Postgraduate Diploma

Economics and Operation of Power Plants: Combined Cycle and Cogeneration Plants

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Postgraduate Diploma

Economics and Operation of Power Plants: Combined Cycle and Cogeneration Plants

- 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-economics-operation-power-plants-combined-cycle-congeneration-plants**

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01

Introduction

Due to the boom that this technology is having, especially in the residential and industrial fields, the program studies in detail its operation, the alternatives in different processes, and the justification for its construction. In turn, it focuses on the administrative and financial aspect of power plants, with special attention to their profitability, from cost until their construction is completed and their operation begins. It also deepens the knowledge of the different combined cycle power plants, their operation and conditions, as well as the technology used in this type of power plants, the influence of the different variables in this type of production and the future trends in their development and evolution. The same approach is followed for cogeneration plants. However, this program is essential for the specialization of the professional in the energy sector.

Your next challenge will be to analyze the associated energy evacuation system that every power generation plant must have, together with the associated protections. And you will achieve it with this Postgraduate Diploma!"

This Postgraduate Diploma contains the most complete program on Economics and Power Plant and Operation of Power Plants: Combined Cycle and Cogeneration Plants. It details how the integration of the different technologies within the power generation park is operated and regulated, and addresses production technologies according to their characteristics, installed capacity and energy demand. It also includes the integration of renewable energies into the electricity generation market.

The student will learn how to perform investment appraisals for the viability and profitability of a power generation plant, as well as how to finance a power generation plant with equity and debt. All this will allow you to perform an in-depth analysis of preliminary projects and studies, since the technical-economic variables and the feasibility of the investment required for the implementation and construction of power generation projects are studied.

On the other hand, the program establishes the influence of international environmental agreements and how they affect the electricity generation activity, analyzing the thermodynamic processes of this type of power plants and how to improve their efficiency and productivity. Thus, the student deepens in all the necessary knowledge to be able to work, operate and design the gas turbines that are part of this type of power plants.

Finally, before embarking on the construction of an electricity generating plant, we must know what type of recruitment we will use for its execution. Therefore, we will study the different types of recruitment that exist, with their different characteristics. Moreover, 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. They will only need a device with internet access to take their 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 that is continuously changing, in line with the SDGs promoted by the UN.

This **Postgraduate Diploma in Economics and Operation of Power Plants: Combined Cycle and Cogeneration Plants** 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
- 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 learn more about how renewable energies are integrated into the Electricity Market and the international agreements related to the emission of pollutants into the atmosphere"

With this Postgraduate Diploma you will deepen your knowledge in the operation and performance of the steam turbine, as it is a fundamental part of power plants"

You will discover a new approach to the evolution and new trends in cogeneration plants as never before.

Due to its economic importance, you will learn how the life cycle of electricity generating plants evolves.

