Professional Master's Degree

Power Generation, Promotion, Technology and Operations

tech technological university

Professional Master's Degree
Power Generation, Promotion, Technology and Operations

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Technological University**
- Dedication: **16h/week**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/us/engineering/professional-master-degree/master-power-generation-promotion-technology-operations**

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01

Introduction

This program in Electricity Generation, Promotion, Technology and Exploitation effectively combines the knowledge of techniques and technologies of electricity generation with the technical-economic aspect of it, closely related to the business of the Electricity Market. Its comprehensive curriculum establishes guidelines to optimize cost control in the maintenance and operation procedures of electric power plants. In addition, it delves into the management of energy resources to optimize the benefits of electric power production and generation, contributing to the sustainability of the industry.

Master electrical power generation techniques and establish preventive maintenance plans for the future. You will contribute to the smooth operation of power plants while taking into account resources, the environment and the highest quality standards"

This Professional Master's Degree in Electricity Generation, Promotion, Technology and Operation effectively combines the knowledge of techniques and technologies of electricity generation, without forgetting an interesting technical-economic aspect in close relation to the business of the Electricity Market, establishing the guidelines to follow to optimize cost control in maintenance procedures and operation of electric power generation plants.

The content of the curriculum also delves into Energy Resource Management to optimize the benefit of electric power production and generation, contributing to the sustainability of the planet and the improvement of the industry.

In addition, as it is a 100% *online*, program, it provides the student with the ease of being able to study 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.

This **Professional Master's Degree in Power Generation, Promotion, Technology and Operations** contains the most complete and up-to-date 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 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

You will deepen your knowledge of energy resource management to optimize the benefit of electric power production and generation"

You will learn in detail the different techniques and technologies of electricity generation and discover the potential business opportunities offered by their infrastructures"

Deepen your engineering knowledge and specialize in new technologies and the latest trends in power generation with TECH.

In this Professional Master's Degree, you will learn to successfully manage maintenance plans for power plants.

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 Professional Master's Degree in Electricity Generation, Promotion, Technology and Exploitation is aimed at providing students with the necessary skills to undertake various functions related to electricity generation, from project design to economic and feasibility analysis of the investment required for the implementation of a power plant, to consultancy in power generation plants with conventional techniques and technologies, applied to thermal, solar, combined cycle, cogeneration, hydro, wind, maritime and nuclear energy.In this way, we propose a broad agenda with quality content and highly qualified management so that the professional can achieve all these objectives.

The content of this Professional Master's Degree will guide you to successfully integrate renewable energies into the electricity generation park, contributing to the sustainability of the sector"

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

Deepen knowledge of the evolution of nuclear power plants and the new generation of power plants to be built in the near future"

Specific Objectives

Module 1. Economics of Electricity Generation

- Identify the most appropriate generation technology for a given power demand or need to expand the power generation fleet demand or the need to expand the power generation park
- Detailed knowledge and diversification of the different generation techniques and technologies
- Acquire the necessary background knowledge of the existing technologies and techniques in the generation of electric power and the future trend of the same
- Integrating renewable energies into the electric power generation fleet
- Establish the guidelines that must be taken into account in the environmental management of this type of facilities
- Study the profitability of a power generation plant based on production revenues/costs, plant economics and financial planning

Module 2. Industrial Boilers for Electric Power Generation and Production

- Interpret the concepts of energy and heat involved in the production of electrical energy, together with the different fuels involved in the process
- Address the analysis and study of the thermodynamic processes that occur during the operation of industrial processes for the generation of electrical energy
- Break down the components and equipment that make up the steam generators used in the production of electrical energy
- Acquire knowledge of the operation of the systems that are part of steam generators
- Analyze the operating procedures of steam generators for safe functionality
- Correctly manage the different controls to which steam generators used for electric power generation must be subjected

Module 3. Conventional Thermal Plants

- Interpret the production process of conventional thermal power plants together with the different systems involved
- Addressing start-up and planned shutdowns in this type of power plant
- Know in detail the composition of power generation equipment and its auxiliary systems
- Acquire the necessary knowledge to optimize the operation of turbogenerators, turbines and auxiliary systems that are part of the power generation process in a conventional power plant
- You will correctly manage the physical-chemical treatment of water to be converted into steam for energy production, together with the failures that occur due to poor treatment
- Correct sizing of the flue gas treatment and purification system to minimize the environmental impact of this type of power plant and comply with new environmental regulations and legislation
- Prepare documentation related to the safety and design of steam generators in conventional thermal power plants
- Analyze alternatives to traditional fuels and the modifications to be made to a conventional plant to adapt it to renewable fuels

Module 4. Solar Generation

- 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
- To 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

Module 5. Combined Cycle

- Coordinate the operation of the different systems that are part of the combined cycle facilities
- Sizing improvements in the thermodynamic processes of energy production in this type of power plants
- Detailed knowledge of the protocols and treaties on atmospheric emissions and how they influence combined cycle plants
- Acquire the necessary knowledge to optimize the operation of gas turbines, reciprocating engines and waste heat boilers
- Identify the parameters that affect the performance of the combined cycle power plant
- Structuring the auxiliary systems of combined cycle plants
- Select the ideal operating level based on the different types of existing combined cycle plants
- Develop projects for hybridization of combined cycles with solar energy

