Postgraduate Diploma
Production and Generation of Renewable Electricity

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Postgraduate Diploma
Production and Generation of Renewable Electricity

- Modality: **online**
- Duration: 6 months
- Certificate: **TECH Technological University**
- Dedication: **16h/week**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/pk/engineering/postgraduate-diploma/postgraduate-diploma-production-generation-renewable-electricity**

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01

Introduction

The storage capacity of electrical energy is becoming more and more important, so, since this technology only works during the day, the different storage techniques available and their future evolution are being considered. Thus, this program in Production and Generation of Renewable Electricity explores in depth the study of photovoltaic generating plants and their connection to the electrical distribution network, with special attention to generating facilities in the self-consumption modality. Similarly, it focuses on water resources and their viability when producing electricity, together with the analysis of wind resource variables and the state-of-the-art technology and techniques of wave power generation plants.

You will deepen in the productivity of electricity in solar thermal power plants, hydro, wind and electricity generation associated with marine resources, specializing in a sector with a future"

In this Postgraduate Diploma, the variables to be taken into account in the design and study of the location of a solar generation plant are analyzed, with the different types of photovoltaic solar collectors together with the rest of the elements that make up an isolated generation system. In addition, due to the great projection of solar thermal power plants, their operation and equipment will be discussed, detailing in depth the different types of technologies that currently exist and the new trends in this type of power plants.

At the same time, the program focuses on describing the water resources associated with this type of power plants and the different uses they have for electricity production. The student will study their operation and how they affect the different variables in the design for the productivity of electricity in this type of power plants. In addition, you will learn how to select the type of turbine to be installed together with the knowledge of the different techniques currently available on the market. In this sense, it also contemplates the influence of the different types of dams used for the creation of water reservoirs, detailing in depth the existing technology in pumped-storage power plants. Due to its importance, special attention is paid to the civil works equipment required for this type of infrastructure.

In addition, as it is a 100% online Postgraduate Diploma it provides the student with the ease of being able to take it comfortably, wherever and whenever they want. All you need is a device with internet access to take your career one step further. A modality in line with the current times with all the guarantees to position the professional in a highly demanded area in continuous change, in line with the SDGs promoted by the UN.

Finally, since this is an expanding resource, a section is dedicated to power generation plants associated with other types of marine resources, such as waves, oceanic gradients, the osmotic gradient and the use of marine currents.

This **Postgraduate Diploma in Production and Generation of Renewable Electricity** contains the most complete and up-to-date scientific program on the market. The most important features of the program include:

- The development of case studies presented by experts in electrical engineering
- The deepening in Energy Resources Management
- The graphic, schematic, and eminently 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
- 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

Due to the enormous potential they have for the generation of electrical energy, you will get to know mini hydroelectric power plants in depth"

You will learn all about power generation plants associated with marine resources, such as waves, oceanic gradients, the osmotic gradient and the use of marine currents"

You will learn how to break down the design of a thermoelectric power plant with parabolic concentrators with rigor and success.

In this Postgraduate Diploma you will end up mastering the Production and Generation of Renewable Electric Energy to be part of tomorrow's change, leaving a better planet.

The program's teaching staff includes professionals from the 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 an immersive training program designed to train in 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 academic year. For this purpose, the professional will be assisted by an innovative interactive video system created by renowned and experienced experts.

02

Objectives

The Postgraduate Diploma in Production and Generation of Renewable Electricity is aimed at the student acquiring the necessary skills to undertake various functions oriented to electricity generation with renewable energy, discovering the latest trends, technologies and techniques in the sector, which will enable him/her to successfully manage maintenance plans for energy production plants. In this way, we propose a specific and complete syllabus with quality content that, together with the guidance of experts, will enable the professional to achieve the following objectives.

With this Postgraduate Diploma you will learn how to integrate renewable energies into the electricity generation park with rigor, contributing to the sustainability of the sector and to an adequate use of natural resources"

General Objectives

- Interpret the investments and feasibility of power generation plants
- Discover the potential business opportunities offered by electricity generation infrastructures
- Delve into the latest trends, technologies and techniques in electric power generation
- Identify the components necessary for the correct functionality and operation of the facilities that make up the power generation plants
- Establish preventive maintenance plans that ensure and guarantee the proper operation of the power plants, taking into account human and material resources, the environment and the most rigorous quality standards
- Successfully manage maintenance plans for power generation plants
- Analyze the different productivity techniques existing in power generation plants, taking into account the particular characteristics of each facility
- Select the most appropriate contracting model according to the characteristics of the power plant to be built

You will be able to correctly identify the ideal locations for the construction of wind farms"

