Postgraduate Diploma

Operation of Photovoltaic Installations

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Postgraduate Diploma
Operation of Photovoltaic Installations

- Modality: **online**
- Duration: **6 months**
- Certificate: **TECH Global University**
- Accreditation: **18 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/us/engineering/postgraduate-diploma/postgraduate-diploma-operation-photovoltaic-installations**

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01

Introduction

The Operation of Photovoltaic Installations has undergone a remarkable evolution in recent years, driven by the advancement of technology and the integration of real-time data analysis solutions. These advances have not only improved operational efficiency, but have also enabled a more proactive and accurate management of the systems. Faced with this reality, engineering professionals need to incorporate the most sophisticated strategies for preventive maintenance and advanced control systems into their practice. In order to help them with this task, TECH presents a cutting-edge online program focused on this subject.

With this 100% online Postgraduate Diploma, you will develop the most innovative strategies to improve the operation and maintenance of Photovoltaic Installations"

In the fight against climate change, photovoltaic solar energy has played a crucial role, contributing significantly to the reduction of CO2 emissions. A report by the International Renewable Energy Agency shows that PV installations helped to avoid approximately 900 million tons of CO2 emissions. In this context, the efficient operation of these plants is essential to maximize both their environmental and economic benefits. Given these challenges, engineers need to stay at the forefront of the most innovative techniques for minimizing environmental impact and optimizing the use of resources.

In this framework, TECH launches a revolutionary Postgraduate Diploma in Operation of Photovoltaic Installations. Made up of 10 specialized modules, the academic itinerary will delve into the operation of the direct current components of photovoltaic plants. Along the same lines, the syllabus will analyze in detail the main inverter technologies. In this way, graduates will be able to design more flexible and adaptable systems. During the course of the program, students will develop advanced skills to identify potential risks in electrical systems and design mitigation strategies to reduce the probability of malfunction.

As for the methodology of this university program, it should be noted that it reinforces its innovative character. TECH provides students with a 100% online educational environment, thereby adapting to the needs of busy professionals who want to advance their careers. It also employs the Relearning teaching system, based on the repetition of key concepts to fix knowledge and facilitate learning. In this way, the combination of flexibility and a robust teaching approach makes it highly accessible. The only thing engineers will need is an electronic device with an Internet connection in order to access the Virtual Campus and enjoy the most dynamic teaching materials available on the educational market.

This **Postgraduate Diploma in Operation of Photovoltaic Installations** contains the most complete and up-to-date scientific program on the market. The most important features include:

- The development of case studies presented by experts in Photovoltaic Energy
- The graphic, schematic, and practical contents with which they are created, provide practical information on the disciplines that are essential for professional practice
- Practical exercises where the self-assessment process can be carried out 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

This program gives you the opportunity to update your knowledge in a real scenario, with the utmost scientific rigor of an institution at the forefront of technology"

You will delve into Alternating Current Electrical Protections and safeguard the components of the electrical system in case of voltage fluctuations"