Module 6. Cogeneration

- Establish the operating and safety criteria according to the requirements of the system to be supported by cogeneration
- Analyze the different types of cycles that can exist in cogeneration plants
- Know in detail the technology associated with reciprocating engines and turbines used in cogeneration plants
- Deepen the knowledge of pyrotubular steam generators
- Integrate the operation of the various technologies used in the machines with absorption techniques
- Assigning priorities in trigeneration, tetrageneration and microcogeneration facilities
- Supervise and control the correct operation of cogeneration plants with tail cycle
- Select the type and size of the cogeneration plant according to the energy needs to be covered in the adjacent installations
- Identify new trends in cogeneration plants

Module 7. Hydraulic Power Plants

- 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

Module 8. Wind Generation and Offshore Energy

- 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

Module 9. Nuclear Power Plants

- Analyze the fundamentals of nuclear energy and its potential for energy generation today
- Evaluate the parameters involved in nuclear reactions
- Identify the components, equipment and functionality of the systems of a nuclear power plant
- Deepen in the operation of the different types of reactors currently operating in nuclear power plants
- Optimize the performance of thermodynamic processes in nuclear power plants
- Establish operational and operating guidelines for safety in this type of plants
- Know in detail the treatment associated with the waste produced in nuclear power plants, together with the decommissioning and decommissioning of a nuclear power plant
- Deepen knowledge of the evolution of nuclear power plants and the new generation of power plants to be built in the near future
- Evaluate the potential of SMR small modular reactors

Module 10. Construction and Operation of Electric Power Production Plants

- Selecting the most beneficial type of contract for the construction of a power production plant
- Analyze how the exploitation of renewable energies affects the Electricity Market
- Perform maintenance to optimize the performance of the steam generators
- Diagnose failures in gas and steam turbines and reciprocating engines
- Elaborate the maintenance plan of a wind farm
- Execute and design the maintenance plan of a photovoltaic plant
- Study the profitability of a production plant by analyzing its life cycle
- In-depth knowledge of the elements attached to an electric power production plant for its discharge to the distribution network

03

Skills

The structure of this Professional Master's Degree has been designed in such a way that the professional to whom it is addressed is able to understand the knowledge of the techniques and technologies of electricity generation, as well as its economic management in relation to the electricity market. In this way, TECH guarantees students a quality syllabus according to their expectations, giving them the opportunity to stand out in this industrial sector. To their expectations, giving them the opportunity to stand out in this industrial sector. You will be qualified, therefore, to perform the various functions related to this Professional Master's Degree, including consultancy work, thus guiding you towards excellence in your professional career.

The skills that you will acquire after completing this program will guide you towards the successful planning of the production of electrical energy with guaranteed success"

General Skills

- Qualify as a Specialist Technician in Electric Power Production Planning
- Qualify as a Specialist Technician in Maintenance of Electric Power Production Plants
- Integrate the operation of a Power Plant within the Electricity Market

This Professional Master's Degree qualifies you as a Specialist Technician in Maintenance of Power Generation Plants"

Specific Skills

- Design Power Generation Plant Projects
- Work as a Power Generation Plant Project Manager
- Working as site manager of Power Generation Plants
- Be able to manage Energy Production Energy Consortiums
- Coordinate and plan the Maintenance of Energy Production Plants
- Coordinate and plan the maintenance of factories/companies with their own energy generation
- Manage implementation and installation departments of Power Generation Plants in large installers and integrators
- Access to management positions in the Energy Resources Business Areas

04

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 the specialty of the electric energy sector, its generation, its techniques and technologies, as well as its economy, such as the promotion and exploitation of the different energy generating plants. For this reason, this Professional Master's Degree has a highly qualified team with extensive experience in the sector, which will offer the best possible resources for students in the development of their skills during the course. In this way, the student has the guarantees required to specialize in a sector in full update.

Learn from the best and you will develop the skills you need to perform energy industry tasks successfully"

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

05

Structure and Content

The structure of the contents of this program has been designed by a team of professional industrial engineers and energy production consultants who put all their knowledge and experience into the syllabus. It comprises ten modules that integrate from the techniques and knowledge necessary for the development of projects and the methodologies of their design to the structuring of financing, evaluation and implementation of the same, both in planning and subsequent maintenance. Therefore, it deals with the different power generation systems, with special attention to renewable energies; economic management and the construction and operation of power generation plants. 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 the feasibility of projects focused on renewable energies and you will be able to elaborate an economic-financial analysis of the available resources successfully"

Module 1. Economics of Electricity Generation

1.1. Electric Generation Technologies
   - 1.1.1. Generation Activity
   - 1.1.2. Hydraulic Power Plants
   - 1.1.3. Conventional Thermal Plants
   - 1.1.4. Combined Cycle
   - 1.1.5. Cogeneration
   - 1.1.6. Wind
   - 1.1.7. Solar
   - 1.1.8. Biomass
   - 1.1.9. Tidal
   - 1.1.10. Geothermal

1.2. Production Technologies
   - 1.2.1. Features
   - 1.2.2. Installed Power
   - 1.2.3. Power Demand

1.3. Renewable Energies
   - 1.3.1. Characterization and Technologies
   - 1.3.2. Economy of Renewable Energies
   - 1.3.3. Integration of Renewable Energies

1.4. Financing of a Generation Project
   - 1.4.1. Financial Alternatives
   - 1.4.2. Financial Instruments
   - 1.4.3. Financial Strategies

1.5. Valuation of Investments in Power Generation
   - 1.5.1. Current Net Value
   - 1.5.2. Internal Rate of Return
   - 1.5.3. Capital Asset Pricing Model (CAPM)
   - 1.5.4. Recuperation of Investment
   - 1.5.5. Limitations to Traditional Techniques