Specific Objectives

- Interpret the solar potential and the parameters to be taken into account in the site selection for solar installations
- Addressing the needs of installations that can be supplied with off-grid photovoltaic systems
- Know in detail the elements that compose the photovoltaic plants connected to the electrical distribution grid
- Acquire the necessary knowledge to carry out photovoltaic installations in the self-consumption modality
- Selecting and correctly dimensioning the necessary elements in a thermoelectric/thermosolar power plant
- Correctly analyze the operation of the different solar collectors that are part of solar thermal power plants
- Manage the different methodologies for energy storage in thermoelectric power plants
- Design of a thermoelectric power plant with CCP technology collectors
- Identify water resources and optimize the type of water resource use
- Deepen in the functioning of the power generation technique and which variables allow to optimize its productivity
- Selecting the most suitable generation turbine according to the current state of technology.
- Breakdown of the different typologies and functionality of dams for the accumulation of water resources
- Control the operation of hydroelectric power plants using pumping techniques
- Analyze the civil works equipment necessary to undertake this type of project
- Regulating and controlling the production of electrical energy in this type of power plant
- Deal in detail with the technologies and techniques of mini-hydraulic plants
- Identify suitable locations for the construction of wind farms
- Detailed knowledge and interpretation of data from meteorological stations to analyze the potential of a wind farm
- Control and prepare the working environment in wind turbines
- Apply the different working techniques for the execution of wind turbines
- Evaluate the operation of a wind turbine and the latest trends in wind power generation
- Elaborate and promote the feasibility of wind power generation parks
- Diagnose the equipment necessary to build offshore wind power plants
- Locate marine resources for electric power generation
- Plan the construction of a wave energy power generation plant

03

Course Management

In its maxim of offering an elite education for all, TECH counts on renowned professionals so that the student acquires a solid knowledge in renewable energies used in the production and generation of electric energy. For this reason, this program has a highly qualified teacher with extensive experience in the sector, whose trajectory has propelled them as a manager. Thus, it will offer the best tools to students in the development of their skills during the course, with the guarantees required to specialize in a sector in full update and innovation, oriented towards the sustainability of resources.

You will be guided by the best in the industry, who bring all their academic and professional experience to this Postgraduate Diploma that TECH has created for you"

Management

Mr. Palomino Bustos, Raúl

- Director at the Institute for Technical Training and Innovation
- International Consultant in Engineering, Construction and Maintenance of Energy Production Plants for the company RENOVETEC
- Technological/training expert recognized and accredited by the State Public Employment Service
- Industrial Engineer, University of Carlos III in Madrid
- Industrial Technical Engineer by the EUITI of Toledo
- Master's Degree in Occupational Risk Prevention from the Francisco de Vitoria University
- Master's Degree in Quality and Environment by the Spanish Quality Association

04

Structure and Content

The structure of the contents of this program has been designed by industrial engineering professionals focused on renewable energy production and generation, so that they have poured their knowledge and experience into a complete and up-to-date syllabus. The program comprises three blocks dedicated to solar generation, hydroelectric power plants, wind power generation and ocean energy so that students can learn more about renewable energies and orient their pre-apprenticeship towards sustainable production. Therefore, this study plan is presented as the only one in the market today, with which the professional will acquire full competence for their day-to-day work in this sector.

You will learn all about renewable electric energies: solar, hydro, wind and maritime thanks to this complete TECH Specialization"

Module 1. Solar Generation

1.1. Energy Collection
- 1.1.2. Solar Radiation
- 1.1.3. Solar Geometry
- 1.1.4. Optical Path of Solar Radiation
- 1.1.5. Orientation of Solar Collectors
- 1.1.6. Peak Sun Hours

1.2. Isolated Photovoltaic Systems
- 1.2.1. Solar Cells
- 1.2.2. Solar Collectors
- 1.2.3. Charge Regulator
- 1.2.4. Batteries
- 1.2.5. Inverters
- 1.2.6. Design of an Installation

1.3. Grid-Connected Photovoltaic Systems
- 1.3.1. Solar Collectors
- 1.3.2. Monitoring Structures
- 1.3.3. Inverters

1.4. Solar PV for Self-Consumption
- 1.4.1. Design Requirements
- 1.4.2. Energy Demand
- 1.4.3. Viability

1.5. Thermoelectric Power Plants
- 1.5.1. Operation
- 1.5.2. Components
- 1.5.3. Advantages over Non-concentrating Systems

1.6. Medium Temperature Concentrators
- 1.6.1. Parabolic-Cylinder CCP
- 1.6.2. Linear Fresnel
- 1.6.3. Fixed Mirror FMSC
- 1.6.4. Fresnel Lenses

