Postgraduate Diploma

Modeling and Assessment of Photovoltaic Installations

tech global university

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Postgraduate Diploma
Modeling and Assessment 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-modeling-assessment-photovoltaic-installations**

Index

01

Introduction

The growing demand for energy and the need to reduce greenhouse gas emissions have driven the development of renewable energy technologies, with solar PV being one of the most promising. In this regard, Photovoltaic Installations have emerged as a viable solution to generate sustainable energy. However, both their design and assessment require a rigorous approach to maximize their efficiency and cost-effectiveness. Therefore, it is important for engineers to keep abreast of the most cutting-edge strategies to optimize the use of solar energy and minimize environmental impact. In this context, TECH presents a revolutionary online university program focused on the most sophisticated techniques to maximize this electricity.

Thanks to this 100% online Postgraduate Diploma, you will assess the performance of photovoltaic systems and design innovative strategies to optimize energy production"

A recent report by the International Energy Agency shows that global demand for renewable energy has grown by 30% in recent years. Among the reasons for this, the growing concern about climate change and the demand for sustainable energy stand out. In this scenario, engineering professionals need to incorporate into their procedures the most effective techniques to ensure that photovoltaic installations are efficient, cost-effective and clean. Only in this way will they be able to optimize the use of natural resources and minimize energy losses in both the conversion and transmission of electricity.

Given this scenario, TECH presents a pioneering Postgraduate Diploma in Modeling and Assessment of Photovoltaic Installations. Designed by leading experts in this field, the academic itinerary will delve into the location of photovoltaic installations, taking into account aspects such as the solar trajectory, the calculation of radiation on tilted surfaces or terrestrial databases. The syllabus will also delve into the economic, administrative and environmental factors of photovoltaic plants. Throughout the program, students will develop skills to effectively manage the most advanced design, simulation and sizing software. In this way, professionals will be able to recreate different scenarios to analyze their impact on system performance.

It should be noted that the program is based on a convenient 100% online format, which allows engineers to plan their own schedules and study time. In this sense, TECH's Relearning system, based on the reiteration of key concepts to consolidate knowledge, will facilitate effective and rigorous updating. All students will need is an electronic device with an Internet connection to enter the Virtual Campus and access the most complete teaching materials on the educational market. Undoubtedly, an immersive experience that will considerably raise the professional scope of engineers.

This **Postgraduate Postgraduate Diploma in Modeling and Assessment 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

The Modeling and Assessment of Photovoltaic Installations has a growing future. This program will prepare you to face the challenges that come your way and will open the way to new opportunities"

You will delve into the Calculation of Radiation on Tilted Surfaces, which will allow you to increase the accuracy of Photovoltaic Installations"

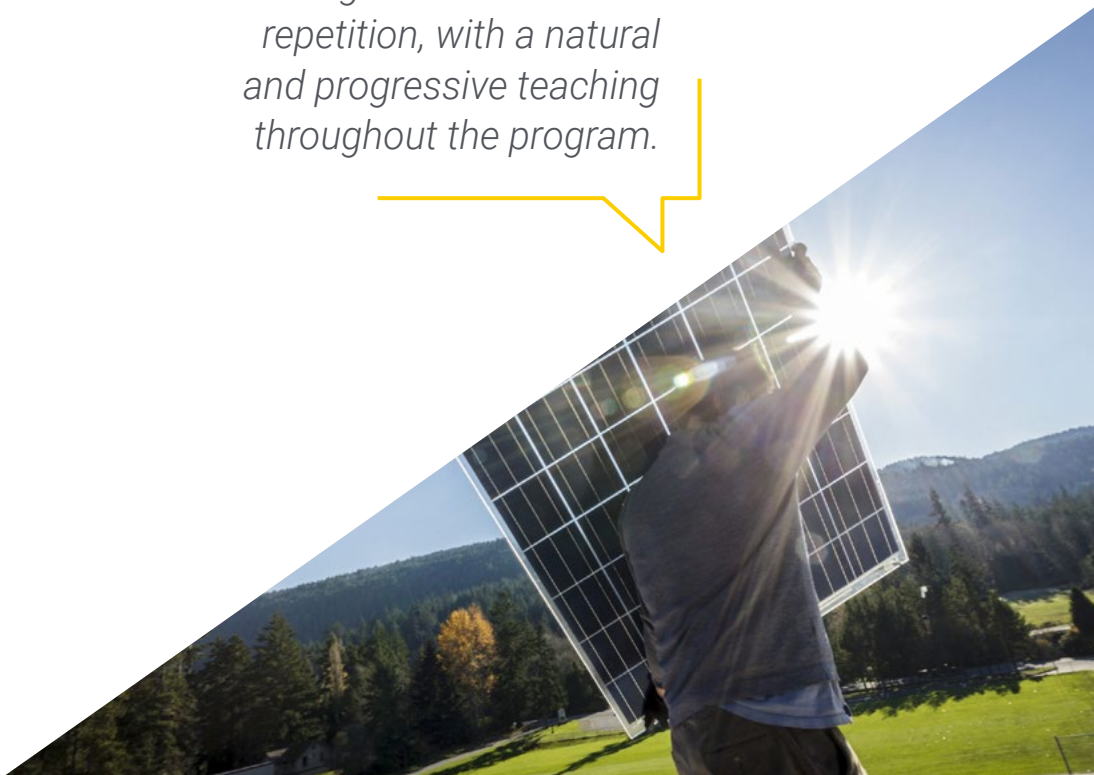
Do you want to incorporate the most innovative strategies for shading analysis into your practice? Achieve it with this program in only 540 hours.