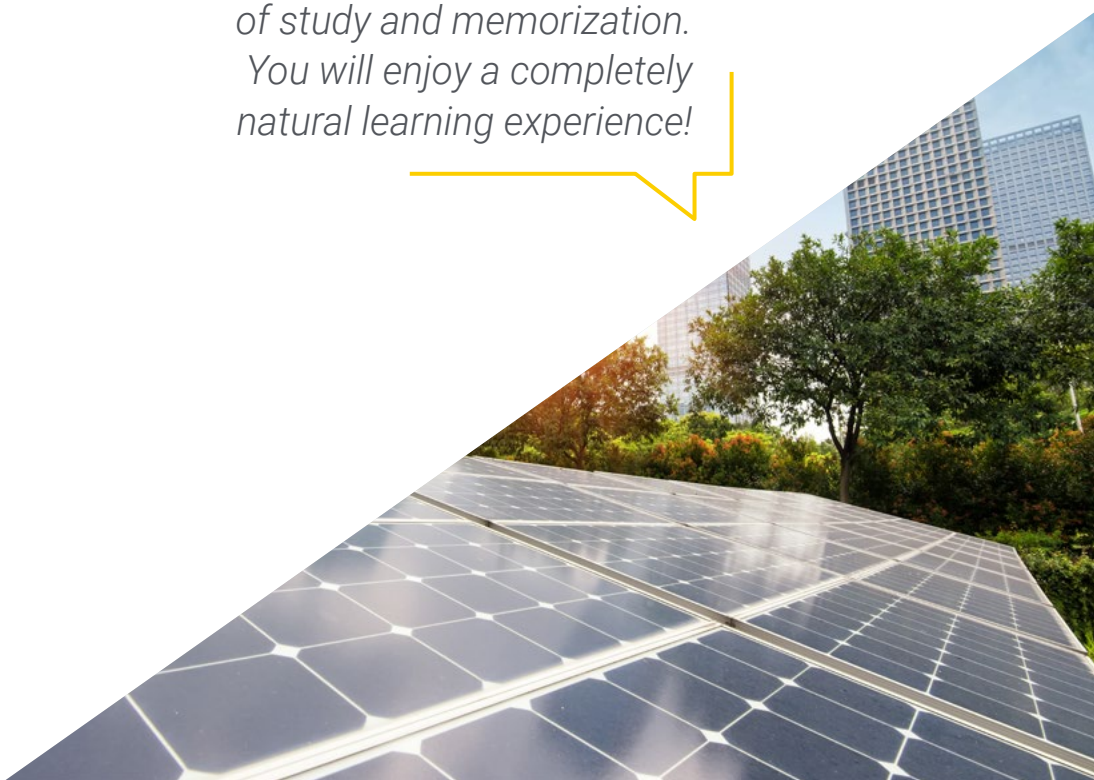
Do you want to incorporate into your practice the most innovative maintenance strategies to detect system failures? Achieve it with this program in only 540 hours.

With TECH's Relearning system you will reduce the long hours of study and memorization. You will enjoy a completely natural learning experience!

The program's teaching staff includes professionals from the field who contribute their work experience to this educational 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 education programmed to prepare for real situations.

This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise during the course. For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.



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Objectives

Through this Postgraduate Diploma, engineers will excel in their detailed knowledge of the fundamentals of solar energy conversion to electricity.
Upon completion of the program, graduates will acquire advanced skills to both plan and execute preventive and corrective maintenance programs.
In this way, professionals will minimize downtime and extend the useful life of equipment. In addition, experts will be able to efficiently manage human and material resources to ensure effective operation.

You will effectively manage the most advanced monitoring systems to supervise and analyze the performance of Photovoltaic Installations"

General Objectives

- Develop a specialized vision of the photovoltaic market and its lines of innovation
- Analyze the typology, components and advantages and disadvantages of all configurations and schemes of large photovoltaic plants
- Specify the typology, components and the advantages and disadvantages of all the configurations and schemes of self-consumption photovoltaic installations
- Examine the typology, components and advantages and disadvantages of all off-grid PV plant configurations and schemes
- Establish the typology, components and the advantages and disadvantages of hybridization of photovoltaic technology with other conventional and renewable generation technologies
- Establish the fundamentals of the operation of the components of the direct current part of the photovoltaic installations
- Understand all the properties of the components
- Establish the fundamentals of the operation of the components of the direct current part of the photovoltaic installations
- Understand all the properties of the components
- Characterize the solar resource on any site in the world
- Handle terrestrial and satellite databases
- Select optimal sites for photovoltaic systems
- Identify other factors and their influence on the photovoltaic installation
- Assess the profitability of investments, operation and maintenance activities and financing of photovoltaic projects
- Identify risks that may affect the viability of investments
- Manage PV projects
- Design and dimensioning of photovoltaic plants, including site selection, sizing of components and their coupling
- Estimate energy yields
- Monitor photovoltaic plants
- Manage health and safety
- Design and dimensioning of self-consumption photovoltaic installations, including site selection, sizing of components and their coupling
- Estimate energy yields
- Monitor photovoltaic installations
- Design and dimensioning of off-grid photovoltaic systems, including site selection, sizing of components and their coupling
- Estimate energy yields
- Monitor photovoltaic installations
- Analyze the potential of PVGIS, PVSYST and SAM software in the design and simulation of photovoltaic installations.
- Simulate, dimension and design photovoltaic installations using the following software: PVGIS, PVSYST and SAM
- Acquire skills in the assembly and commissioning of installations
- Develop specialized knowledge in the operation and preventive and corrective maintenance of the facilities

