

Postgraduate Diploma

Pumping Systems, Water Supply and Sanitation Networks of the Integrated Water Cycle



Postgraduate Diploma Pumping Systems, Water Supply and Sanitation Networks of the Integrated Water Cycle

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

Website: www.techtute.com/pk/engineering/postgraduate-diploma/postgraduate-diploma-pumping-systems-water-supply-sanitation-networks-integrated-water-cycle

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01

Introduction

In order to perform the functions of Pumping Systems, Water Supply and Sanitation Networks of the Integrated Water Cycle, it is necessary to have solid knowledge in the field, which is up to date and in line with current sustainability measures. TECH offers engineers who wish to delve deeper into the subject this complete program that will increase their job opportunities, enabling them to develop their activity in the integral water cycle, designing effective and innovative solutions for water elevation and supply and sanitation networks. Thus, the student will be able to size and select the most appropriate equipment for the design or reform of a new network, with the latest computer tools on the market, positioning him at the forefront of his professional future.





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The future of the integrated water cycle needs qualified experts in Pumping Systems and Water Supply and Sanitation Networks and you can be one of them"

When it comes to guaranteeing the supply of urban water services, the continuity in the operation of its pumping systems is key. Therefore, within the program of this Postgraduate Diploma, a complete vision of all aspects related to this essential stage in any drinking water distribution network and sanitation system is provided, that is, with special emphasis on pumping stations. In this way, it shows the different applications where a pumping station can solve the need for water relief, defining the selection and design criteria of each solution available in the market, including the novel simulation techniques by means of computational fluid analysis.

After the design phase, the challenge of installation, maintenance and control requires the professional responsible for the pumping stations to have a thorough knowledge of the usual problems of these installations. For this reason, TECH has experts in the sector who offer the student practical cases to avoid the mistakes that occur in each of these areas. In addition, due to the demanding demand for process improvement in the water sector, this program provides knowledge of the most widely implemented technological innovations, so that students can apply them in the development of their functions, thus acquiring a differential value in their skills.

However, the curriculum of this Postgraduate Diploma allows the engineer to learn more about Pumping Systems, their stations (EBAR) and the aspects that concern them, such as the electrical and maneuvering equipment needed or the operation and maintenance. Another novelty included in this program, due to its demand, is a subject on laminators and storm tanks, standing out from others in the market.

A quality teaching staff completes the excellence of this program, designed for the student to successfully enter a sector with high labor demand. A 100% online program that enables the engineer to make a qualitative leap in his career, projecting his professional career towards the most prestigious areas of water management, supply networks and sanitation systems.

The **Postgraduate Diploma in Pumping Systems, Water Supply and Sanitation Networks of the Integrated Water Cycle** contains the most complete and up-to-date educational program on the market. The most important features include:

- ◆ Practical cases presented by experts in engineering focused on the integral water cycle with special attention to the different pumping systems and supply and sanitation networks
- ◆ The graphic, schematic, and 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



TECH is committed to the innovation of professions with past, present and future, giving you the best tools for you to lead the change"

“

Study where and when you want, set your own time and objectives. The academic flexibility that this University offers is unique in the marketplace"

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 immersive education programmed to learn 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 engineering experts.

TECH provides you with the tools to boost you towards success.

Master the whole water cycle: become and expert in Pumping Systems



02 Objectives

Water engineering professionals have established the importance of the existence of this degree, so TECH has relied on the best to design a program that meets all the requirements to be taken into account for the future graduate to thrive in this sector. Thus, students will develop the skills to master everything related to Pumping Systems and Water Supply and Sanitation Networks of the Integrated Water Cycle. This Postgraduate Diploma provides the student with solid knowledge in the field, updated in line with quality and sustainability objectives. In addition, the student has an innovative methodology and practical cases that, together with the experience of the teaching staff, will allow an accelerated knowledge of all the elements that he/she will need to master to apply them in their day-to-day work.