You will benefit from a learning method based on repetition, with a natural and progressive teaching throughout the program.

The program's teaching staff includes professionals from the sector who contribute their work experience to this 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's design focuses on Problem-Based Learning, through which the professional must try to solve the different professional practice situations that arise during the academic program. For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.



02

Objectives

After completing this University Expert, engineers will master the principles of photovoltaic energy, as well as the most advanced techniques for converting solar energy into electricity. At the same time, professionals will obtain skills to design Photovoltaic Installations of different sizes and applications, guaranteeing their efficiency and optimal performance. In addition, graduates will master the most advanced software to simulate the behavior of these plants under different conditions. In this line, they will be highly qualified to plan, execute and manage photovoltaic projects, including the coordination of resources, time or budgets.

You will acquire advanced skills in analyzing the performance of photovoltaic systems, identifying factors that affect their efficiency and proposing solutions for improvement"

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
- 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. Design, Simulation and Sizing Software

- Sizing of the components of the installations
- Optimize and estimate productions
- Acquire knowledge of how to couple the components
- Analyze external influences such as shading, soiling, on production

Module 2. Location of 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. Economic, Administrative and Environmental Aspects of Photovoltaic Plants

- Analyze, from an economic point of view, the economic viability in any phase of the project: investments, operation and maintenance and financing
- Be competent for the processing of any photovoltaic project before the different authorities, both in time and form, as well as its follow-up

03

Course Management

In its objective to provide the most holistic and renewed university programs on the educational market, TECH carries out a rigorous process to select its teaching staff. For the teaching of this Postgraduate Diploma, it gathers distinguished professionals in the field of Modeling and Assessment of Photovoltaic Installations. They have an extensive professional background, where they have been part of prestigious entities. In this way, they have developed teaching materials that stand out for their quality and full applicability to the requirements of today's labor market for engineers to embark on an experience that will broaden their professional horizons.

Leading experts in Modeling and Assessment of Photovoltaic Installations have come together in this program to share all the knowledge you need to optimize your work as an engineer"

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

Ms. Katz Perales, Raquel

- Academic in Renewable Energies, Spain
- Green Infrastructure Project Development at Faktor Gruen, Germany
- Freelance Professional in Green Area Design in the Landscaping, Agriculture and Environment Sector, Valencia
- Agricultural Engineer at Floramedia Spain
- Agricultural Engineer by the Polytechnic University of Valencia
- Degree in Environmental Sciences from the Polytechnic University of Valencia
- BDLA-Green Area Design, Hochschule Weihenstephan-Triesdorf University, Germany

Dr. Garcia Nieto, David

- Academic in Atmospheric Sciences
- PhD in Atmospheric Sciences from the Spanish National Research Council (CSIC) and the Polytechnic University of Madrid
- 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

04

Structure and Content

Through this university program, engineers will have a solid understanding of the fundamentals of solar photovoltaic energy and its application in power generation systems. The syllabus will delve into the use of simulation tools, which will allow graduates to optimize the design of the systems to maximize their efficiency. Likewise, the syllabus will delve into the location of Photovoltaic Installations taking into account factors such as solar radiation, satellite data bases or the influence of temperature. Also, the program will provide the most innovative strategies to avoid losses due to soiling.