Specific Objectives

Module 1. Direct Current Photovoltaic Installations

- Be qualified to select the optimum equipment for each installation
- Properly couple components to each other and according to climatic and site conditions

Module 2. Alternating Current Photovoltaic Installations

- Identify possible limitations or barriers to a photovoltaic installation due to its location
- Analyze the effect of other factors on electricity production such as shading, dirt, altitude, lightning, theft, etc.

Module 3. Assembly, Operation and Maintenance of Photovoltaic Plants

- Plan the assembly, operation and maintenance, both technically and in terms of Health and Safety
- Manage incidents during the useful life of the installation
- Perform technical reports of operation and maintenance: Productions, Alarms, Ratios
- Establish maintenance tasks

You will achieve your objectives with the help of TECH's teaching tools, including interactive summaries, explanatory videos and case studies"

03

Course Management

TECH's priority is to provide the most complete and up-to-date university programs on the educational field. For this reason, the institution carries out an exhaustive process to gather its teaching staff. For the teaching of this Postgraduate Diploma, TECH has enlisted the services of outstanding professionals in the field of the Operation of Photovoltaic Installations.

These experts have an extensive professional background, which has led them to work in prestigious international organizations. In this way, they have created numerous top-quality teaching materials that will help engineers experience a leap in quality in their careers.

You will be guided by a teaching team made up of true specialists in Photovoltaic Energy"

Management

Dr. Blasco Chicano, Rodrigo

- Academic in Renewable Energy, Madrid
- Energy Consultant at JCM Bluenergy, Madrid
- PhD in Electronics from the University of Alcalá
- Specialist in Renewable Energy from the Complutense University of Madrid
- Master's Degree in Energy from the Complutense University of Madrid
- Degree in Physics from the Complutense University of Madrid

Professors

Mr. Alegre Peñalva, Alejandro

- Researcher in Materials Physics
- Research Trainee at the Institute of Structure of Matter, CSIC
- Degree in Physics, Mention in Physics of Materials, European University of Madrid
- Introductory Course in Structure of Matter Research: From Elementary Particles to High Molecular Weight Systems, IEM-CSIC

04

Structure and Content

Through this university program, engineers will have a holistic understanding of the generation and conversion of solar photovoltaic energy. The syllabus will delve into the operation of the components that are part of a photovoltaic installation, analyzing their characteristics and selection criteria. Likewise, the syllabus will delve into the assembly of the plants, taking into account factors ranging from the treatment of incidents to the maintenance of self-consumption installations without batteries. In this way, graduates will develop skills to manage the daily operations of Photovoltaic Installations, ensuring their optimal functioning.