“

Succeed in designing Pumping Systems with the latest hydrodynamic simulation tools on the market”



General Objectives

- ◆ Delve into key aspects of pumping systems and supply and sanitation networks of the integral water cycle
- ◆ Have mastered a strategic vision of the importance of sanitation networks within the integrated water cycle
- ◆ Have a solid knowledge to size a water pumping station
- ◆ Orient the student's professional activity towards the achievement of the Water objective in the 2030 Agenda
- ◆ Be able to apply the latest technological innovations to establish optimal resource management
- ◆ Be able to draw up and supervise a preventive and corrective maintenance plan for the drinking water distribution network
- ◆ Control the revenues and costs of a supply system in order to maximize the economic performance of an administrative concession
- ◆ Master EPANET software
- ◆ Analyze the main computer tools related to a sewerage system such as GIS and SWMM





Specific Objectives

Module 1. Pumping Stations

- ◆ Complete Sizing of a Water Pumping Station
- ◆ Select the electromechanical equipment best suited to the needs of a water lifting system
- ◆ Analyze the latest hydrodynamic simulation tools that facilitate the successful design of a pumping system prior to its commissioning
- ◆ Be able to apply the latest technological innovations to establish a state-of-the-art management of pumping stations

Module 2. Drinking Water Distribution. Layouts and practical criteria for network design

- ◆ Quickly identify the problems associated with a supply network based on the design typology of the network itself
- ◆ Diagnose the deficiencies of an existing network based on the most important operating parameters. With the possibility of capturing it in the most implemented simulation software in the sector such as EPANET
- ◆ Be able to draw up and supervise a preventive and corrective maintenance plan for the drinking water distribution network
- ◆ Control the revenues and costs of a supply system in order to maximize the economic performance of an administrative concession

Module 3. Sanitation Networks

- ◆ Obtain a strategic vision of the importance of sanitation networks within the integral water cycle
- ◆ Know in depth the elements of the sewerage network in order to act with criterion in making decisions in case of failures
- ◆ Identify the main problems of wastewater pumping stations in order to optimize their operation
- ◆ Analyze the main computer tools related to a sewerage system such as GIS and SWMM



Set yourself only one goal: to succeed in your profession thanks to this TECH degree"

03

Course Management

The management and faculty of this Postgraduate Diploma have extensive experience in the water industry and have pooled their expertise to create a program that will ensure that students take a step further on their journey to success. Thanks to the professional background of each of the teachers, the student acquires a complete learning in the subject, with up to date content and tools that teach them how to master the latest techniques used in this sector. It is a program that is applied in several areas within the field of the Integral Water Cycle, so its labor projection is wide and with future.



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This teaching staff is expert and multidisciplinary to provide you with a strategic vision of the sector from different profiles”

Management



Mr. Ortiz Gómez, Manuel

- ◆ Deputy to the head of the Water Treatment Department at FACSA
- ◆ Head of Maintenance at TAGUS, concessionaire of water and sewage services in Toledo
- ◆ Industrial Engineer at Jaume I University
- ◆ Postgraduate degree in Innovation in Business Management from the Valencian Institute of Technology
- ◆ Executive MBA from EDEM
- ◆ Author of several papers and presentations at conferences of the Spanish Association of Desalination and Reuse and the Spanish Association of Water Supply and Sanitation

Professors

Mr. Llopis Yuste, Edgar

- ◆ Expert the construction of hydraulic infrastructures, industrial process water treatment and drinking water treatment equipment
- ◆ Municipal drinking water supply manager
- ◆ Technical Engineer in Public Works from the Polytechnic University of Valencia
- ◆ Degree in Environmental Sciences from the UPV
- ◆ Master's Degree MBA by UPV
- ◆ Master's Degree in Industrial Wastewater Treatment and Recycling Engineering, Catholic University of Valencia

Mr. Sánchez Cabanillas, Marciano

- ◆ Director-Coordinator of the Advanced Course for Laboratory Technicians of Wastewater Treatment Plants. Regional Government of Castilla-La Mancha
- ◆ CEO PECICAMAN (Projects of Circular Economy of Castilla La Mancha)
- ◆ Industrial Chemical Engineer UCLM
- ◆ Master's Degree in Environmental Engineering and Management E.O.I. Madrid
- ◆ Master's Degree in Business Administration and Management CEREM Madrid
- ◆ Expert Professor the Master of Engineering and Environmental Management at ITQUIMA-UCLM
- ◆ Research work on the reuse of sludge from chemical washing of nitric acid boilers and on nanoparticulated products for water treatment with new technologies
- ◆ Speaker at National and International Congresses on Water, Agriculture and Sustainability

