

# Postgraduate Certificate Grid-Connected and Isolated Solar PV Systems





## Postgraduate Certificate Grid-Connected and Isolated Solar PV Systems

- » Modality: **online**
- » Duration: **2 months**
- » Certificate: **TECH Technological University**
- » Dedication: **16h/week**
- » Schedule: **at your own pace**
- » Exams: **online**

Website: [www.techtute.com/in/engineering/postgraduate-certificate/grid-connected-isolated-solar-pv-systems](http://www.techtute.com/in/engineering/postgraduate-certificate/grid-connected-isolated-solar-pv-systems)

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# 01

# Introduction

Renewable Energies are undoubtedly on the rise and this market increasingly requires specialized professionals who know how to manage them and choose those that are best in each case. Aware of this, TECH professionals have designed this very complete program whose main objective is to provide engineers with the knowledge and trends in the latest technologies available in the field of Solar Photovoltaic Energies. Likewise, this program will go in depth, to help the student understand how to implement this type of technology, since Photovoltaic Solar Energy is one of the main Renewable Energies with the greatest expansion forecast for the next decades. This knowledge will enable the engineer to take part in projects of high importance, thus enhancing his professional profile.



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*Photovoltaic solar energy is one of the renewable energies with the greatest expansion forecast in the coming years. Don't miss the opportunity to specialize in this subject."*

The renewable energy sector is in full international expansion and is increasingly demanding engineers specialized in this field. Therefore, the best professionals in the sector have designed for TECH this complete Postgraduate Certificate that aims to train professionals with high knowledge in everything that encompasses the Renewable Energy sector, specifically in Photovoltaic Solar Energy, to increase their working position in today's energy market.

In this sense, the program will study in depth Photovoltaic Solar Energy as an energy source that produces electricity from renewable sources and is obtained directly from solar radiation and, therefore, it is an inexhaustible, non-polluting, non-consuming, free, accessible and silent, modular and flexible source, with low maintenance and a long life.

In the same way, all the disadvantages of this energy model, such as the reliability of the system, the required surface area and the price, will also be addressed. Likewise, the decrease in the prices of photovoltaic modules will be discussed in depth, as well as the differential technical advantages compared to other types of Renewable Energies, together with the significant increase in solar self-consumption that is occurring and that opens a huge market in the application of this type of renewable energy.

The Postgraduate Certificate program aims to specialize students in this technology and its implementation, since Solar Photovoltaic Energy is one of the main Renewable Energies with the greatest expansion forecast until 2030/2050. Solar PV is expected to grow from a current installed capacity of 4.8 GW to 36.8 GW by 2030, more than seven times the current installed capacity.

For all these reasons, this **Postgraduate Certificate in Grid-Connected and Isolated PV Solar Systems** integrates the most complete and innovative educational program in the current market in terms of knowledge and the latest available technologies, as well as encompassing all the sectors or parties involved in this field. In addition, the program consists of exercises based on real cases of situations currently managed or previously faced by the teaching team.

This **Grid-Connected and Isolated Solar PV Systems** contains the most complete and up-to-date educational program on the market. The most important features of the program include:

- ◆ The development of case studies presented by experts in Renewable Energies
- ◆ The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- ◆ Practical exercises where self-assessment can be used to improve learning
- ◆ Its special emphasis on innovative methodologies
- ◆ Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- ◆ Content that is accessible from any fixed or portable device with an Internet connection



*Learn about and apply the latest advances in Solar Photovoltaic Energy in your daily practice and give your curriculum a boost in value"*

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*You will be provided with innovative teaching materials and resources that will facilitate the learning process and allow you to understand all the ins and outs of the world of Solar Thermal Energy in a more permanent way”*

The program's teaching staff includes professionals from sector who contribute their work experience to this training program, as well as renowned specialists from leading societies and prestigious universities.

The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive training programmed to train in real situations.

The design of this program focuses on Problem-Based Learning, which means the student must try to solve the different real-life situations of that arise throughout the academic program. For this purpose, the professional will be assisted by an innovative interactive video system created by renowned and experienced engineering experts.

*As this is a 100% online program, you will be sure to be able to study without leaving the rest of your daily activities.*

*A unique, key, and decisive training experience to boost your professional development.*



# 02

# Objectives

TECH has designed this comprehensive program with the aim of training engineering professionals to be able to design, implement and work on Solar Photovoltaic Energy projects, knowing in depth everything related to this industry and the aspects of sustainability and climate change on an international level that directly affect it. To this end, specific aspects of energy systems that stand out for their enormous importance in today's business landscape will be addressed, and for which large corporations are increasingly demanding competent engineers with solid specialized training.





