged sword for the industry as it exacerbates shortage in STEM graduates with relevant SE sector specialist skills described as “the mismatch between the skills needs and the available skills”. Although the demand for professionals with training in STEM fields is considerable, other skilled people such as lawyers, logistics experts, marketing professionals, financial analysts and experts in regulation and standardisation are required.

The Solar Energy Technology Training (SETechTra) course has been developed as part of the SETEchTra project with the aim to develop freely available training materials to tackle skills gap in the solar energy sectors from STEM and STEAM (STEM and Arts such as visual arts, design and new media) perspectives by integrating STEM concepts with the arts into the developed SE training technology. The intersections between the Arts, STEM creates an engaging discovery and problem-solving space that is multifaceted and inclusive which also contribute to the general view of industry and business for future-ready employees to have multiple areas of expertise or being able to use a whole-system thinking with a holistic approach to identifying sustainable solutions.

The SETechTra project consortium is composed of 6 partners: 4 Universities and 2 industry partners representing 4 different European countries namely Finland, Greece, Norway, and UK. Partners are:

1. University of Wolverhampton, UK (UoW) coordinating the whole project.
2. Teesside University, UK (TU).
3. Satakunta University of Applied Sciences, Finland (SAMK).
4. Centre for Renewable Energy Sources and Saving foundation (CRES).
5. Norwegian University of Science and Technology, Norway (NUT).
6. Research and Knowledge Consultancy Ltd, UK (RKC.

The team have developed the course after extensive skills gap analysis, a review of Higher Education Qualifications Framework (HEQF) and professional and statutory body (PSRB) requirements for partner countries and consultation with Industrial Advisory Board professional bodies and other stakeholders on the attributes of STEM graduates with reference to the solar and renewable energy sector. These review and consultation allow the integration of key professional competencies into the curriculum design. This course forms a base upon which each of the High Education Institution (HEI) partners will be implementing the curriculum in their respective country with some modification based on their respective strategies and regulations.

The contents of course are divided into four major areas corresponding to 12 weeks training: (i) Introduction to solar energy systems (weeks 1-3), (ii) Design and Reliability of Solar Photovoltaic (PV) Systems (weeks 4-6), (iii) Application examples (weeks 7-9), and (iv) Entrepreneurial Skills Training (week 10-12).

## Course aim and objectives.

### Course aim

This course exposes trainees/students to solar energy technology via on-hand training and academic activities that support their entrepreneurial capability development in the solar energy sector.

### Module objectives

The objectives of the module are to support Trainee/students especially undergraduate students) to:

* Deepen their awareness, knowledge and understanding of renewable energy with focus on solar energy and the photovoltaic technology which support its conversion to electricity.
* Develop critical skills in solar energy, solar thermal, PV design and reliability issues.
* Develop critical skills in solar energy, solar thermal, PV applications in powering device and building.
* Acquire entrepreneurial competences that develop and empower trainee/students to set-up Solar/thermal and PV Company.

## Learning outcomes

* Have knowledge on a range of renewable technologies available for energy generation (can be covered briefly) in domestic buildings and devices.
* Able to simulate solar system performance using available solar energy simulation tools/software.
* Able to demonstrate competence in designing a solar energy system (solar heat and / or photovoltaics) and able to design for building, device, or other relevant applications.
* Able to develop competency in identifying sustainable energy solutions for development and utilization.
* Have knowledge and understanding of legislation associated with renewable technologies and energy performance of domestic buildings and devices (this should be covered locally).

## Course Structure and Indicative Contents

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| **Weeks** | **Activity Description** | **Indicative Contents** |
| **1-3** | **Introduction to Solar Energy Systems** | |
| Activity 1 | **Fundamental Concept of Solar Energy**   * General concept on solar energy in relation to other renewable energies (wind, hydropower, Biomass, Ocean, Tidal, etc.). * Solar PV and Solar Thermal, Concentrated solar thermal power generation technologies. * Challenges and future trends. |
| Activity 2 | **Solar Energy Conversion Technology**   * PV and components of PV systems * PV panel and solar thermal collectors and performance. * Demonstration of silicon solar energy conversion to electricity. |

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| **Weeks** | **Activity Description** | **Indicative Contents** |
| **4 - 6** | **Design and Reliability of Solar Photovoltaic (PV) Systems** | |
| Activity 1 | **Component/module design, installation and thermal cum thermo-mechanical reliability**   * Design, manufacture, assembly, installation and reliability issues of PV module and systems. * PV systems installation sizing and components (Inverter, battery) design. |
| Activity 2 | **Activity 2: Application of software in PV module and system design, manufacture, and deployment.**   * ANSYS Fluent application in PV module moisture ingress quantification. * PVGIS application in PV module system sizing design. * RETscreen Expert Applications. |

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| **Weeks** | **Activity Description** | **Indicative Contents** |
| **7 - 9** | **Application Examples** | |
| Activity 1 | **Introduction on General Application (Relevant Legislation)**   * Environmental aspects and sustainability perspective with solar energy. * Demonstration of a solar PV system (for residential application or powering devices). |
| Activity 2 | **PV system applications**   * Building sizing and connections. * Off- and on-grid connected PV-systems. * Micro-grid and Smart grid. |
| Activity 3 | **Device Powering (PV Manufacturing Process)**   * Visit to PV manufacturing industry. * Talk by PV industry Entrepreneur. |
|  | Activity 4 | **Building Powering (Residential PV Application) case study applications.**   * Project/Task to execute. |

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| **Weeks** | **Activity Description** | **Indicative Contents** |
| **10 - 12** | **Entrepreneurial Skills Training** | |
| Activity 1 | **Developing Customer Awareness**   * Solar PV market and industry. * Recruiting and servicing clients in the PV market. |
| Activity 2 | **Business plan and Business Start-ups**   * Generating new ideas based on societal needs and business opportunities. * Solar PV/thermo business start-up. * Delivering an elevator pitch. |
| Activity 3 | **Intellectual Property and Documentation**   * Intellectual property. * Regulatory and ethical issues. * Reporting and documentation. |

## Digital certificate of completion of the course

After completing this e-learning course (the whole twelve weeks activities), a digital certificate will be generated based on the personal information encoded during the registration and the overall score obtained. The University of Wolverhampton will keep your personal information until course completion and will delete this after the certificate has been issued as per the Privacy-Notice. Therefore, it is important to save your training records.