1.7. High Temperature Concentrators
- 1.7.1. Solar Tower
- 1.7.2. Parabolic Discs
- 1.7.3. Receiving Unit

1.8. Parameters.
- 1.8.1. Angles
- 1.8.2. Opening Area
- 1.8.3. Concentration Factor
- 1.8.4. Interception Factor
- 1.8.5. Optic Efficiency
- 1.8.6. Thermal Efficiency

1.9. Energy Storage
- 1.9.1. Thermal Fluid
- 1.9.2. Thermal Storage Technologies
- 1.9.3. *Rankine* Cycle with Thermal Storage

1.10. Design of 50 MW Thermoelectric Power Plant with CCP
- 1.10.1. Solar Field
- 1.10.2. Power Block
- 1.10.3. Electricity Production

Module 2. Hydraulic Power Plants

2.1. Water Resources
- 2.1.1. Fundamentals
- 2.1.2. Dam Utilization
- 2.1.3. Bypass Utilization
- 2.1.4. Mixed Use

2.2. Operation
- 2.2.1. Installed Power
- 2.2.2. Produced Energy
- 2.2.3. Height of the Waterfall
- 2.2.4. Flow Rate
- 2.2.5. Components

2.3. Turbines
- 2.3.1. Pelton
- 2.3.2. Francis
- 2.3.3. Kaplan
- 2.3.4. Michell-Banky
- 2.3.5. Turbine Selection

2.4. Dams
- 2.4.1. Fundamental Principles
- 2.4.2. Typology
- 2.4.3. Composition and Operation
- 2.4.4. Drainage

2.5. Pumping Power Plants
- 2.5.1. Operation
- 2.5.2. Technology
- 2.5.3. Advantages and Disadvantages.
- 2.5.4. Pumped Storage Plants

2.6. Civil Works Equipment
- 2.6.1. Water Retention and Storage
- 2.6.2. Controlled Flow Evacuation
- 2.6.3. Elements of Water Conduction
- 2.6.4. Water Hammer
- 2.6.5. Balancing Chimney
- 2.6.6. Turbine Chamber

2.7. Electromechanical Equipment
- 2.7.1. Gratings and Grille Cleaners
- 2.7.2. Opening and Closing of the Water Passage
- 2.7.3. Hydraulic Equipment

2.8. Electrical Equipment
- 2.8.1. Generator
- 2.8.2. Opening and Closing of the Water Passage
- 2.8.3. Asynchronous Start-up
- 2.8.4. Starting by Auxiliary Machine
- 2.8.5. Variable Frequency Starting

2.9. Regulation and Control
- 2.9.1. Generation Voltage
- 2.9.2. Speed of the Turbine
- 2.9.3. Dynamic Answer
- 2.9.4. Network Coupling

2.10. Minihydraulics
- 2.10.1. Water Intake
- 2.10.2. Cleaning of Solids
- 2.10.3. Conduction
- 2.10.4. Pressure Chambers
- 2.10.5. Pressure Piping
- 2.10.6. Machinery
- 2.10.7. Suction Pipe
- 2.10.8. Output Channel

Module 3. Wind Generation and Offshore Energy

3.1. The Wind
- 3.1.1. Origin
- 3.1.2. Horizontal Gradient
- 3.1.3. Measurement
- 3.1.4. Obstacles

3.2. The Wind Resource
- 3.2.1. Wind Measurement
- 3.2.2. The Wind Rose
- 3.2.3. Factors that Affect the Wind

3.3. Wind Turbine Study
- 3.3.1. *Betz* Limit
- 3.3.2. The Rotor of a Wind Turbine
- 3.3.3. Electrical Power Generated
- 3.3.4. Power Regulation

3.4. Components of a Wind Turbine
- 3.4.1. Tower
- 3.4.2. Rotor
- 3.4.3. Multiplier Box
- 3.4.4. Brakes

3.5. Wind Turbine Operation
- 3.5.1. Generating Systems
- 3.5.2. Direct and Indirect Connection
- 3.5.3. Control System
- 3.5.4. Tendencies

3.6. Feasibility of a Wind Farm
- 3.6.1. Location
- 3.6.2. Wind Resource Study
- 3.6.3. Energy Production
- 3.6.4. Economic Study

3.7. Offshore Wind: Offshore Technology
- 3.7.1. Wind Turbines
- 3.7.2. Superficial
- 3.7.3. Electrical Connexion
- 3.7.4. Installation Vessels
- 3.7.5. ROVs