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*With this program, TECH has only one goal: to help you grow in your profession and become a prestigious engineer.”*



## General Objectives

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- ◆ Conduct an exhaustive analysis of current legislation and the energy system, from electricity generation to the consumption phase, as well as the fundamental production factor in the economic system and the functioning of the different energy markets
- ◆ Identify the different phases required for the feasibility and implementation of a Renewable Energy project and its commissioning
- ◆ Analyze in depth the different technologies and manufacturers available to create renewable energy exploitation systems, and distinguish and critically select those qualities based on costs and their actual application
- ◆ Identify the operation and maintenance tasks required for the correct operation of Renewable Energy installations
- ◆ Size facilities for the application of all energy sources of lesser implementation such as mini-hydro, geothermal, tidal and clean vectors
- ◆ Manage and analyze relevant bibliography on a topic related to one or some of the fields of Renewable Energies, published both nationally and internationally
- ◆ Adequately interpret society's expectations on the environment and climate change, and engage in technical discussions and critical opinions on energy aspects of sustainable development, as skills that Renewable Energy professionals should have
- ◆ Integrate knowledge and face the complexity of formulating reasoned judgments in the field applicable to a company in the Renewable Energy sector
- ◆ Master the different existing solutions or methodologies for the same problem or phenomenon related to Renewable Energies and develop a critical spirit knowing the practical limitations





## Specific Objectives

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- ♦ Master the specific subject matter required to meet the needs of specialized companies and to become a highly qualified professional in the design, construction, assembly, operation and maintenance of photovoltaic solar energy equipment and facilities
- ♦ Apply the knowledge acquired to the understanding, conceptualization and modeling of solar photovoltaic installations
- ♦ Synthesize knowledge and research appropriate methodologies for integration into innovation and project development departments in any company in the solar photovoltaic field
- ♦ Effectively pose and solve practical problems, identifying and defining the significant elements that constitute them
- ♦ Apply innovative methods in solving problems related to photovoltaic solar energy
- ♦ Identify, find and obtain data on the Internet related to the context of solar photovoltaic energy
- ♦ Design and conduct research based on analysis, modeling and experimentation in the field of solar photovoltaic energy
- ♦ Gain in-depth knowledge and handle the specific regulations for photovoltaic solar installations
- ♦ Gain in-depth knowledge and select the necessary equipment for different solar photovoltaic applications
- ♦ Design, calculate, implement, operate and maintain solar photovoltaic installations



*TECH puts at your disposal a compendium of practical cases that will be your main asset when facing real situations"*

03

# Course Management

TECH applies a criterion based on high quality in all its courses. This guarantees students that by studying here they will find the best didactic content taught by the best professionals in the sector. In this sense, this Postgraduate Certificate in Grid-Connected and Isolated Photovoltaic Solar Energy Systems has highly prestigious professionals in this area, who bring to the program the experience of their years of work, as well as the knowledge acquired from research in the field. All to provide the engineer with a high-level program, which will enable them to practice in national and international environments with greater guarantees of success.





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*The best Postgraduate Diplomas are at the best University. Don't miss this unique opportunity to learn from the best"*

## Guest Director



### Mr. De la Cruz Torres, José

- ♦ Degree in Physics and Industrial Electronics Engineering, University of Seville
- ♦ Master's Degree in Operations Management by EADA Business School Barcelona
- ♦ Master's Degree in Industrial Maintenance Engineering, University of Huelva, Spain
- ♦ Railway Engineering, UNED
- ♦ South head of the appraisal, assessment and valuation of technologies and processes of Renewable Energy generation facilities at RTS International Loss Adjusters

## Codirector



### Lillo Moreno, Javier

- ♦ Telecommunications Engineer, University of Seville
- ♦ Master's Degree in Project Management and Master's Degree in Big Data & Business Analytics, School of Industrial Organization (EOI)
- ♦ With an extensive professional career in the Renewable Energy sector of more than 15 years
- ♦ Has managed the O&M areas of several companies with high visibility in the sector



# 04

## Structure and Content

The syllabus of the program is structured as a comprehensive tour through each and every one of the concepts required to understand and work in this field. Thus, through an innovative didactic approach, based on the practical application of the contents, the engineer will learn and understand the functioning of wind energy, knowing how to design and implement projects in this sense, providing high levels of safety and services to companies. This, in addition to adding value to your professional profile, will make you a much better prepared professional to work in a variety of environments.