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

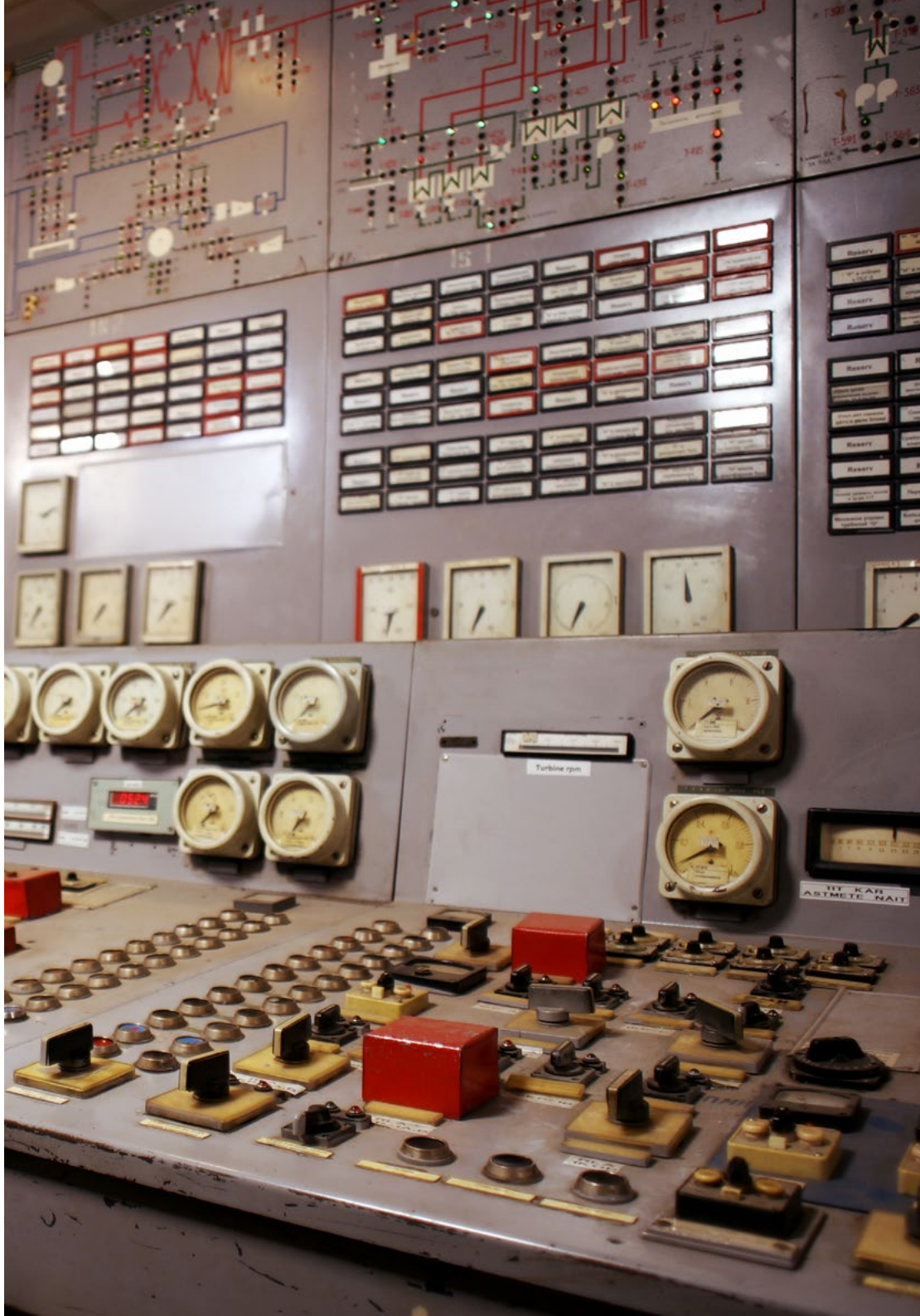
The Postgraduate Diploma in Economics and Operation of Power Plants: Combined Cycle and Cogeneration Plants is oriented towards the student acquiring the necessary skills to undertake various functions oriented to the economic-financial administration of a power plant, as well as its operation. The student will discover the latest trends, technologies and techniques of the sector, which will enable them to successfully manage maintenance plans for energy production plants, coordinate the operation of the different systems that are part of the combined cycle facilities, establish the operating and safety criteria according to the requirements of the system to be supported by cogeneration or analyze how the operation of renewable energies affects the Electricity Market.

You will successfully coordinate the operation of the different systems that are part of the combined cycle facilities thanks to this TECH program"

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 study in depth the elements attached to an electric power production plant for its discharge to the distribution network and you will study its profitability by analyzing its life cycle"



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. 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 3. 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 4. 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

Course Management

In its maxim of offering an elite education for all, TECH relies on renowned professionals so that the student acquires a solid knowledge in economic management and operation of combined cycle and cogeneration power plants. For this reason, this program has highly qualified professionals with extensive experience in the sector, whose trajectory has propelled them to the top. In this way, TECH offers students the opportunity to learn from the best, who will provide them with the tools they need to develop their skills during the course.

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

04

Structure and Content

The structure of the contents of this program has been designed by industrial engineering professionals who work as electrical energy consultants, focused on the economic management and operation of Combined Cycle and cogeneration power plants. Thus, the program comprises the most advanced knowledge in economics and the latest updates on this area of the energy sector, distributed in four modules. A comprehensive and complete syllabus that is presented as unique in the market today, with which the professional will acquire full competence for their day-to-day work, specializing in areas of the future.