You will effectively manage the most sophisticated modeling tools to predict the behavior and energy production of Photovoltaic Installations under different conditions"

Module 1. Design, Simulation and Sizing Software

1.1. Photovoltaic Installation Design and Simulation Software on the Market
- 1.1.1. Design and Simulation Software
- 1.1.2. Required, Relevant Data
- 1.1.3. Advantages and Disadvantages

1.2. Practical Application of the PVGIS Software
- 1.2.1. Objectives. Data Screens
- 1.2.2. Product and Climate Database
- 1.2.3. Practical Applications

1.3. Software PVSYST
- 1.3.1. Alternatives
- 1.3.2. Product Database
- 1.3.3. Climate Database

1.4. PVSYST Program Data
- 1.4.1. Inclusion of New Products
- 1.4.2. Inclusion of Climate Databases
- 1.4.3. Project Simulation

1.5. PVSYST Program Management
- 1.5.1. Alternative Selection
- 1.5.2. Shading Analysis
- 1.5.3. Result Screens

1.6. Practical Application of the PVSYST : Photovoltaic Plant
- 1.6.1. Application for Photovoltaic Plant
- 1.6.2. Solar Generator Optimization
- 1.6.3. Optimization of Other Components

1.7. Example of Application with PVSYST
- 1.7.1. Example of Application for a Photovoltaic Plant
- 1.7.2. Example of Application for Self-Consumption Photovoltaic Installation
- 1.7.3. Example of Application for a Stand-Alone Photovoltaic Installation

1.8. SAM (System Advisor Model) Program
  1.8.1. Objective Data Screens
  1.8.2. Product and Climate Database
  1.8.3. Result Screens
1.9. Practical Application of the SAM
  1.9.1. Application for Photovoltaic Plant
  1.9.2. Application for Self-Consumption Photovoltaic Installation
  1.9.3. Application for Stand-Alone Photovoltaic Installation
1.10. Example of Application with SAM
  1.10.1. Example of Application for a Photovoltaic Plant
  1.10.2. Example of Application for Self-Consumption Photovoltaic Installation
  1.10.3. Example of Application for a Stand-Alone Photovoltaic Installation

Module 2. Location of Photovoltaic Installations

2.1. Solar Radiation
  2.1.1. Quantities and Units
  2.1.2. Interaction with the Atmosphere
  2.1.3. Radiation Components
2.2. Sun's Trajectories
  2.2.1. Sun's Movement. Solar Time
  2.2.2. Parameters that Determine the Sun's Position
  2.2.3. Incidence of Sun's Movement on the Shade
2.3. Terrestrial and Satellite Databases
  2.3.1. Terrestrial Databases
  2.3.2. Satellite Databases
  2.3.3. Advantages and Disadvantages
2.4. Radiation Calculation on Tilted Surfaces
  2.4.1. Methodology
  2.4.2. Global Radiation Calculation Exercise I. Effect of Latitude and Tilt on Photovoltaic Systems
  2.4.3. Global Radiation Calculation Exercise II. Self-Calibration Systems
2.5. Other Environmental Factors
  2.5.1. Influence of Temperature
  2.5.2. Influence of Wind
  2.5.3. Influence of Other Factors: Humidity, Condensation, Dust, Altitude.
2.6. Influence of Soiling on the Photovoltaic Solar Field
  2.6.1. Types of Soiling
  2.6.2. Losses due to Soiling
  2.6.3. Strategies and Methods to Avoid Losses due to Soiling
2.7. Influence of Shading on the Photovoltaic Solar Field
  2.7.1. Shading Types
  2.7.2. Losses due to Shading
  2.7.3. Strategies and Methods to Avoid Losses Due to Shade
2.8. Influence of Other Factors: Theft, Lightning
  2.8.1. Lightning Risk: Overvoltages
  2.8.2. Total or Partial Risk of Theft: Module, Wiring
  2.8.3. Prevention Measures
2.9. Site Location Selection Criteria for Photovoltaic Plants
  2.9.1. Technical Criteria
  2.9.2. Environmental Criteria
  2.9.3. Other Criteria: Administrative and Financial
2.10. Site Location Selection Criteria for Self-Consumption and Off-Grid Systems
  2.10.1. Technical and Architectural Integration Criteria
  2.10.2. Photovoltaic Generator Tilt(s) and Orientation(s)
  2.10.3. Other Criteria: Accessibility, Safety, Shading, Soiling