Ms. Arias Rodríguez, Ana

- ◆ Project technician at Canal de Isabel II: management, maintenance and operation of sanitation and supply networks in the Community of Madrid
- ◆ Technical Engineer in Public Works, Polytechnic University of de Madrid
- ◆ Degree in Civil Engineering from the Polytechnic University of Avila, University of Salamanca
- ◆ Master's Degree in Professional Development from the University of Alcalá, Madrid

Mr. Salaix, Rochera, Carlos

- ◆ Professional in sectors related to urbanization, construction of wastewater treatment plants and water treatment and maintenance of supply and sanitation infrastructure networks
- ◆ Technical Engineer in Public Works, specializing in Transport and Urban Services, Polytechnic University of Valencia
- ◆ Master's Degree in Integrated Management PRL, Quality, Environment, Continuous Improvement (EFQM), Universitat Jaume I de Castellón
- ◆ Official Master's Degree in Occupational Risk Prevention (Hygiene, Safety, Ergonomics), Universitat Jaume I of Castellón

Mr.Simarro Ruiz, Mario

- ◆ Key Account Manager for Spain & Portugal and Technical Sales Representative in EMEA & LATAM in DuPont Water Solutions company
- ◆ He has been working for almost 15 years in the Municipal water segment, mainly water treatment and reuse, promoting technologies and developing markets
- ◆ Industrial Engineer, Polytechnical University of Madrid
- ◆ Executive MBA from EAE Business School
- ◆ He has participated as speaker in congresses of the Spanish Association of Desalination and Reuse as well as with other entities

04

Structure and Content

The structure of the syllabus of this Postgraduate Diploma in pumping systems and networks and the Integrated Water Cycle Sanitation is divided into three modules focused on the specificity of its content. The structure of the syllabus of this Postgraduate Diploma in Pumping Systems, Water Supply and Sanitation Networks of the Integrated Water Cycle is divided into three modules focused on the specificity of its content. The second module deals with the distribution of drinking water, layouts and practical criteria for network design. The last module is focused on sanitation networks, their types, needs and elements to be taken into account in their design and management. In short, a complete Postgraduate Diploma with quality content specially designed to provide students with all the tools they will need to develop professionally in this sector.





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Quality content perfectly structured for remote learning, 100% online"

Module 1. Pumping Stations

- 1.1. Applications
 - 1.1.1. Supply
 - 1.1.2. Purification and WWTP
 - 1.1.3. Singular Applications
- 1.2. Hydraulic Pumps
 - 1.2.1. Evolution of Hydraulic Pumps
 - 1.2.2. Types of Impellers
 - 1.2.3. Advantages and Disadvantages of Different Types of Pumps
- 1.3. Engineering and Design of Pumping Stations
 - 1.3.1. Submersible Pumping Stations
 - 1.3.2. Dry Chamber Pumping Stations
 - 1.3.3. Economic Analysis
- 1.4. Installation and Operation
 - 1.4.1. Economic Analysis
 - 1.4.2. Real Case Designs
 - 1.4.3. Pump Testing
- 1.5. Monitoring and Control of Pumping Stations
 - 1.5.1. Pump Start-Up Systems
 - 1.5.2. Pump Protection Systems
 - 1.5.3. Optimization of Pump Control Systems
- 1.6. Enemies of Hydraulic Systems
 - 1.6.1. Water Hammer
 - 1.6.2. Cavitation
 - 1.6.3. Noise and Vibration
- 1.7. Total Life Cycle Cost of a Pumping Unit
 - 1.7.1. Costs
 - 1.7.2. Cost Distribution Model
 - 1.7.3. Identification of Opportunity Areas

- 1.8. Hydrodynamic Solutions. CFD Modeling
 - 1.8.1. Importance of CFD
 - 1.8.2. CFD Analysis Process in Pumping Stations.
 - 1.8.3. Interpretation of Results
- 1.9. Latest Innovations Applied to Pumping Stations
 - 1.9.1. Innovation in Materials
 - 1.9.2. Intelligent Systems
 - 1.9.3. Digitization of the Industry
- 1.10. Unique Designs
 - 1.10.1. Singular Design in Sourcing
 - 1.10.2. Singular Design in Sanitation
 - 1.10.3. Pumping Station in Sitges

Module 2. Drinking Water Distribution. Layouts and practical criteria for network design