Become an expert in the different power generation technologies and perform successful economic-financial feasibility analyses"

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. Combined Cycle

2.1. Combined Cycle
- 2.1.1. Current Combined Cycle Technology
- 2.1.2. Thermodynamics of Combined Gas-Steam Cycles
- 2.1.3. Future Trends in Combined Cycle Development

2.2. International Agreements for Sustainable Development
- 2.2.1. Kyoto Protocol
- 2.2.2. Montreal Protocol
- 2.2.3. Paris Climate

2.3. Brayton Cycle
- 2.3.1. Ideal
- 2.3.2. Real
- 2.3.3. Cycle Improvements

2.4. Rankine Cycle Improvements
- 2.4.1. Intermediate Reheating
- 2.4.2. Regeneration
- 2.4.3. Use of Supercritical Pressures

2.5. Gas Turbine
- 2.5.1. Operation
- 2.5.2. Performance
- 2.5.3. Systems and Subsystems
- 2.5.4. Classification

2.6. Recovery Boiler
- 2.6.1. Recovery Boiler Components
- 2.6.2. Pressure Levels
- 2.6.3. Performance
- 2.6.4. Characteristic Parameters

2.7. Steam Turbines
- 2.7.1. Components
- 2.7.2. Operation
- 2.7.3. Performance

2.8. Auxiliary Systems
- 2.8.1. Cooling System
- 2.8.2. Combined Cycle Performance
- 2.8.3. Advantages of Combined Cycles

2.9. Pressure Levels in Combined Cycles
- 2.9.1. A Level
- 2.9.2. Two Levels
- 2.9.3. Three Levels
- 2.9.4. Typical Configurations

2.10. Combined Cycle Hybridization
- 2.10.1. Fundamentals
- 2.10.2. Economic Analysis
- 2.10.3. Emission Savings

Module 3. Cogeneration

3.1. Structural Analysis
- 3.1.1. Functionality
- 3.1.2. Heat Needs
- 3.1.3. Alternatives in the Processes
- 3.1.4. Justification

3.2. Types of Heat
- 3.2.1. With Reciprocating Gas or Fuel Oil Engine
- 3.2.2. With a Gas Turbine
- 3.2.3. With a Steam Turbine
- 3.2.4. In Combined Cycle with Gas Turbine
- 3.2.5. In Combined cycle with Reciprocating Engine

3.3. Alternative Motors
- 3.3.1. Thermodynamic Effects
- 3.3.2. Gas Engine and Auxiliary Elements
- 3.3.3. Energy Recovery

3.4. Pyrotubular Boilers
- 3.4.1. Types of Boilers
- 3.4.2. Combustion
- 3.4.3. Water Treatment

3.5. Absorption Machines
- 3.5.1. Operation
- 3.5.2. Absorption Vs Compression
- 3.5.3. Water/Lithium Bromide
- 3.5.4. Ammonia/Water

3.6. Trigeneration, Tetrageneration and Microcogeneration
- 3.6.1. Trigeneration
- 3.6.2. Tetrageneration
- 3.6.3. Microcogeneration

3.7. Exchangers
- 3.7.1. Classification
- 3.7.2. Air-Cooled Exchangers
- 3.7.3. Plate Heat Exchangers

3.8. Tail Cycles
- 3.8.1. ORC Cycles
- 3.8.2. Organic Fluids
- 3.8.3. Kalina Cycle

3.9. Selection of Cogeneration Plant Type and Size
- 3.9.1. Design
- 3.9.2. Types of Technologies
- 3.9.3. Selection of Fuel
- 3.9.4. Dimensioning

3.10. New Trends in Cogeneration Plants
- 3.10.1. Services
- 3.10.2. Gas Turbines
- 3.10.3. Alternative Motors

Module 4. Construction and Operation of Electric Power Production Plants

4.1. Construction
- 4.1.1. EPC
- 4.1.2. EPCM
- 4.1.3. Open Book

4.2. Exploitation of Renewable Energy in the Electricity Market
- 4.2.1. Increase in Renewable Energies
- 4.2.2. Market Failures
- 4.2.3. New Tendencies in Markets

4.3. Steam Generator Maintenance
- 4.3.1. Water Pipes
- 4.3.2. Steam Pipes
- 4.3.3. Recommendations

4.4. Turbine and Motor Maintenance
- 4.4.1. Gas Turbines
- 4.4.2. Steam Turbines
- 4.4.3. Alternative Motors

4.5. Wind Park Maintenance
- 4.5.1. Types of Faults
- 4.5.2. Component Analysis
- 4.5.3. Strategies

4.6. Nuclear Power Plant Maintenance
- 4.6.1. Structures, Systems and Components
- 4.6.2. Behavioral Criteria
- 4.6.3. Behavioral Assessment.