Module 3. Economic, Administrative and Environmental Aspects of Photovoltaic Plants

3.1. Economic Analysis of Photovoltaic Plants
- 3.1.1. Economic Analysis of Investments
- 3.1.2. Economic Analysis of Operation and Maintenance
- 3.1.3. Economic Analysis of Financing

3.2. Project Cost Structures
- 3.2.1. Investment Costs
- 3.2.2. Replacement Costs
- 3.2.3. Operation and Maintenance Costs

3.3. Economic Feasibility Indicators
- 3.3.1. Technical Indicators. Performance Ratio
- 3.3.2. Economic Indicators
- 3.3.3. Estimation of Indicators

3.4. Project Income
- 3.4.1. Project Income
- 3.4.2. Financial Savings
- 3.4.3. Residual Value

3.5. Tax Aspects of the Project
- 3.5.1. Taxation of Electricity Generation
- 3.5.2. Taxation of Profits
- 3.5.3. Tax Deductions for Renewable Investments

3.6. Project Risks and Insurance
- 3.6.1. General Insurance: Investment, Equipment, Production
- 3.6.2. Guarantees and Security Deposits
- 3.6.3. Equipment and Production Guarantees in Contracts

3.7. Administrative Procedures (I): Public Administration
- 3.7.1. Guarantees and Land Contracts
- 3.7.2. Technical Report and/or Project
- 3.7.3. Prior Technical and Environmental Authorizations

3.8. Administrative Procedures (II). Electricity Companies
- 3.8.1. Prior Access and Connection Authorizations
- 3.8.2. Start-up Authorizations
- 3.8.3. Reviews and Inspections

3.9. Access and Connection to Electrical Grids
- 3.9.1. Photovoltaic Plants
- 3.9.2. Self-Consumption Installations
- 3.9.3. Processing

3.10. Environmental Procedures
- 3.10.1. International Environmental Law
- 3.10.2. Protection of Birdlife in Electrical Power Grids
- 3.10.3. Environmental Assessment and Corrective Measures

A university program designed to bring you up to date on the latest trends in Modeling and Assessment of Photovoltaic Installations. Enroll now!

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

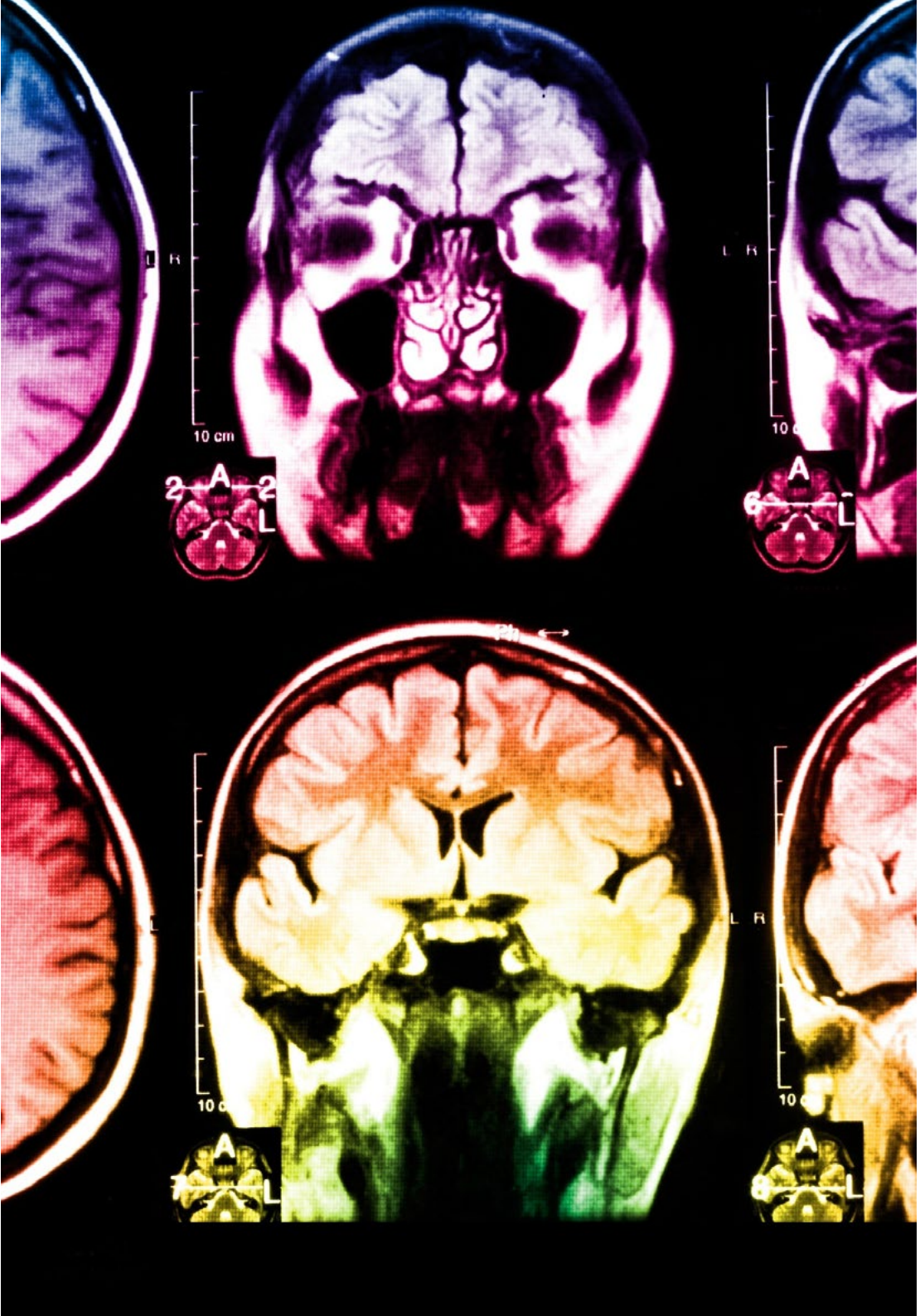
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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.