You will be able to collect, analyze and interpret operational data to optimize the performance of photovoltaic systems and detect problems early"

Module 1. Direct Current Photovoltaic Installations

1.1. Solar Cell Technologies
- 1.1.1. Solar Technologies
- 1.1.2. Evolution by Technology
- 1.1.3. Comparative Analysis of the main Commercial Technologies

1.2. Photovoltaic Modules
- 1.2.1. Electrical Technical Parameters
- 1.2.2. Other Technical Parameters
- 1.2.3. Technical Regulatory Framework

1.3. Photovoltaic Module Selection Criteria
- 1.3.1. Technical Criteria
- 1.3.2. Economic Criteria
- 1.3.3. Other Criteria

1.4. Optimizers and Regulators
- 1.4.1. Optimizers
- 1.4.2. Regulators
- 1.4.3. Advantages and Disadvantages

1.5. Battery Technologies
- 1.5.1. Types of Cells
- 1.5.2. Evolution by Technology
- 1.5.3. Comparative Analysis of the main Commercial Technologies

1.6. Technical Parameters of Batteries
- 1.6.1. Technical Parameters of Lead-Acid Batteries
- 1.6.2. Technical Parameters of Lithium Batteries
- 1.6.3. Durability, Degradation and Efficiency

1.7. Batteries Selection Criteria
- 1.7.1. Technical Criteria
- 1.7.2. Economic Criteria
- 1.7.3. Other Criteria

1.8. Direct Current Electrical Protections
- 1.8.1. Protection Against Direct and Indirect Contacts
- 1.8.2. Protection Against Overvoltage
- 1.8.3. Other Protections
  - 1.8.3.1. Grounding, Insulation, Overload and Short-Circuit Systems

1.9. Direct Current Wiring
- 1.9.1. Type of Wiring
- 1.9.2. Wiring Selection Criteria
- 1.9.3. Dimensioning of Wiring, Conduits, Cable Ducts, Cable Boxes

1.10. Fixed and Solar Tracking Structures
- 1.10.1. Types of Structures with Solar Tracking. Materials
- 1.10.2. Types of Structures with Solar Tracking. One or Two Axes
- 1.10.3. Advantages and Disadvantages of the Type of Solar Tracking

Module 2. Alternating Current Photovoltaic Installations

2.1. Inverter Technology
- 2.1.1. The Inverter Technology
- 2.1.2. Evolution by Technology
- 2.1.3. Comparative Analysis of the main Commercial Technologies

2.2. Technical Parameters of the Inverters
- 2.2.1. Electrical Technical Parameters
- 2.2.2. Other Technical Parameters
- 2.2.3. International Normative Framework

2.3. Inverters Selection Criteria
- 2.3.1. Technical Criteria
- 2.3.2. Economic Criteria
- 2.3.3. Other Criteria

2.4. Transformer Technology
- 2.4.1. Classification of Transformer Technologies
- 2.4.2. Evolution by Technology
- 2.4.3. Comparative Analysis of the main Commercial Technologies

2.5. Technical Parameters of Transformers
- 2.5.1. Electrical Technical Parameters
- 2.5.2. High-Voltage Switchgear: Switches, Disconnectors and Self-Operated Valves
- 2.5.3. International Normative Framework

2.6. Transformers Selection Criteria
- 2.6.1. Technical Criteria
- 2.6.2. Economic Criteria
- 2.6.3. Other Criteria

2.7. Alternating Current (AC) Electrical Protections
- 2.7.1. Protection Against Indirect Contacts
- 2.7.2. Protection Against Overvoltage
- 2.7.3. Other Protections: Grounding, Overload and Short-Circuit Systems

2.8. Alternating Current and Low Voltage Wiring
- 2.8.1. Type of Wiring
- 2.8.2. Wiring Selection Criteria
- 2.8.3. Wire Sizing. Conduits, Manholes

2.9. High-Voltage Wiring
- 2.9.1. Type of Wiring, Poles
- 2.9.2. Wiring Selection Criteria, Layouts, Poles, Declaration of Public Utility
- 2.9.3. Wire Sizing

2.10. Civil Works
- 2.10.1. Civil Works
- 2.10.2. Accesses, Rainwater Outlets Drainage, Enclosures, etc.
- 2.10.3. Electrical Evacuation Networks. Transport Capacity

Module 3. Assembly, Operation and Maintenance of Photovoltaic Plants

3.1. Assembly of Photovoltaic Plants
- 3.1.1. Health and Safety
- 3.1.2. Selection of Equipment on the Market
- 3.1.3. Incident Management