1.6. Real Options
   - 1.6.1. Typology
   - 1.6.2. Principles of Option Pricing
   - 1.6.3. Types of Real Options

1.7. Assessment of Real Options
   - 1.7.1. Probability
   - 1.7.2. Processes
   - 1.7.3. Volatility
   - 1.7.4. Estimation of the Value of the Underlying Asset

1.8. Economic-Financial Feasibility Analysis
   - 1.8.1. Initial Investment
   - 1.8.2. Direct Expenses
   - 1.8.3. Income

1.9. Financing with Own Resources
   - 1.9.1. Corporate Income Tax
   - 1.9.2. Cash Flows
   - 1.9.3. Payback
   - 1.9.4. Net Present Value
   - 1.9.5. Internal Rate of Return

1.10. Partial Debt Financing
   - 1.10.1. Loan
   - 1.10.2. Corporate Income Tax
   - 1.10.3. Cash Flows
   - 1.10.4. Debt Service Coverage Ratio
   - 1.10.5. Shareholder Cash Flow
   - 1.10.6. Shareholder Payback
   - 1.10.7. Net Present Value of Shareholders
   - 1.10.8. Internal Rate of Return to Shareholders

Module 2. Industrial Boilers for Electric Power Generation and Production

2.1. Energy and Heat
- 2.1.1. Fuels
- 2.1.2. Energy
- 2.1.3. Thermal Power Generation Process

2.2. Steam Power Cycles
- 2.2.1. Carnot Power Cycle
- 2.2.2. Simple Rankine Cycle
- 2.2.3. Rankine Cycle with Superheating
- 2.2.4. Effects of Pressure and Temperature on the Rankine Cycle
- 2.2.5. Ideal Cycle Vs Real Cycle
- 2.2.6. Ideal Rankine Cycle with Superheating

2.3. Steam Thermodynamics
- 2.3.1. Steam
- 2.3.2. Types of Steam
- 2.3.3. Thermodynamic Processes

2.4. Steam Generator
- 2.4.1. Functional Analysis.
- 2.4.2. Parts of a Steam Generator
- 2.4.3. Equipment of a Steam Generator

2.5. Water-Tube Boilers for Power Generation
- 2.5.1. Natural Circulation
- 2.5.2. Forced Circulation
- 2.5.3. Water-Steam Circuit

2.6. Systems of the Steam Generator I
- 2.6.1. Fuel System
- 2.6.2. Air Combustion System
- 2.6.3. Water Treatment System

2.7. Systems of the Steam Generator II
- 2.7.1. Water Preheating System
- 2.7.2. Gas Combustion System
- 2.7.3. Blower Systems

2.8. Safety in Steam Generator Operation
- 2.8.1. Safety Standards
- 2.8.2. BMS for Steam Generators
- 2.8.3. Functional Requirements

2.9. Control System
- 2.9.1. Fundamental Principles
- 2.9.2. Control Mode
- 2.9.3. Basic Operations

2.10. The Control of a Steam Generator
- 2.10.1. Basic Controls
- 2.10.2. Combustion Control
- 2.10.3. Other Variables to Control

Module 3. Conventional Thermal Plants

3.1. Process in Conventional Thermal Power Plants
- 3.1.1. Steam Generator
- 3.1.2. Steam Turbines
- 3.1.3. Condensing System
- 3.1.4. Feed Water System

3.2. Start-up and Shutdown
- 3.2.1. Start-up Process
- 3.2.2. Turbine Wheel
- 3.2.3. Synchronization of the Unit
- 3.2.4. Unit Charging Socket
- 3.2.5. Stop

3.3. Power Generation Equipment
- 3.3.1. Electric Turbogenerator
- 3.3.2. Steam Turbine
- 3.3.3. Parts of a Turbine
- 3.3.4. Auxiliary System of the Turbine
- 3.3.5. Lubrication and Control System

3.4. Electric Generator
- 3.4.1. Synchronous Generator
- 3.4.2. Parts of the Synchronous Generator
- 3.4.3. Generator Excitation
- 3.4.4. Voltage Regulator
- 3.4.5. Generator Cooling
- 3.4.6. Generator Protections

3.5. Water Treatment
- 3.5.1. Water for Steam Generation
- 3.5.2. External Water Treatment
- 3.5.3. Internal Water Treatment
- 3.5.4. Effects of Fouling
- 3.5.5. Corrosion Effects

3.6. Efficiency
- 3.6.1. Mass and Energy Balance
- 3.6.2. Combustion
- 3.6.3. Efficiency of the Steam Generator
- 3.6.4. Heat Loss

3.7. Environmental Impact
- 3.7.1. Environmental Protection
- 3.7.2. Environmental Impact of Thermal Power Plants
- 3.7.3. Sustainable Development
- 3.7.4. Smoke Treatment

3.8. Conformity Assessment
- 3.8.1. Requirements
- 3.8.2. Manufacturer Requirements
- 3.8.3. Boiler Requirements
- 3.8.4. User Requirements
- 3.8.5. Operator Requirements

3.9. Security/Safety
- 3.9.1. Fundamental Principles
- 3.9.2. Design
- 3.9.3. Fabrication
- 3.9.4. Materials

3.10. New Trends in Conventional Power Plants
- 3.10.1. Biomass
- 3.10.2. Wate
- 3.10.3. Geothermal

Module 4. Solar Generation

4.1. Energy Collection
- 4.1.1. Solar Radiation
- 4.1.2. Solar Geometry
- 4.1.3. Optical Path of Solar Radiation
- 4.1.4. Orientation of Solar Collectors
- 4.1.5. Peak Sun Hours

4.2. Isolated Photovoltaic Systems
- 4.2.1. Solar Cells
- 4.2.2. Solar Collectors
- 4.2.3. Charge Regulator
- 4.2.4. Batteries
- 4.2.5. Inverters
- 4.2.6. Design of an Installation