- 2.1. Types of Distribution Networks
 - 2.1.1. Classification Criteria
 - 2.1.2. Branched Distribution Networks
 - 2.1.3. Meshed Distribution Networks
 - 2.1.4. Mixed Distribution Networks
 - 2.1.5. Upstream Distribution Networks
 - 2.1.6. Downstream Distribution Networks
 - 2.1.7. Piping Hierarchy
- 2.2. Distribution Network Design Criteria. Modeling
 - 2.2.1. Demand Modulation
 - 2.2.2. Flow Velocity
 - 2.2.3. Pressure
 - 2.2.4. Chlorine Concentration
 - 2.2.5. Dwell Time
 - 2.2.6. Modeling with EPANET

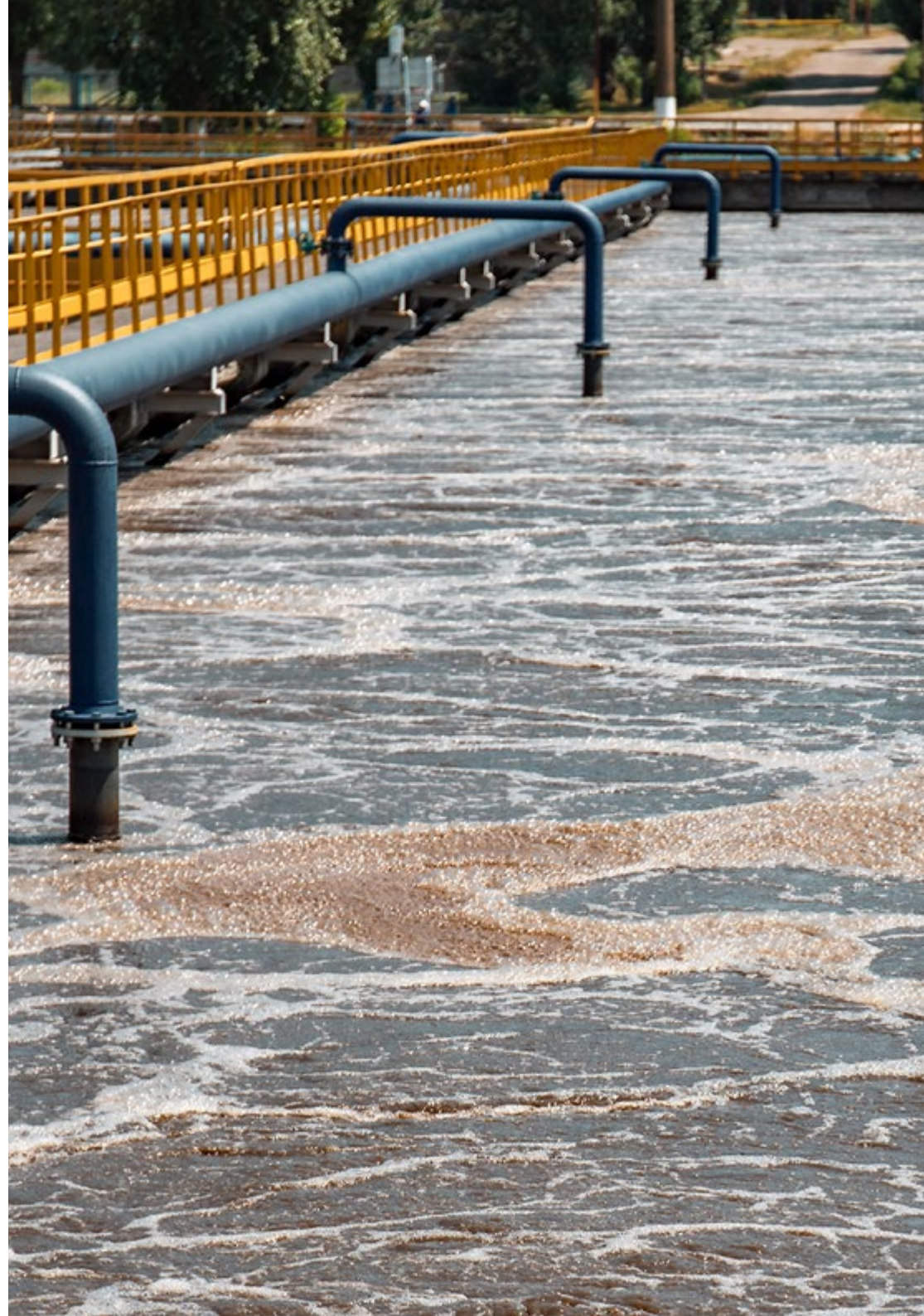
- 2.3. Elements of a Distribution Network
 - 2.3.1. Fundamental Principles
 - 2.3.2. Collection Elements
 - 2.3.3. Pumping
 - 2.3.4. Storage Elements
 - 2.3.5. Distribution Elements
 - 2.3.6. Control and Regulation Elements (Suction Cups, Valves, Drainage, etc.)
 - 2.3.7. Measuring Elements
- 2.4. Pipelines
 - 2.4.1. Features
 - 2.4.2. Plastic Pipes
 - 2.4.3. Non-Plastic Pipes
- 2.5. Valves
 - 2.5.1. Shut-off Valves
 - 2.5.2. Manifold Valves
 - 2.5.3. Check or Non-Return Valves
 - 2.5.4. Regulating and Control Valves
- 2.6. Remote Control and Remote Management
 - 2.6.1. Elements of a Remote-Control System
 - 2.6.2. Communication Systems
 - 2.6.3. Analog and Digital Information
 - 2.6.4. Management Software
 - 2.6.5. Digital Twins
- 2.7. Efficiency of Distribution Networks
 - 2.7.1. Fundamental Principles
 - 2.7.2. Calculation of Hydraulic Efficiency
 - 2.7.3. Efficiency Improvement. Minimization of Water Losses
 - 2.7.4. Monitoring Indicators