4.7. Maintenance of Photovoltaic Power Plants
- 4.7.1. Panels
- 4.7.2. Inverters
- 4.7.3. Energy Evacuation

4.8. Hydraulic Plant Maintenance
- 4.8.1. Catchment
- 4.8.2. Turbine
- 4.8.3. Generator
- 4.8.4. Valves
- 4.8.5. Cooling
- 4.8.6. Oleohydraulics
- 4.8.7. Regulation
- 4.8.8. Rotor Braking and Lifting
- 4.8.9. Excitement
- 4.8.10. Synchronization

4.9. Life Cycle of Power Plants
- 4.9.1. Analysis of Life Cycle
- 4.9.2. LCA Methodologies
- 4.9.3. Limitations

4.10. Auxiliary Elements in Production Plants
- 4.10.1. Evacuation Lines
- 4.10.2. Electrical Substation
- 4.10.3. Protections

This Postgraduate Diploma in Economics and Operation of Combined Cycle and Cogeneration Power Plants is the program you need to become part of the elite of the sector"

05

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

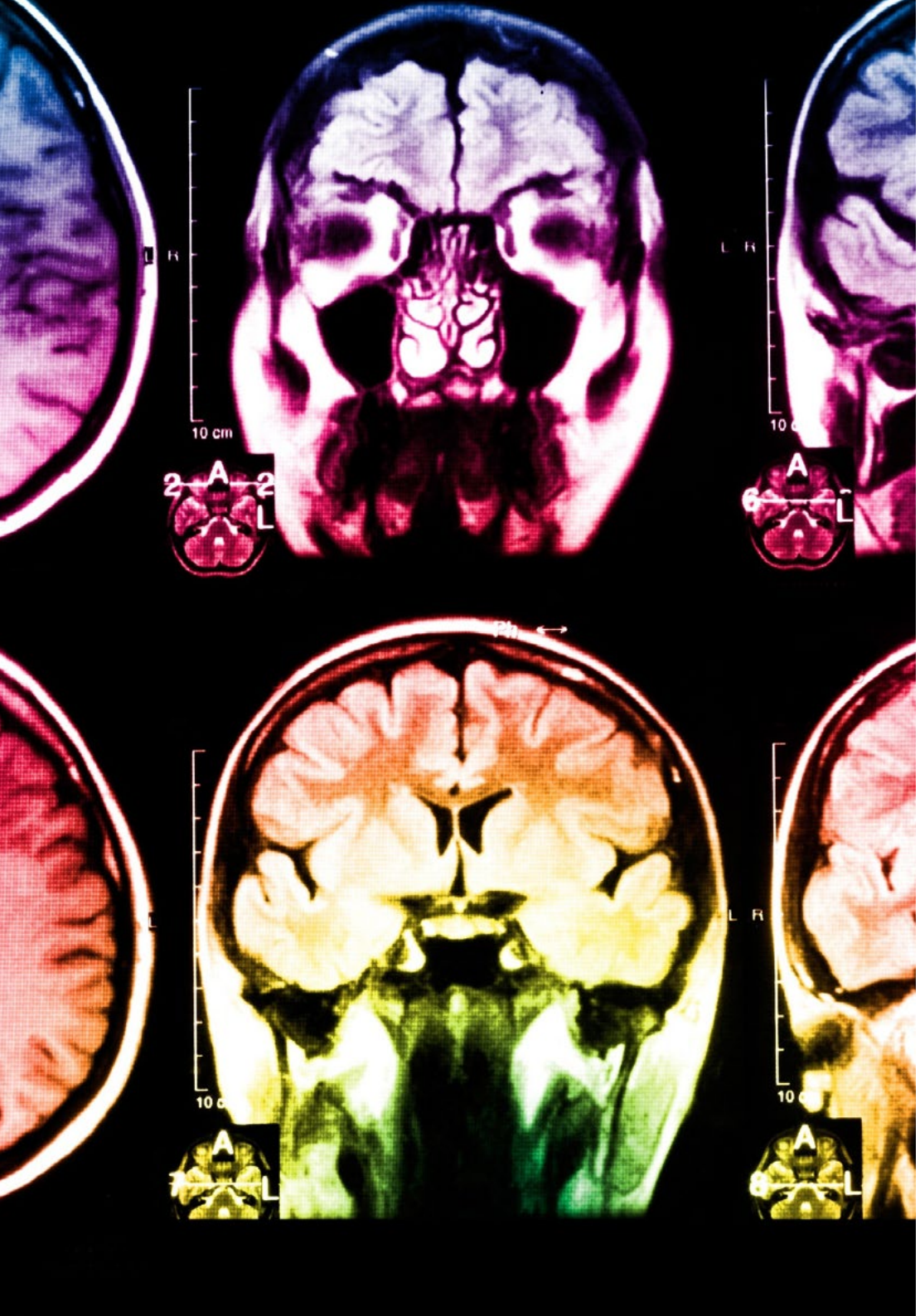
TECH is the first university in the world to combine Harvard University case studies with a 100% online learning system based on repetition, which combines 8 different didactic elements in each lesson.