4.3. Grid-Connected Photovoltaic Systems
- 4.3.1. Solar Collectors
- 4.3.2. Monitoring Structures
- 4.3.3. Inverters

4.4. Solar PV for Self-Consumption
- 4.4.1. Design Requirements
- 4.4.2. Energy Demand
- 4.4.3. Viability

4.5. Thermoelectric Power Plants
- 4.5.1. Operation
- 4.5.2. Components
- 4.5.3. Advantages over Non-concentrating Systems

4.6. Medium Temperature Concentrators
- 4.6.1. Parabolic-Cylinder CCP
- 4.6.2. Linear Fresnel
- 4.6.3. Fixed Mirror FMSC
- 4.6.4. Fresnel Lenses

4.7. High Temperature Concentrators
- 4.7.1. Solar Tower
- 4.7.2. Parabolic Discs
- 4.7.3. Receiving Unit

4.8. Parameters
- 4.8.1. Angles
- 4.8.2. Opening Area
- 4.8.3. Concentration Factor
- 4.8.4. Interception Factor
- 4.8.5. Optic Efficiency
- 4.8.6. Thermal Efficiency

4.9. Energy Storage
- 4.9.1. Thermal Fluid
- 4.9.2. Thermal Storage Technologies
- 4.9.3. Rankine Cycle with Thermal Storage

4.10. Design of 50 MW Thermoelectric Power Plant with CCP
- 4.10.1. Solar Field
- 4.10.2. Power Block
- 4.10.3. Electricity Production

Module 5. Combined Cycle

5.1. Combined Cycle
- 5.1.1. Current Combined Cycle Technology
- 5.1.2. Thermodynamics of Combined Gas-Steam Cycles
- 5.1.3. Future Trends in Combined Cycle Development

5.2. International Agreements for Sustainable Development
- 5.2.1. Kyoto Protocol
- 5.2.2. Montreal Protocol
- 5.2.3. Paris Climate

5.3. Brayton Cycle
- 5.3.1. Ideal
- 5.3.2. Real
- 5.3.3. Cycle Improvements

5.4. Rankine Cycle Improvements
- 5.4.1. Intermediate Reheating
- 5.4.2. Regeneration
- 5.4.3. Use of Supercritical Pressures

5.5. Gas Turbine
- 5.5.1. Operation
- 5.5.2. Performance
- 5.5.3. Systems and Subsystems
- 5.5.4. Classification

5.6. Recovery Boiler
- 5.6.1. Recovery Boiler Components
- 5.6.2. Pressure Levels
- 5.6.3. Performance
- 5.6.4. Characteristic Parameters

5.7. Steam Turbines
- 5.7.1. Components
- 5.7.2. Operation
- 5.7.3. Performance

5.8. Auxiliary Systems
- 5.8.1. Cooling System
- 5.8.2. Combined Cycle Performance
- 5.8.3. Advantages of Combined Cycles

5.9. Pressure Levels in Combined Cycles
- 5.9.1. A Level
- 5.9.2. Two Levels
- 5.9.3. Three Levels
- 5.9.4. Typical Configurations

5.10. Combined Cycle Hybridization
- 5.10.1. Fundamentals
- 5.10.2. Economic Analysis
- 5.10.3. Emission Savings

Module 6. Cogeneration

6.1. Structural Analysis
- 6.1.1. Functionality
- 6.1.2. Heat Needs
- 6.1.3. Alternatives in the Processes
- 6.1.4. Justification

6.2. Types of Heat
- 6.2.1. With Reciprocating Gas or Fuel Oil Engine
- 6.2.2. With a Gas Turbine
- 6.2.3. With a Steam Turbine
- 6.2.4. In Combined Cycle with Gas Turbine
- 6.2.5. In Combined cycle with Reciprocating Engine

6.3. Alternative Motors
- 6.3.1. Thermodynamic Effects
- 6.3.2. Gas Engine and Auxiliary Elements
- 6.3.3. Energy Recovery

6.4. Pyrotubular Boilers
- 6.4.1. Types of Boilers
- 6.4.2. Combustion
- 6.4.3. Water Treatment

6.5. Absorption Machines
- 6.5.1. Operation
- 6.5.2. Absorption Vs Compression
- 6.5.3. Water/Lithium Bromide
- 6.5.4. Ammonia/Water

6.6. Trigeneration, Tetrageneration and Microcogeneration
- 6.6.1. Trigeneration
- 6.6.2. Tetrageneration
- 6.6.3. Microcogeneration

6.7. Exchangers
- 6.7.1. Classification
- 6.7.2. Air-Cooled Exchangers
- 6.7.3 Plate Heat Exchangers

6.8. Tail Cycles
- 6.8.1. ORC Cycles
- 6.8.2. Organic Fluids
- 6.8.3. Kalina Cycle

6.9. Selection of Cogeneration Plant Type and Size
- 6.9.1. Design
- 6.9.2. Types of Technologies
- 6.9.3. Selection of Fuel
- 6.9.4. Dimensioning

6.10. New Trends in Cogeneration Plants
- 6.10.1. Services
- 6.10.2. Gas Turbines
- 6.10.3. Alternative Motors

Module 7. Hydraulic Power Plants

7.1. Water Resources
- 7.1.1. Fundamentals
- 7.1.2. Dam Utilization
- 7.1.3. Bypass Utilization
- 7.1.4. Mixed Use

7.2. Operation
- 7.2.1. Installed Power
- 7.2.2. Produced Energy
- 7.2.3. Height of the Waterfall
- 7.2.4. Flow Rate
- 7.2.5. Components