3.8. Offshore Wind: Wind Turbine Support
- 3.8.1. *Hywind Scotland, Statoil* Platform *Spar*
- 3.8.2. *WinfFlota; Principal Power* Platform *Semisub*
- 3.8.3. GICON SOF Platform TLP
- 3.8.4. Comparison

3.9. Offshore Energy
- 3.9.1. Tidal Energy
- 3.9.2. Oceanic Gradient Energy (OTEC)
- 3.9.3. Salt or Osmotic Gradient Energy
- 3.9.4. Energy from Ocean Currents

3.10. Wave Energy
- 3.10.1. Waves as a Source of Energy
- 3.10.2. Classification of Conversion Technologies
- 3.10.3. Current Technology

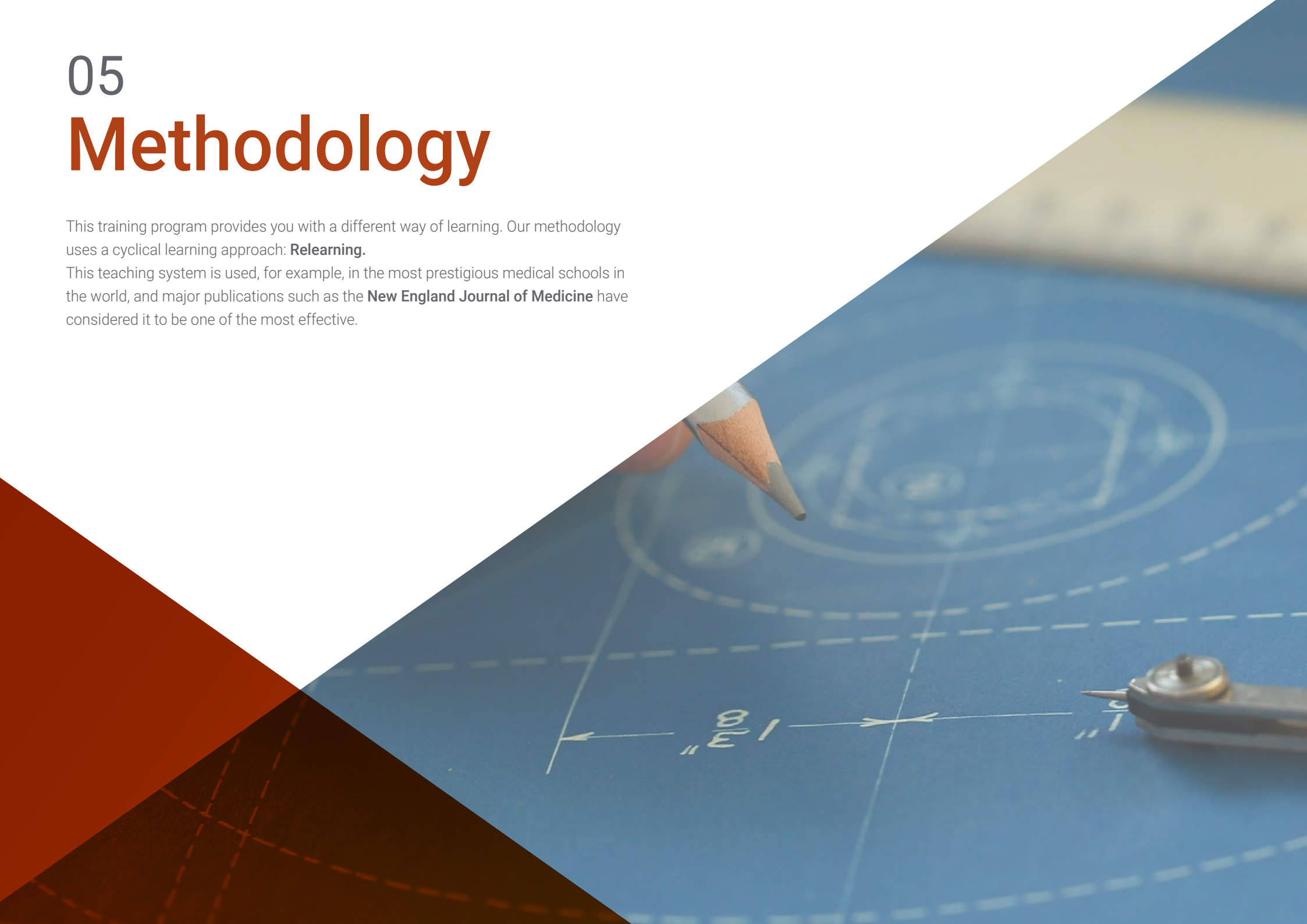
This TECH Postgraduate Diploma in Production and Generation of Renewable Electricity will make you stand out professionally in a sector in continuous transformation"

05

Methodology

This training program provides you with 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"

At TECH we use the Case Method

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

With TECH you can experience a way of learning that is shaking the foundations of traditional universities around the world"

Our school is the first in the world to combine Harvard Business School case studies with a 100% online learning system based on repetition.