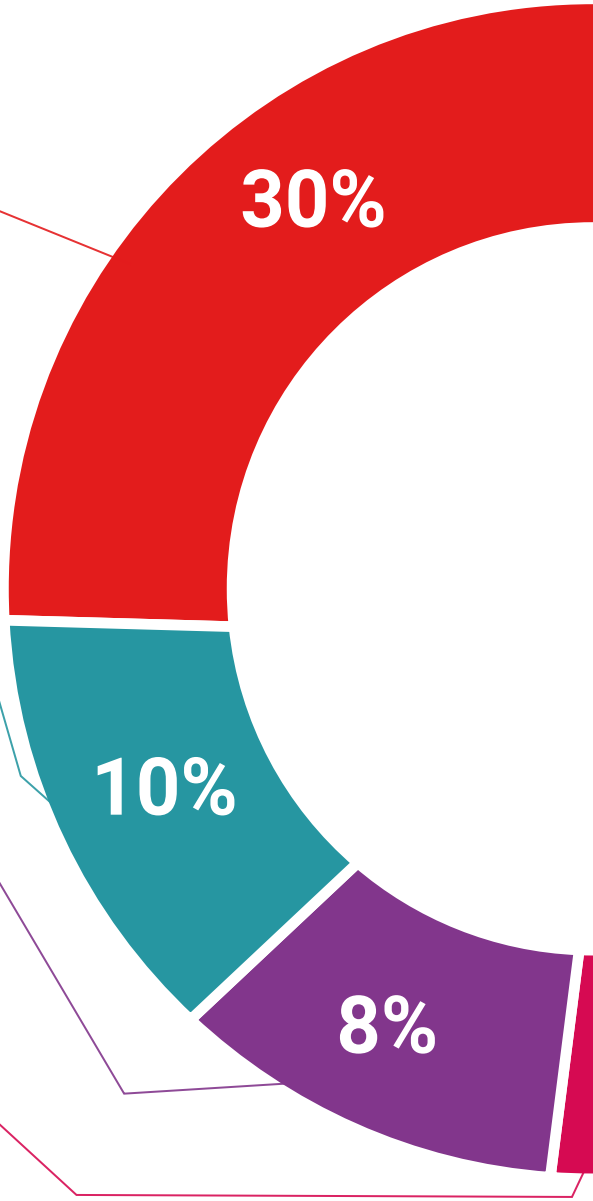
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