- 2.8. Maintenance Plan
 - 2.8.1. Objectives of the Maintenance Plan
 - 2.8.2. Preparation of the Preventive Maintenance Plan
 - 2.8.3. Preventive Maintenance Tanks
 - 2.8.4. Preventive Maintenance of Distribution Networks
 - 2.8.5. Preventive Maintenance of Catchments
 - 2.8.6. Corrective Preventive Maintenance
- 2.9. Operational Logging
 - 2.9.1. Water Volumes and Flow Rates
 - 2.9.2. Water Quality
 - 2.9.3. Energy Consumption
 - 2.9.4. Malfunctions
 - 2.9.5. Pressure
 - 2.9.6. Maintenance Plan Records
- 2.10. Financial Management
 - 2.10.1. Importance of Economic Management
 - 2.10.2. Revenues
 - 2.10.3. Costs

Module 3. Sanitation Networks

- 3.1. Importance of Sewerage Networks
 - 3.1.1. Needs of Sewerage Networks
 - 3.1.2. Types of Networks
 - 3.1.3. Sanitation Networks in the Integral Water Cycle
 - 3.1.4. Regulatory Framework and Legislation
- 3.2. Main Elements of Gravity Sewerage Networks
 - 3.2.1. General Structure
 - 3.2.2. Types of Pipelines
 - 3.2.3. Manholes
 - 3.2.4. Connections and Connections

- 3.3. Other Elements of the Gravity Sewage Systems
 - 3.3.1. Surface Drainage
 - 3.3.2. Spillways
 - 3.3.3. Other Elements
 - 3.3.4. Easements
- 3.4. Road Works
 - 3.4.1. Execution of Road Works
 - 3.4.2. Safety Measures
 - 3.4.3. Trenchless Renovation and Rehabilitation
 - 3.4.4. Asset Management
- 3.5. Wastewater Elevation. WWTP
 - 3.5.1. Intake Works and Coarse Wells
 - 3.5.2. Roughing
 - 3.5.3. Pump Well
 - 3.5.4. Pumps
 - 3.5.5. Delivery Piping
- 3.6. Complementary Elements of a WWTP
 - 3.6.1. Valves and Flow Meters
 - 3.6.2. CS, CT, CCM and Power Generators
 - 3.6.3. Other Elements
 - 3.6.4. Operation and Maintenance
- 3.7. Rolling Mills and Storm Tanks
 - 3.7.1. Features
 - 3.7.2. Laminators
 - 3.7.3. Storm Tanks
 - 3.7.4. Operation and Maintenance