3.2. Commissioning of Photovoltaic Plants. Technical Aspects
- 3.2.1. Commissioning Operations
- 3.2.2. Grid Codes. Control Center
- 3.2.3. Incident Management. Thermography, Electroluminescence, Certifications

3.3. Commissioning of Self-Consumption Installations. Technical Aspects
- 3.3.1. Commissioning Operations
- 3.3.2. Monitoring
- 3.3.3. Incident Management. Thermography, Electroluminescence, Certifications

3.4. Commissioning of Off-Grid Installations. Technical Aspects
- 3.4.1. Commissioning Operations
- 3.4.2. Monitoring
- 3.4.3. Incident Management

3.5. Operation and Maintenance Strategies for Photovoltaic Plants
- 3.5.1. Operation Strategies
- 3.5.2. Maintenance Strategies. Fault Detection
- 3.5.3. Internal and External Incident Management

3.6. Operation and Maintenance Strategies for Self-Consumption Installations without Batteries
- 3.6.1. Operation Strategies. Surplus Management
- 3.6.2. Maintenance Strategies. Fault Detection
- 3.6.3. Internal and External Incident Management

3.7. Operation and Maintenance Strategies for Self-Consumption Installations with Batteries.
- 3.7.1. Operation Strategies. Surplus Management
- 3.7.2. Maintenance Strategies. Fault Detection
- 3.7.3. Internal and External Incident Management

3.8. Operation and Maintenance Strategies for Stand-Alone Installations
- 3.8.1. Operation Strategies
- 3.8.2. Maintenance Strategies. Fault Detection
- 3.8.3. Internal and External Incident Management

3.9. Health and Safety during Assembly, Operation and Maintenance
- 3.9.1. Working at Heights. Roofs, Electric Poles
- 3.9.2. High Voltage Works
- 3.9.3. Other Works

3.10. As Built-Project Documentation
- 3.10.1. Commissioning Documents
- 3.10.2. Final Certifications
- 3.10.3. Modifications and As-Built Project

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.

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.