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

A learning method that is different and innovative

This Engineering program at TECH- Technological University is an intensive program that prepares you to face all the challenges in this area, both nationally and internationally. The main objective is to promote your personal and professional growth. For this purpose, we rely on the case studies of Harvard Business School, with which we have a strategic agreement that allows us to use the materials used in the most prestigious university in the world: HARVARD.

> *We are the only online university that offers Harvard materials as teaching materials on its courses"*

The case method has been the most widely used learning system among the world's leading business schools for as long as they have existed. 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.

In a given situation, what would you do? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the course, you will be presented with multiple real cases. You will have to combine all your knowledge, and research, argue, and defend your ideas and decisions.

Relearning Methodology

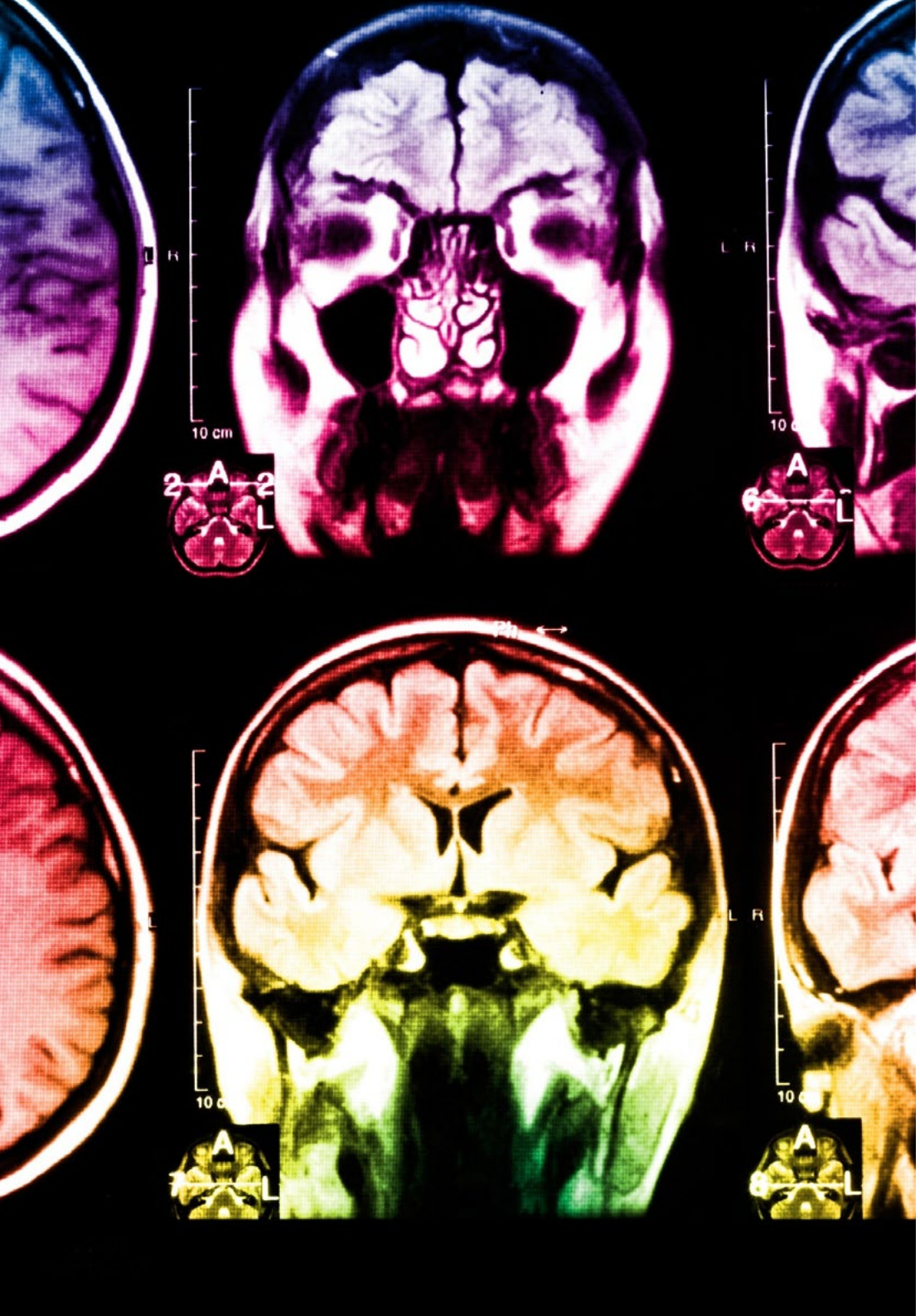
Our University is the first in the world to combine Harvard University case studies with a 100%-online learning system based on repetition, which combines 16 different teaching elements in each lesson.