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*The best professionals in the sector have designed for TECH the most complete and up-to-date syllabus on the market. This way, you'll be sure to learn from the best teaching content"*

## Module 1. Grid-Connected and Isolated Solar PV Systems

- 1.1. Photovoltaic Solar Energy. Equipment and Environment
  - 1.1.1. Fundamental Principles of Photovoltaic Solar Energy
  - 1.1.2. Situation in the Global Energy Sector
  - 1.1.3. Main Components of Solar Facilities
- 1.2. Photovoltaic Generators. Operating Principles and Characterization
  - 1.2.1. Solar Cell Operation
  - 1.2.2. Design Rules. Characterizing the Module: Parameters
  - 1.2.3. The I-V Curve
  - 1.2.4. Module Technologies in Today's Market
- 1.3. Grouping Photovoltaic Modules
  - 1.3.1. Photovoltaic Generator Design Orientation and Inclination
  - 1.3.2. Photovoltaic Generator Installation Structures
  - 1.3.3. Solar Tracking Systems. Communication Environment
- 1.4. Energy Conversion. The Inverter
  - 1.4.1. Types of Inverters
  - 1.4.2. Characterization
  - 1.4.3. Maximum Power Point Tracking (MPPT) and PV Inverter Performance Monitoring Systems
- 1.5. Transformer Station
  - 1.5.1. Functioning and Parts of a Transformer Station
  - 1.5.2. Sizing and Design Issues
  - 1.5.3. The Market and Choosing Equipment
- 1.6. Other Systems of a Solar PV Plant
  - 1.6.1. Supervision and Control
  - 1.6.2. Security and Surveillance
  - 1.6.3. Substation and HV
- 1.7. Grid-Connected Photovoltaic Systems
  - 1.7.1. Design of Large-Scale Solar Parks. Prior Studies
  - 1.7.2. Self-Consumption
  - 1.7.3. Simulation Tools





- 1.8. Isolated Photovoltaic Systems
  - 1.8.1. Elements of an Isolated Facility Regulators and Solar Batteries
  - 1.8.2. Uses: Pumping, Lighting, etc.
  - 1.8.3. Solar Democratization
- 1.9. Operation and Maintenance of Photovoltaic Installations
  - 1.9.1. Maintenance Plans
  - 1.9.2. Personnel and Equipment
  - 1.9.3. Maintenance Management Software
- 1.10. New Lines of Improvement in Photovoltaic Parks
  - 1.10.1. Distributed Generation
  - 1.10.2. New Technologies and Trends
  - 1.10.3. Automization



*A unique learning opportunity that will catapult your career to the next level  
Don't let it slip away"*

05

# Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning**.

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.





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*Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"*

## Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

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*At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world”*



*You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.*



*The student will learn to solve complex situations in real business environments through collaborative activities and real cases.*

### A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

“*Our program prepares you to face new challenges in uncertain environments and achieve success in your career”*

The case method is the most widely used learning system in the best faculties in the world. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the program, the studies will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

## Relearning Methodology

TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

*In 2019, we obtained the best learning results of all online universities in the world.*

At TECH, you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.





In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

*Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.*

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.



This program offers the best educational material, prepared with professionals in mind:



### Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.



### Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.



### Practising Skills and Abilities

They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.



### Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





#### Case Studies

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.



#### Interactive Summaries

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



#### Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.



06

# Certificate

The Postgraduate Certificate in Grid Connected and Isolated PV Solar Systems guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological University.





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*Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork”*

This **Postgraduate Certificate in Grid Connected and Isolated Solar PV Systems** contains the most complete and up-to-date Scientist program on the market.

After the student has passed the assessments, they will receive their corresponding **Postgraduate Certificate** diploma issued by **TECH Technological University** via tracked delivery\*.

The certificate issued by **TECH Technological University** will reflect the qualification obtained in the **Postgraduate Certificate**, and meets the requirements commonly demanded by job markets, competitive examinations and professional career evaluation committees.

Title: **Postgraduate Certificate in Grid Connected and Isolated Solar Photovoltaic Energy Systems**

Official N° of Hours: **150 h.**



\*Apostille Convention. In the event that the student wishes to have their paper certificate issued with an apostille, TECH EDUCATION will make the necessary arrangements to obtain it, at an additional cost.

future

health confidence people

education information tutors

guarantee accreditation teaching

institutions technology learning

community commitment

personalized service innovation

knowledge present quality

online training

development language

virtual classroom

**tech** technological  
university

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