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

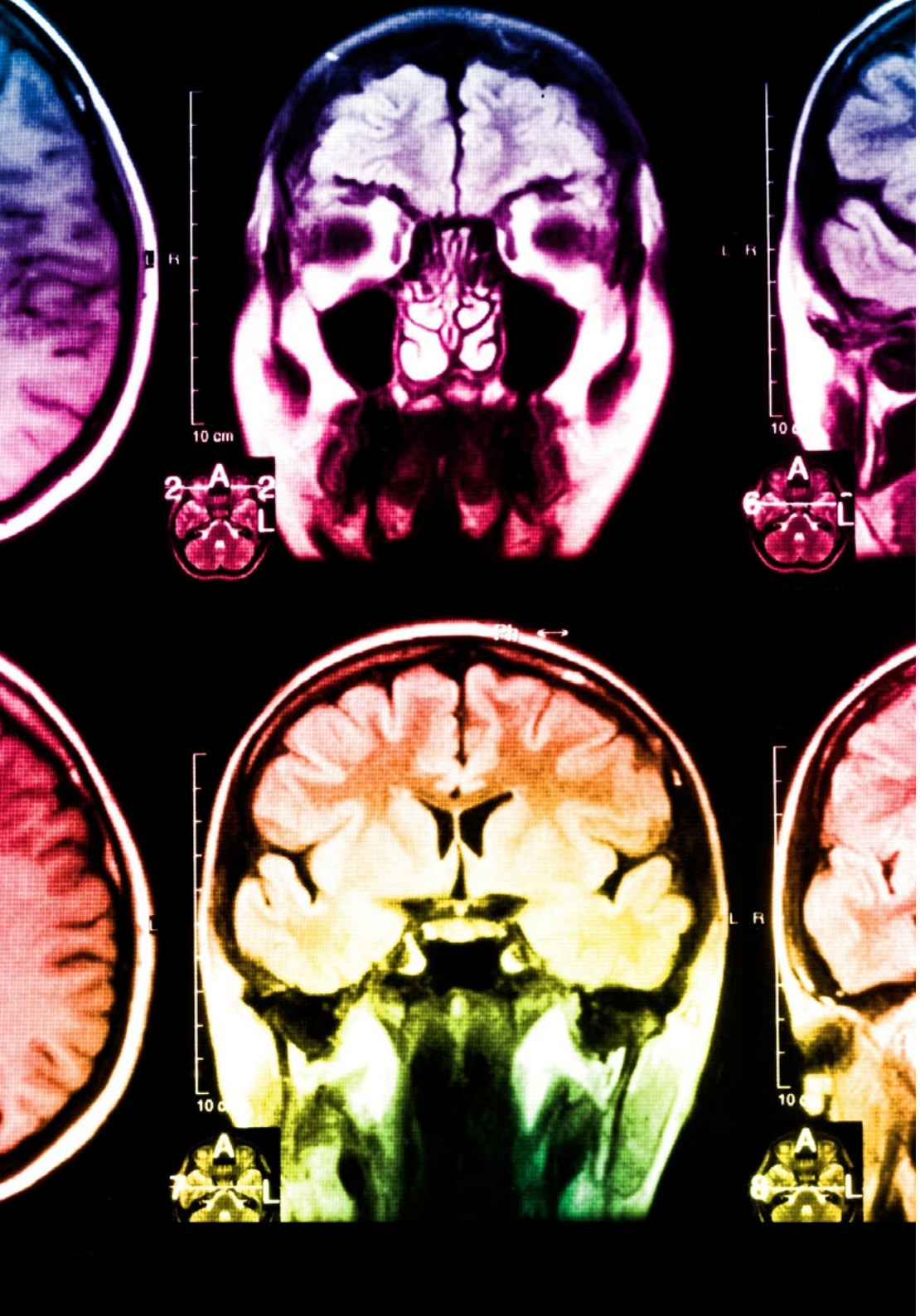
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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.

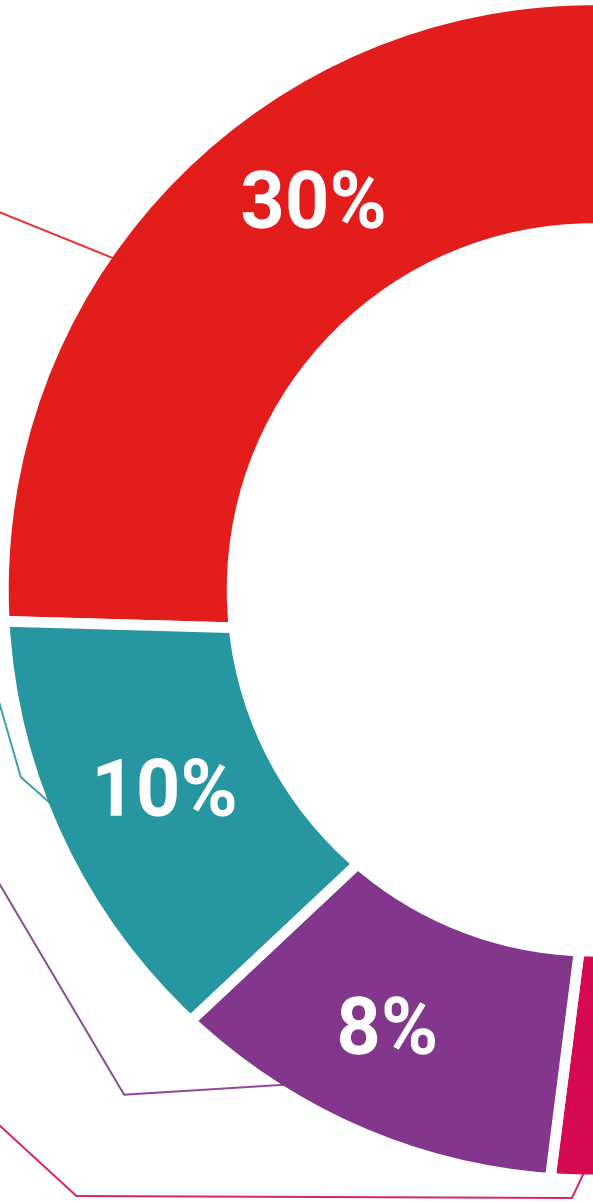
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