We enhance Harvard case studies with the best 100% online teaching method: Relearning.

In 2019 we obtained the best learning results of all Spanish-language 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 Spanish-speaking countries licensed to incorporate 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 Spanish online university indicators.



In our program, learning is not a linear process, but rather a spiral (we learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically. With this methodology we have specialized 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, markets, and financial 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 to success.

Based on the latest evidence in neuroscience, not only do we know how to organize information, ideas, images, memories, but we also know that the place and context where we have learned something is crucial for us to be able to remember it and store it in the hippocampus, and 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.

In this program you will have access to the best educational material, prepared with you 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.

This content is then adapted in an audiovisual format that will create our way of working online, with the latest techniques that allow us to offer you high quality in all of the material that we provide you with.

Classes

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

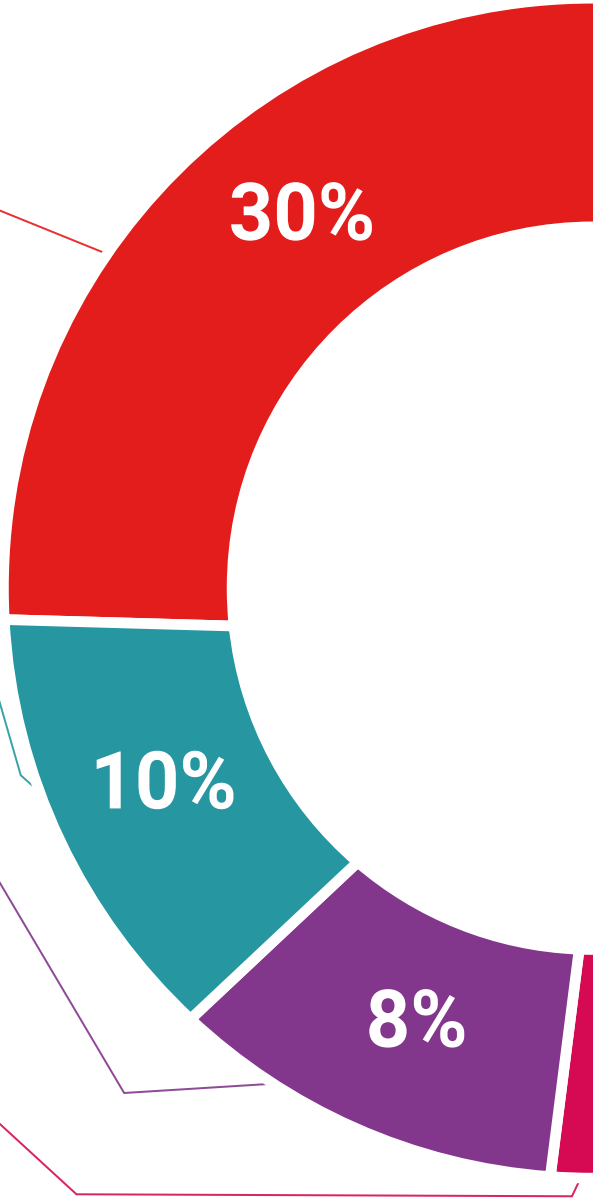
Learning from an expert strengthens knowledge and memory, and generates confidence in our future difficult decisions.