7.3. Turbines
- 7.3.1. Pelton
- 7.3.2. Francis
- 7.3.3. Kaplan
- 7.3.4. Michell-Banky
- 7.3.5. Turbine Selection

7.4. Dams
- 7.4.1. Fundamental Principles
- 7.4.2. Typology
- 7.4.3. Composition and Operation
- 7.4.4. Drainage

7.5. Pumping Power Plants
- 7.5.1. Operation
- 7.5.2. Technology
- 7.5.3. Advantages and Disadvantages
- 7.5.4. Pumped Storage Plants

7.6. Civil Works Equipment
- 7.6.1. Water Retention and Storage
- 7.6.2. Controlled Flow Evacuation
- 7.6.3. Elements of Water Conduction
- 7.6.4. Water Hammer
- 7.6.5. Balancing Chimney
- 7.6.6. Turbine Chamber

7.7. Electromechanical Equipment
- 7.7.1. Gratings and Grille Cleaners
- 7.7.2. Opening and Closing of the Water Passage
- 7.7.3. Hydraulic Equipment

7.8. Electrical Equipment
- 7.8.1. Generator
- 7.8.2. Opening and Closing of the Water Passage
- 7.8.3. Asynchronous Start-up
- 7.8.4. Starting by Auxiliary Machine
- 7.8.5. Variable Frequency Starting

7.9. Regulation and Control
- 7.9.1. Generation Voltage
- 7.9.2. Speed of the Turbine
- 7.9.3. Dynamic Answer
- 7.9.4. Network Coupling

7.10. Minihydraulics
- 7.10.1. Water Intake
- 7.10.2. Cleaning of Solids
- 7.10.3. Conduction
- 7.10.4. Pressure Chambers
- 7.10.5. Pressure Piping
- 7.10.6. Machinery
- 7.10.7. Suction Pipe
- 7.10.8. Output Channel

Module 8. Wind Generation and Offshore Energy

8.1. The Wind
- 8.1.1. Origin
- 8.1.2. Horizontal Gradient
- 8.1.3. Measurement
- 8.1.4. Obstacles

8.2. The Wind Resource
- 8.2.1. Wind Measurement
- 8.2.2. The Wind Rose
- 8.2.3. Factors that Affect the Wind

8.3. Wind Turbine Study
- 8.3.1. Betz Limit
- 8.3.2. The Rotor of a Wind Turbine
- 8.3.3. Electrical Power Generated
- 8.3.4. Power Regulation

8.4. Components of a Wind Turbine
- 8.4.1. Tower
- 8.4.2. Rotor
- 8.4.3. Multiplier Box
- 8.4.4. Brakes

8.5. Wind Turbine Operation
- 8.5.1. Generating Systems
- 8.5.2. Direct and Indirect Connection
- 8.5.3. Control System
- 8.5.4. Tendencies

8.6. Feasibility of a Wind Farm
- 8.6.1. Location
- 8.6.2. Wind Resource Study
- 8.6.3. Energy Production
- 8.6.4. Economic Study

8.7. Offshore Wind: Offshore Technology
- 8.7.1. Wind Turbines
- 8.7.2. Superficial
- 8.7.3. Electrical Connexion
- 8.7.4. Installation Vessels
- 8.7.5. ROVs

8.8. Offshore Wind: Supporting Wind Turbines
- 8.8.1. Hywind Scotland, Statoil Platform Spar
- 8.8.2. WinfFlota; Principal Power Platform Semisub
- 8.8.3. GICON SOF Platform TLP
- 8.8.4. Comparison

8.9. Offshore Energy
- 8.9.1. Tidal Energy
- 8.9.2. Oceanic Gradient Energy (OTEC)
- 8.9.3. Salt or Osmotic Gradient Energy
- 8.9.4. Energy from Ocean Currents

8.10. Wave Energy
- 8.10.1. Waves as a Source of Energy
- 8.10.2. Classification of Conversion Technologies
- 8.10.3. Current Technology

Module 9. Nuclear Power Plants

9.1. Theoretical Basis
- 9.1.1. Fundamentals
- 9.1.2. Binding Energy
- 9.1.3. Nuclear Stability

9.2. Nuclear Reaction
- 9.2.1. Fission
- 9.2.2. Fusion
- 9.2.3. Other Reactions

9.3. Components of a Nuclear Reactor
- 9.3.1. Fuels
- 9.3.2. Moderator
- 9.3.3. Biological Barrier
- 9.3.4. Control Barriers
- 9.3.5. Reflector
- 9.3.6. Reactor Shell
- 9.3.7. Coolant

9.4. Most Common Types of Reactors
- 9.4.1. Types of Reactors
- 9.4.2. Pressurized Water Reactor
- 9.4.3. Boiling Water Reactor

9.5. Other Types of Reactors
- 9.5.1. Heavy Water Reactors
- 9.5.2. Gas-Cooled Reactor
- 9.5.3. Channel Type Reactor
- 9.5.4. Fast Breeder Reactor

9.6. Rankine Cycle in Nuclear Power Plants
- 9.6.1. Differences between Thermal and Nuclear Power Plant Cycles
- 9.6.2. Rankine Cycle in Boiling Water Power Plants
- 9.6.3. Rankine Cycle in Heavy Water Power Plants
- 9.6.4. Rankine Cycle in Pressurized Water Power Plants

9.7. Nuclear Power Plant Safety
- 9.7.1. Safety in Design and Construction
- 9.7.2. Safety by Means of Barriers against the Release of Fission Products
- 9.7.3. Security through Systems
- 9.7.4. Redundancy, Single Fault and Physical Separation Criteria
- 9.7.5. Operation Safety