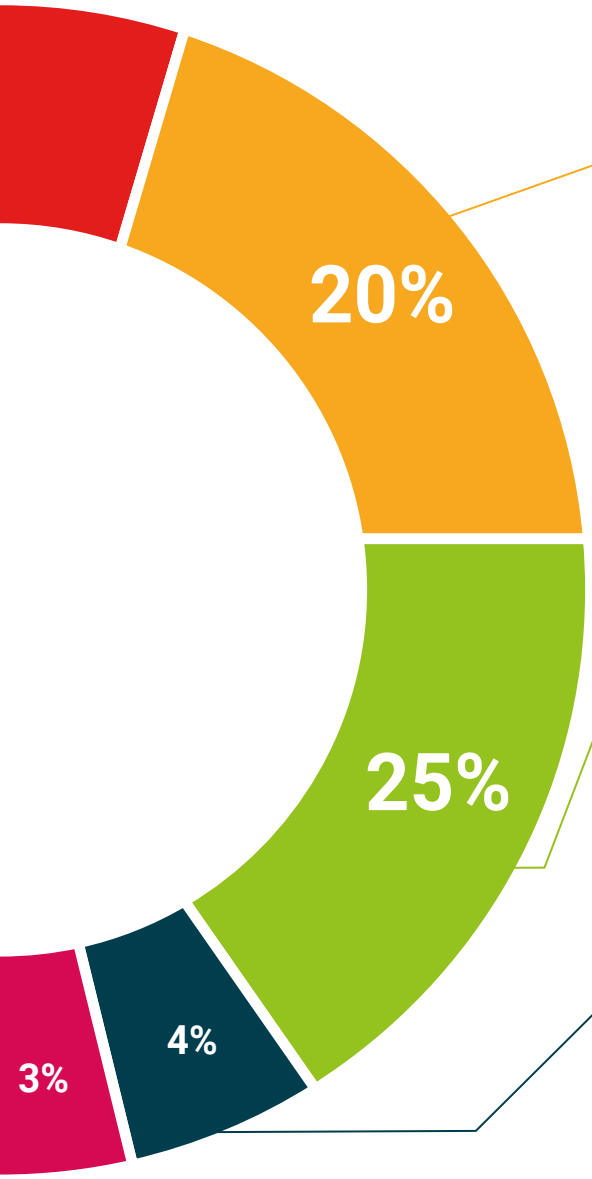
Practising Skills and Abilities

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 in Operation of Photovoltaic Installations guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Diploma issued by TECH Global University.

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

This private qualification will allow you to obtain a **Postgraduate Diploma in Operation of Photovoltaic Installations** endorsed by **TECH Global University**, the world's largest online university.

TECH Global University, is an official European University publicly recognized by the Government of Andorra ***(official bulletin)***. Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

This **TECH Global University** private qualification, is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Diploma in Operation of Photovoltaic Installations**

Modality: **online**

Duration: **6 months**

Accreditation: **18 ECTS**


tech global university

Mr./Ms. _____, with identification document _____
has successfully passed and obtained the title of:

Postgraduate Diploma in Operation of Photovoltaic Installations

This is a private qualification of 540 hours of duration equivalent to 18 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024

Dr. Pedro Navarro Illana
Dean

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country. Unique TECH Code: AFWORD23S techtitute.com/certificates

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

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