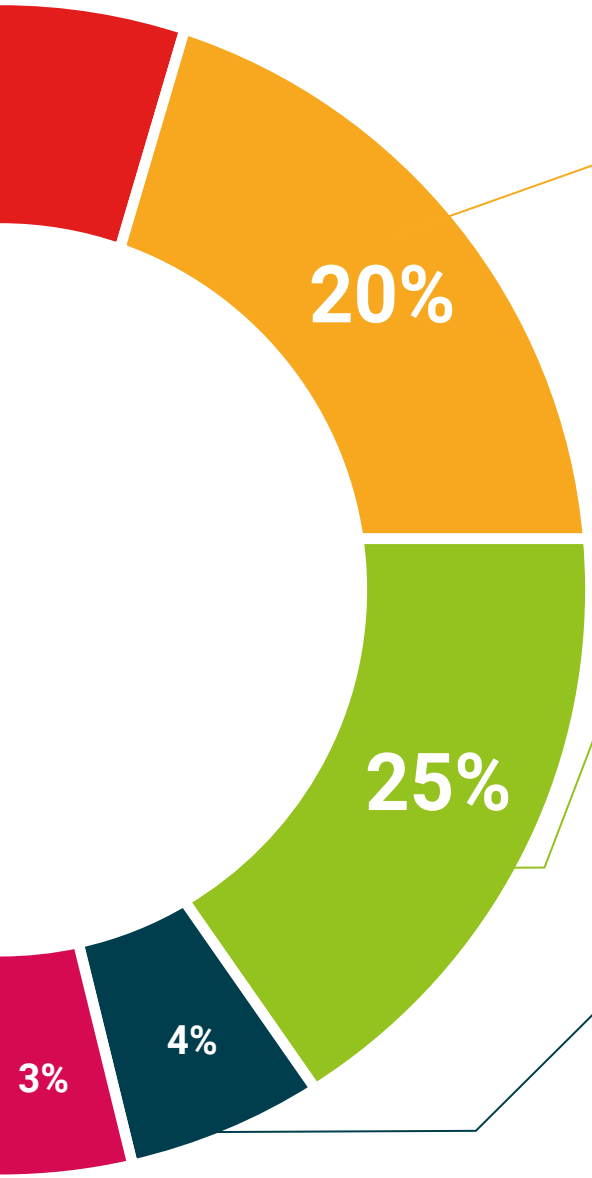
Practising Skills and Abilities

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 Modeling and Assessment 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 Modeling and Assessment 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 Modeling and Assessment of Photovoltaic Installations**

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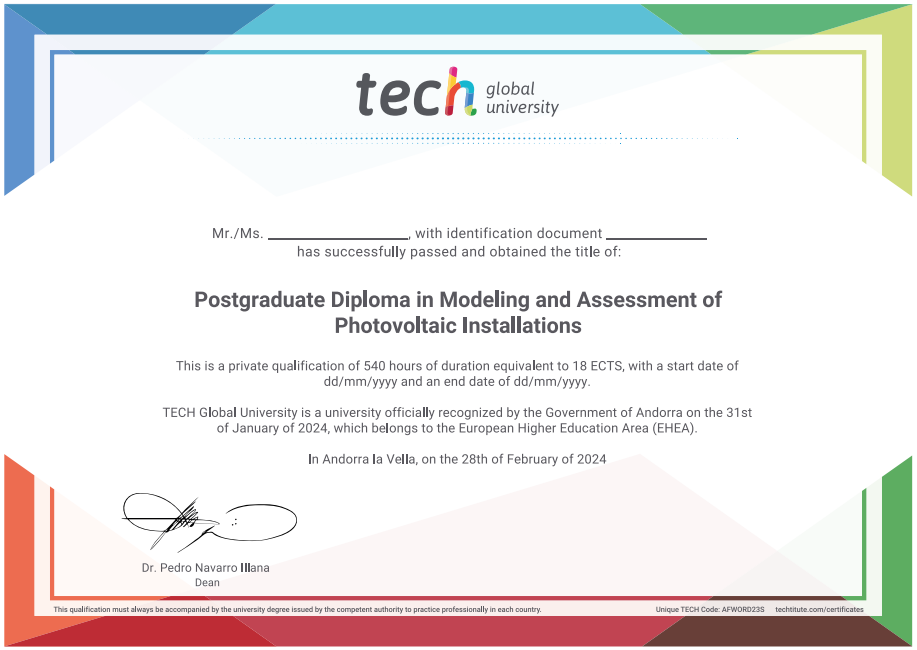
tech global university

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

Postgraduate Diploma in Modeling and Assessment 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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