9.8. Radioactive Waste, Dismantling and Decommissioning of Facilities
- 9.8.1. Radioactive Waste
- 9.8.2. Dismantling
- 9.8.3. Closing

9.9. Future Tendencies Generation IV
- 9.9.1. Gas- Quickly Cooled Reactor
- 9.9.2. Lead-Cooled Fast Reactor
- 9.9.3. Molten Salt Fast Reactor
- 9.9.4. Water-Cooled Supercritical Water Reactor
- 9.9.5. Sodium-Cooled Fast Reactor
- 9.9.6. Very High Temperature Reactor
- 9.9.7. Evaluation Methodology
- 9.9.8. Risk of Explosion Evaluation

9.10. Small Modular Reactors SMR
- 9.10.1. SMR
- 9.10.2. Advantages and Disadvantages.
- 9.10.3. Types of SMR

Module 10. Construction and Operation of Electric Power Production Plants

10.1. Construction
- 10.1.1. EPC
- 10.1.2. EPCM
- 10.1.3. Open Book

10.2. Exploitation of Renewable Energy in the Electricity Market
- 10.2.1. Increase in Renewable Energies
- 10.2.2. Market Failures
- 10.2.3. New Tendencies in Markets

10.3. Steam Generator Maintenance
- 10.3.1. Water Pipes
- 10.3.2. Steam Pipes
- 10.3.3. Recommendations

10.4. Turbine and Motor Maintenance
- 10.4.1. Gas Turbines
- 10.4.2. Steam Turbines
- 10.4.3. Alternative Motors

10.5. Wind Park Maintenance
- 10.5.1. Types of Faults
- 10.5.2. Component Analysis
- 10.5.3. Strategies

10.6. Nuclear Power Plant Maintenance
- 10.6.1. Structures, Systems and Components
- 10.6.2. Behavioral Criteria
- 10.6.3. Behavioral Assessment

10.7. Maintenance of Photovoltaic Power Plants
- 10.7.1. Panels
- 10.7.2. Inverters
- 10.7.3. Energy Evacuation

10.8. Hydraulic Plant Maintenance
- 10.8.1. Catchment
- 10.8.2. Turbine
- 10.8.3. Generator
- 10.8.4. Valves
- 10.8.5. Cooling
- 10.8.6. Oleohydraulics
- 10.8.7. Regulation
- 10.8.8. Rotor Braking and Lifting
- 10.8.9. Excitement
- 10.8.10. Synchronization

10.9. Life Cycle of Power Plants
- 10.9.1. Analysis of Life Cycle
- 10.9.2. LCA Methodologies
- 10.9.3. Limitations

10.10. Auxiliary Elements in Production Plants
- 10.10.1. Evacuation Lines
- 10.10.2. Electrical Substations
- 10.10.3. Protections

This Professional Master's Degree in Electricity Generation, Promotion, Technology and Exploitation of TECH will make you stand out professionally, boosting your career towards excellence in the sector"

06
Methodology

This training program offers 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 a revolutionary method of skills and knowledge development. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

At TECH, you will experience a way of learning that is shaking the foundations of traditional universities around the world"

We are the first online university 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 intensive Engineering program at TECH Technological University prepares you to face all the challenges in this field, both nationally and internationally. We are committed to promoting your personal and professional growth, the best way to strive for success, that is why at TECH Technological University you will use Harvard case studies, with which we have a strategic agreement that allows us, to offer you material from the best university in the world.

> *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 by 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

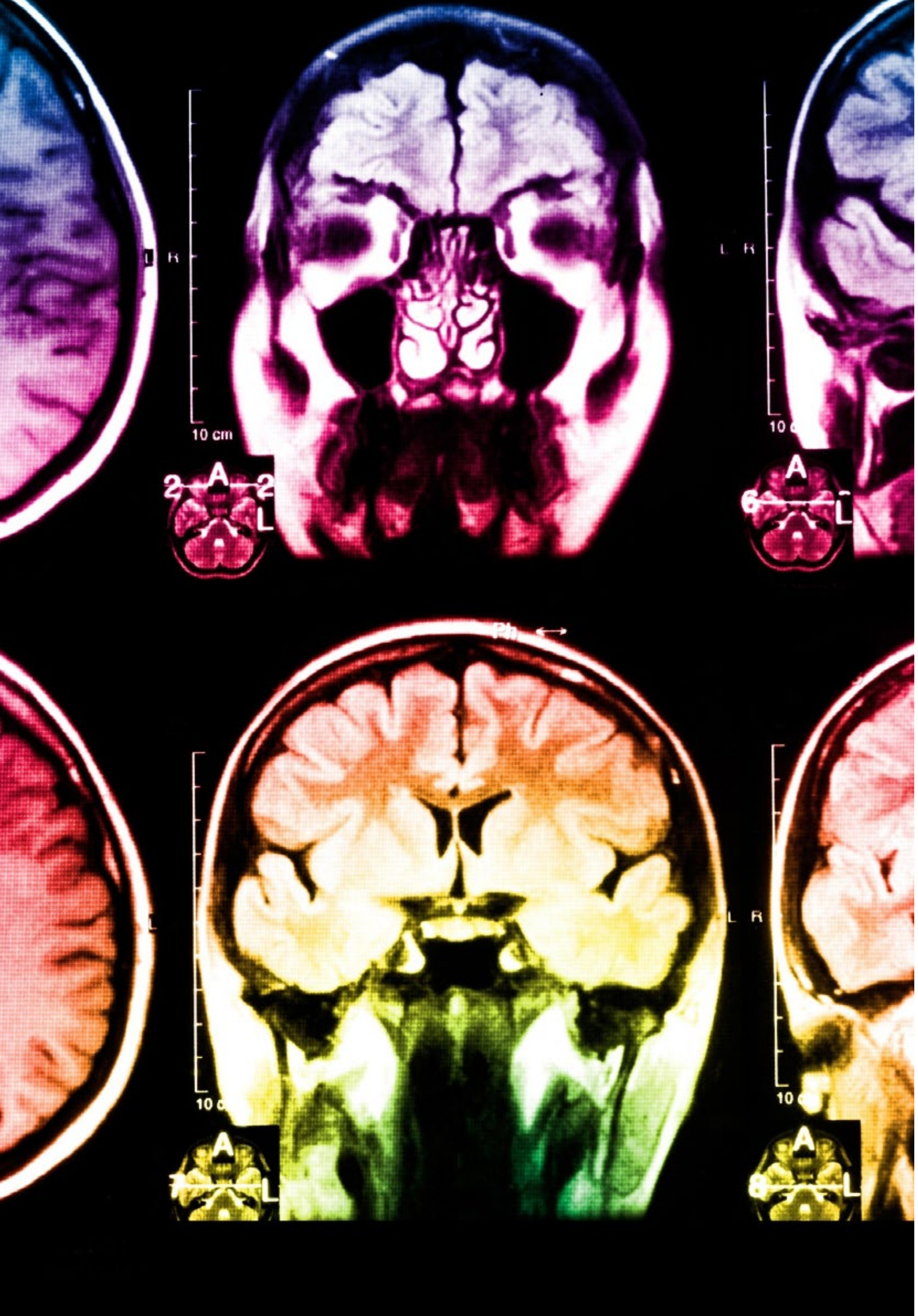
TECH is the first university in the world to combine Harvard University case studies with a 100% online learning system based on repetition, which combines 8 different didactic elements in each lesson.