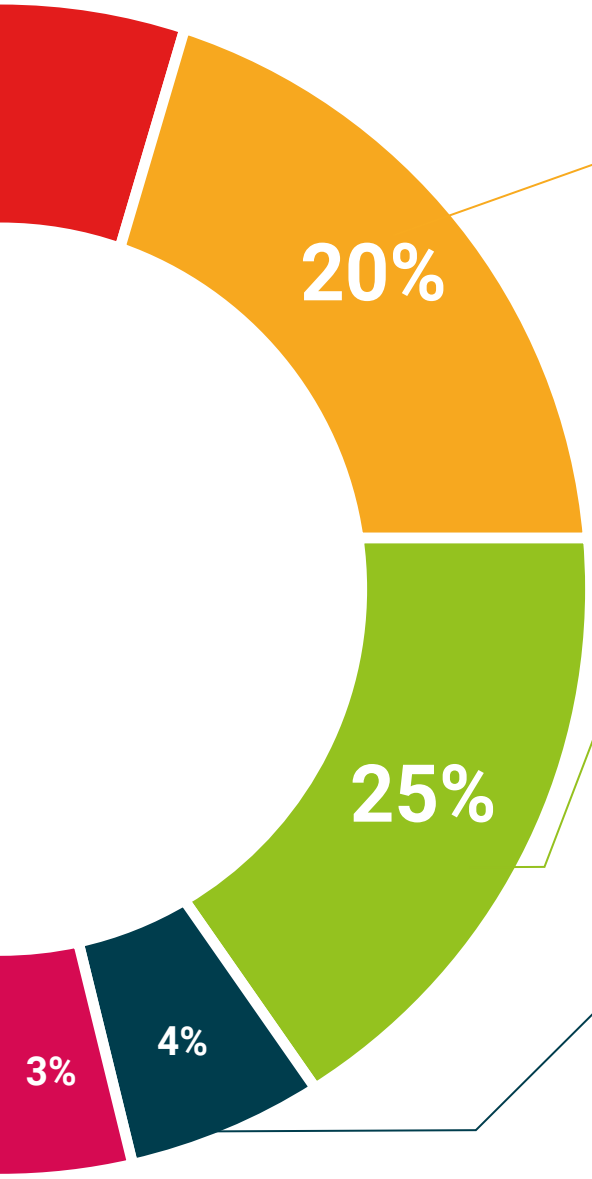
Practising Skills and Abilities

You 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 we live in.

Additional Reading

Recent articles, consensus documents, international guides... in our virtual library you will have access to everything you need to complete your training.





Case Studies

You will complete a selection of the best case studies in the field used at Harvard. Cases that are presented, analyzed, and supervised by the best senior management specialists in Latin America.

Interactive Summaries

We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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

Testing & Re-testing

We periodically evaluate and re-evaluate your knowledge throughout the program. We do this on 3 of the 4 levels of Miller's Pyramid.

06

Certificate

The Postgraduate Diploma in Renewable Electricity Production and Generation, in addition to the most rigorous and up-to-date training, access to a Postgraduate Diploma issued by TECH Technological University.

Achieve professional success within the energy sector with this unique TECH degree and propel your career path to excellence"

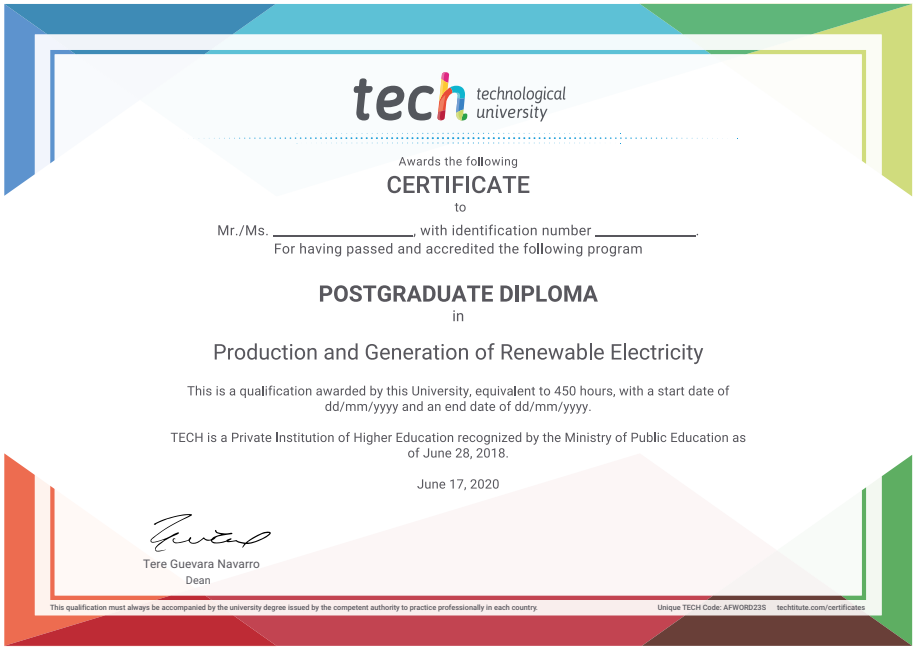
This **Postgraduate Diploma in Production and Generation of Renewable Electricity** contains the most complete and up-to-date program on the market today.

After the student has passed the evaluations, they will receive their corresponding **Postgraduate Diploma** issued by **TECH Technological University** via tracked delivery*.