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

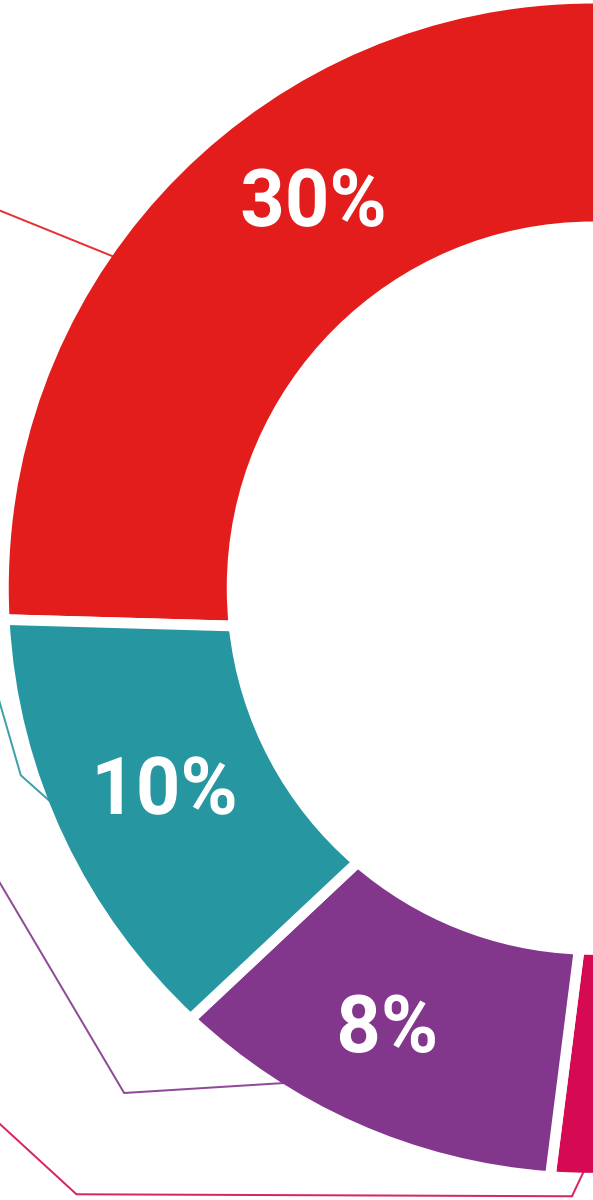
There is scientific evidence suggesting that observing third-party experts can be useful. Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