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

In 2019, we obtained the best learning results of all 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 university 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

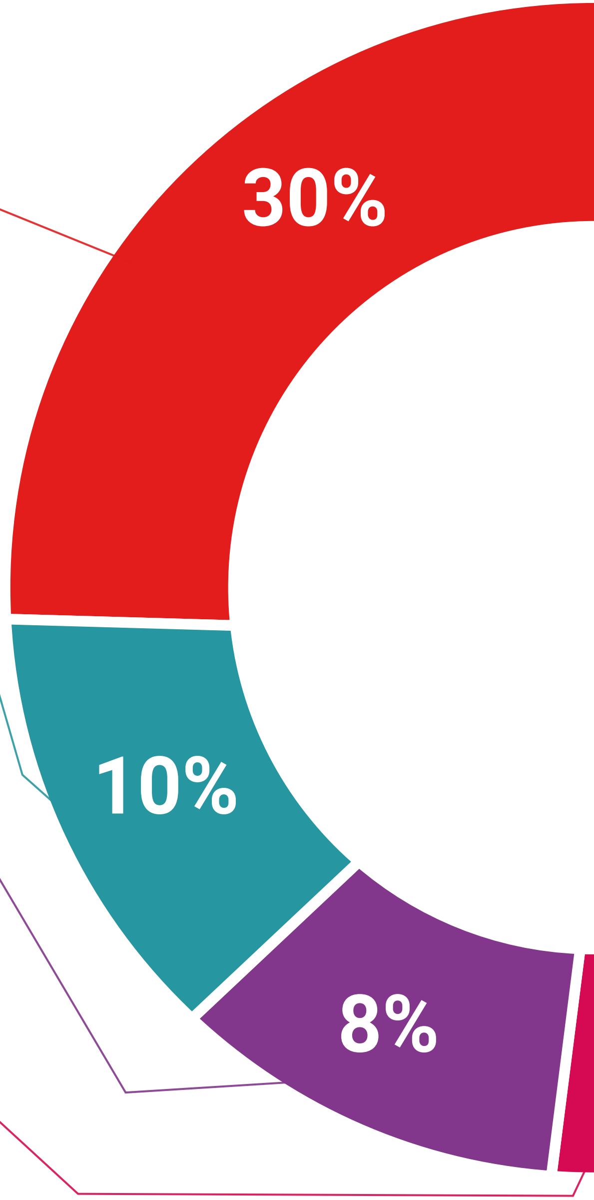
There is scientific evidence suggesting that observing third-party experts can be useful. Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