The certificate issued by **TECH Technological University** will reflect the qualification obtained in the qualification specialization, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Diploma in Production and Generation of Renewable Electricity**

Official Nº of Hours: **450 h.**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Awards the following

CERTIFICATE

to

Mr./Ms. _____, with identification number _____.

For having passed and accredited the following program

POSTGRADUATE DIPLOMA

in

Production and Generation of Renewable Electricity

This is a qualification awarded by this University, equivalent to 450 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH is a Private Institution of Higher Education recognized by the Ministry of Public Education as of June 28, 2018.

June 17, 2020

Tere Guevara Navarro

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 certificate issued with an apostille, TECH EDUCATION will make the necessary arrangements to obtain it, at an additional cost.

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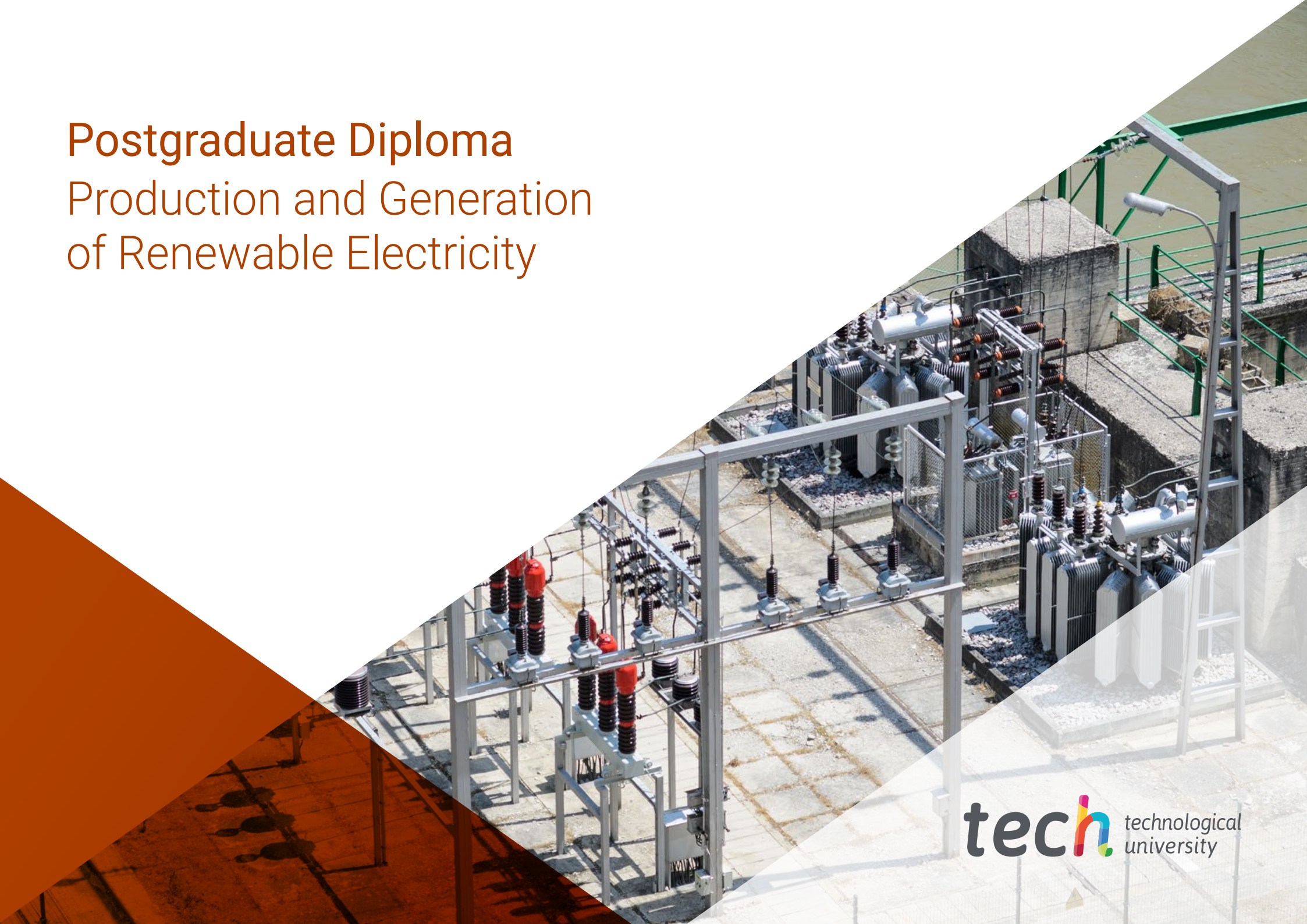

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