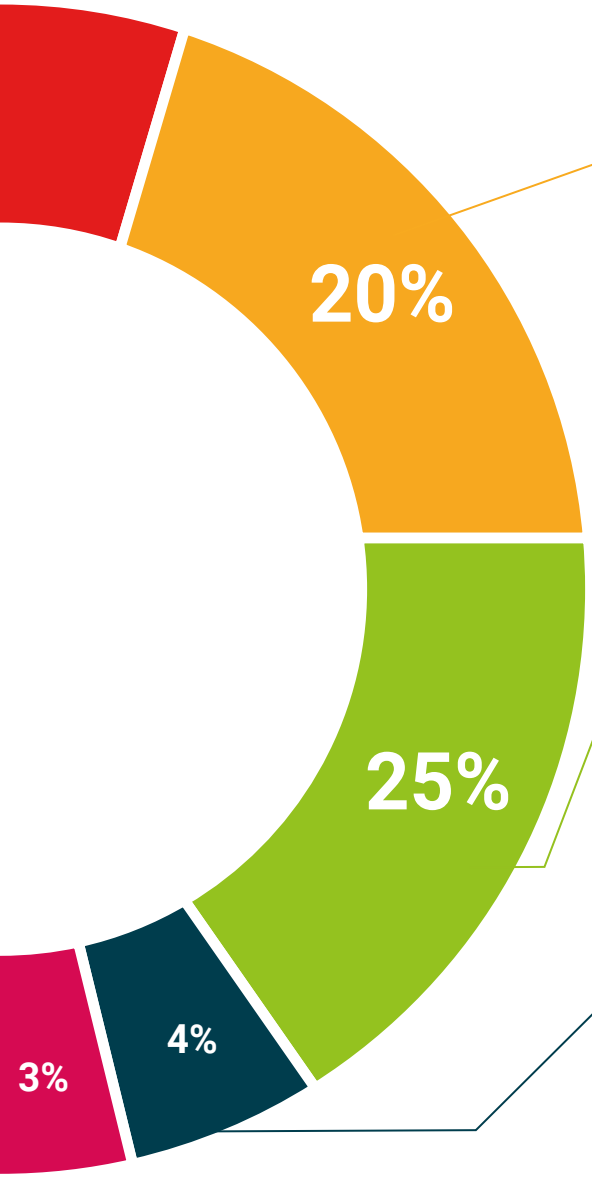
Practising Skills and Abilities

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.

06

Certificate

The Postgraduate Diploma in Economics and Operation of Power Plants in Combined Cycle and Cogeneration Plants, guarantees you, in addition to the most rigorous and updated training, access to a Postgraduate Diploma issued by TECH Technological University.

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

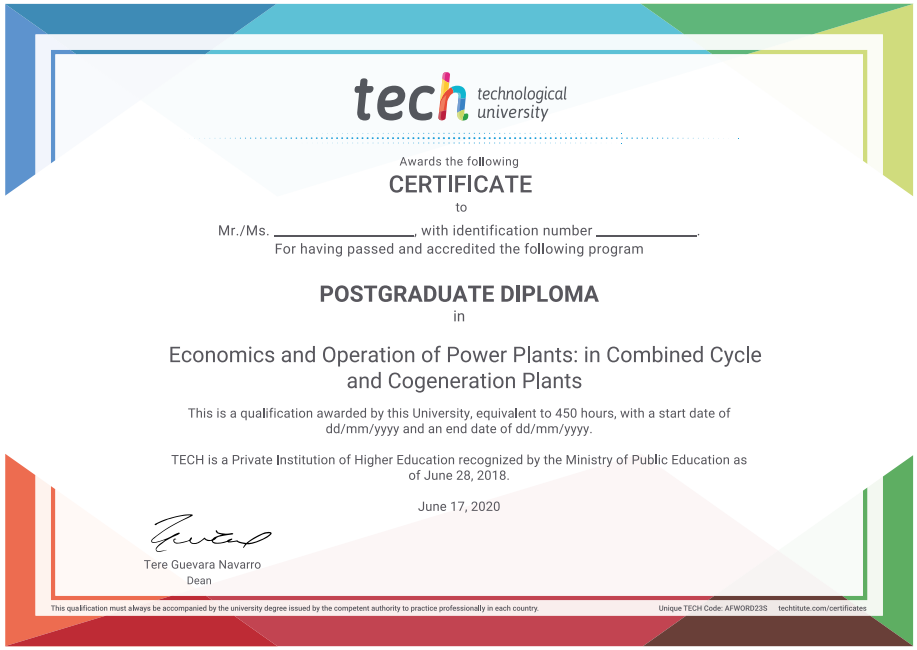
This **Postgraduate Diploma in Economics and Operation of Power Plants: in Combined Cycle and Cogeneration Plants** contains the most complete and updated program on the market.

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

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

Title: **Postgraduate Diploma in Economics and Operation of Power Plants in Combined Cycle and Cogeneration Plants**

Official Nº of hours: **600 h.**


tech technological university

Awards the following

CERTIFICATE

to

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

For having passed and accredited the following program

POSTGRADUATE DIPLOMA

in

Economics and Operation of Power Plants: in Combined Cycle and Cogeneration Plants

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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