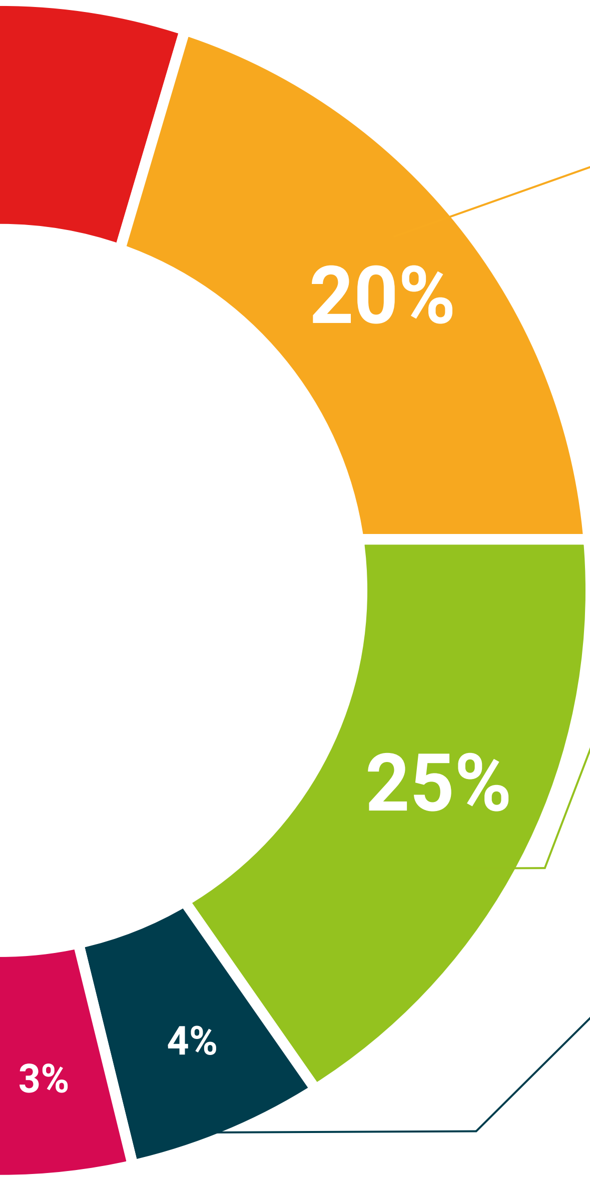
Practising Skills and Abilities

They will carry out activities to develop specific competencies and skills in each thematic 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 and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





Case Studies

They 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 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 multimedia content presentation training Exclusive system 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 your goals.

07

Certificate

The Professional Master's Degree in Power Generation, Promotion, Technology and Operations guarantees, in addition to the most rigorous and update training, access to a Professional Master's Degree issued by TECH Technological University.

Successfully complete this training and receive your university degree without travel or laborious paperwork"

This **Professional Master's Degree in Power Generation, Promotion, Technology and Operations** contains the scientific most complete and update program on the market.

After you have passed the evaluations, you will receive your corresponding by **Professional Master's Degree** issued by **TECH Technological University** via tracked delivery*.

The diploma issued by **TECH Technological University** will reflect the qualification obtained in the Professional Master's Degree, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional from career evaluation committees.

Title: **Professional Master's Degree in Power Generation, Promotion, Technology and Operations**

Official N° of hours: **1,500 h.**

tech technological university

Awards the following

DIPLOMA

to

Mr./Ms. _________________, with identification number ____________.

For having successfully passed and accredited the following program

PROFESSIONAL MASTER'S DEGREE

in

Power Generation, Promotion, Technology and Operations

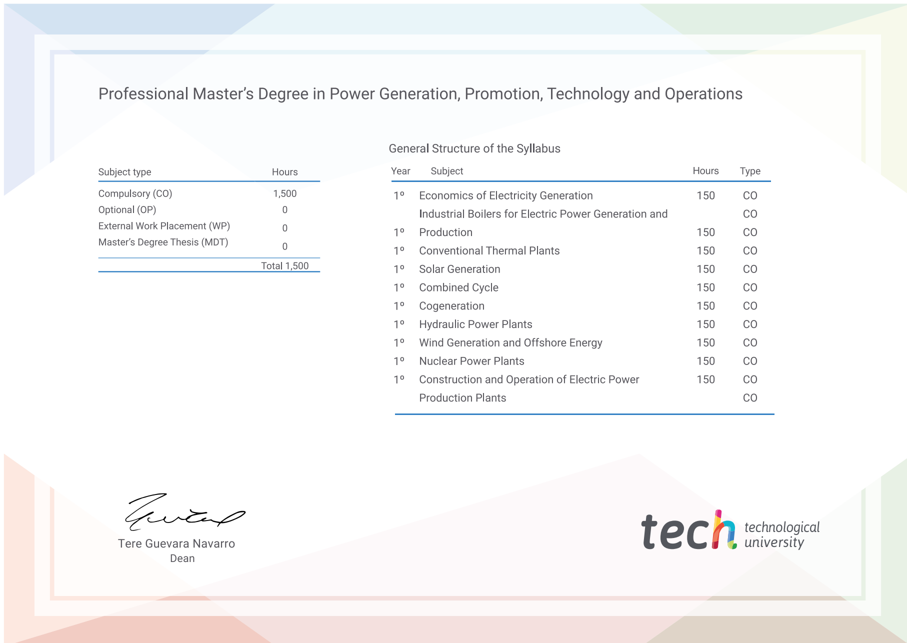
This is a qualification awarded by this University, equivalent to 1,500 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

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



Professional Master's Degree in Power Generation, Promotion, Technology and Operations

Subject type	Hours
Compulsory (CO)	1,500
Optional (OP)	0
External Work Placement (WP)	0
Master's Degree Thesis (MDT)	0
	Total 1,500

General Structure of the Syllabus

Year	Subject	Hours	Type
1º	Economics of Electricity Generation	150	CO
	Industrial Boilers for Electric Power Generation and		CO
1º	Production	150	CO
1º	Conventional Thermal Plants	150	CO
1º	Solar Generation	150	CO
1º	Combined Cycle	150	CO
1º	Cogeneration	150	CO
1º	Hydraulic Power Plants	150	CO
1º	Wind Generation and Offshore Energy	150	CO
1º	Nuclear Power Plants	150	CO
1º	Construction and Operation of Electric Power	150	CO
	Production Plants		CO

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Dean

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

Professional Master's Degree
Power Generation, Promotion, Technology and Operations

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Technological University**
- Dedication: **16h/week**
- Schedule: **at your own pace**
- Exams: **online**

Professional Master's Degree

Power Generation, Promotion, Technology and Operations