- 3.8. Operation of Gravity Drainage Networks
 - 3.8.1. Surveillance and Cleaning
 - 3.8.2. Inspection
 - 3.8.3. Cleaning
 - 3.8.4. Conservation Works
 - 3.8.5. Improvement Works
 - 3.8.6. Usual Incidents
- 3.9. Network Design
 - 3.9.1. Background Information
 - 3.9.2. Trace
 - 3.9.3. Materials
 - 3.9.4. Joints and Connections
 - 3.9.5. Special Parts
 - 3.9.6. Design Flow Rates
 - 3.9.7. Network Analysis and Modeling with SWMM
- 3.10. Management Support Software Tools
 - 3.10.1. Cartographic Maps, GIS
 - 3.10.2. Recording of Incidents
 - 3.10.3. WWTP Support



With this Postgraduate Diploma you will learn to master the main IT tools related to a sanitation system, such as GIS or SWMM"

05

Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning**.

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.





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Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"

Case Study to contextualize all content

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

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



You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.



A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

“ *Our program prepares you to face new challenges in uncertain environments and achieve success in your career”*

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

The case method is the most widely used learning system in the best faculties in the world. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the program, the studies will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

Relearning Methodology

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

We enhance the Case Study with the best 100% online teaching method: Relearning.

In 2019, we obtained the best learning results of all online universities in the world.

At TECH, you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.



In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.



This program offers the best educational material, prepared with professionals in mind:



Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.



Classes

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

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



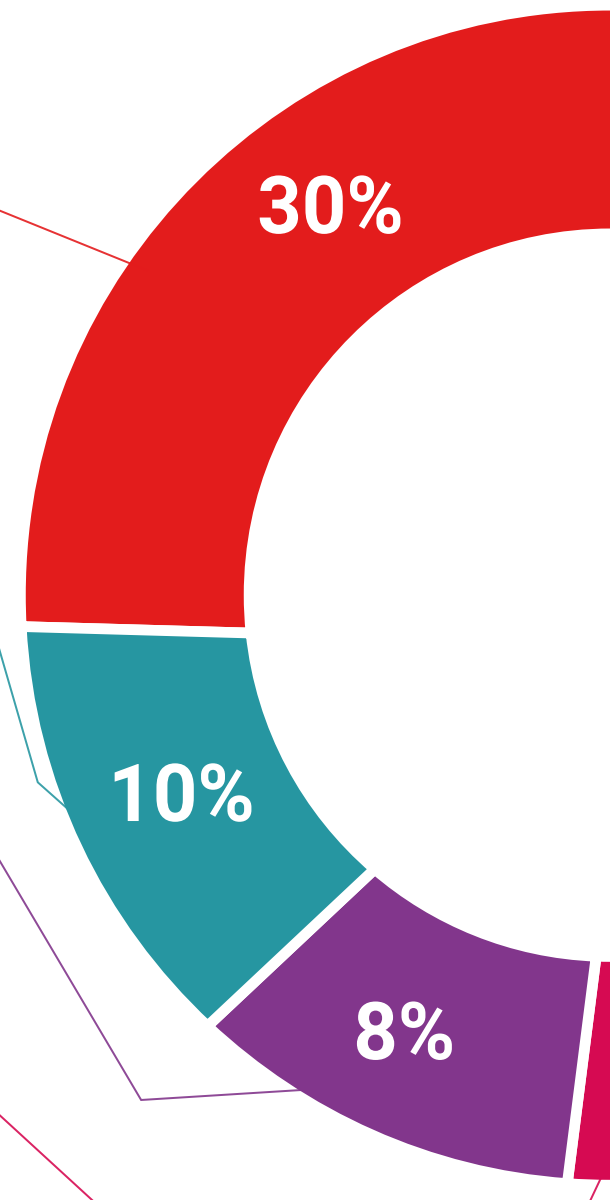
Practising Skills and Abilities

They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.



Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





Case Studies

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.



Interactive Summaries

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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



Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.



06

Certificate

Through a different and stimulating learning experience, you will be able to acquire the necessary skills to take a big step in your training. An opportunity to progress, with the support and monitoring of a modern and specialized university, which will propel you to another professional level.



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Include in your specialization a Postgraduate Diploma in Pumping Systems, Water Supply and Sanitation Networks of the Integral Water Cycle: a highly qualified added value for any professional in the field of education”

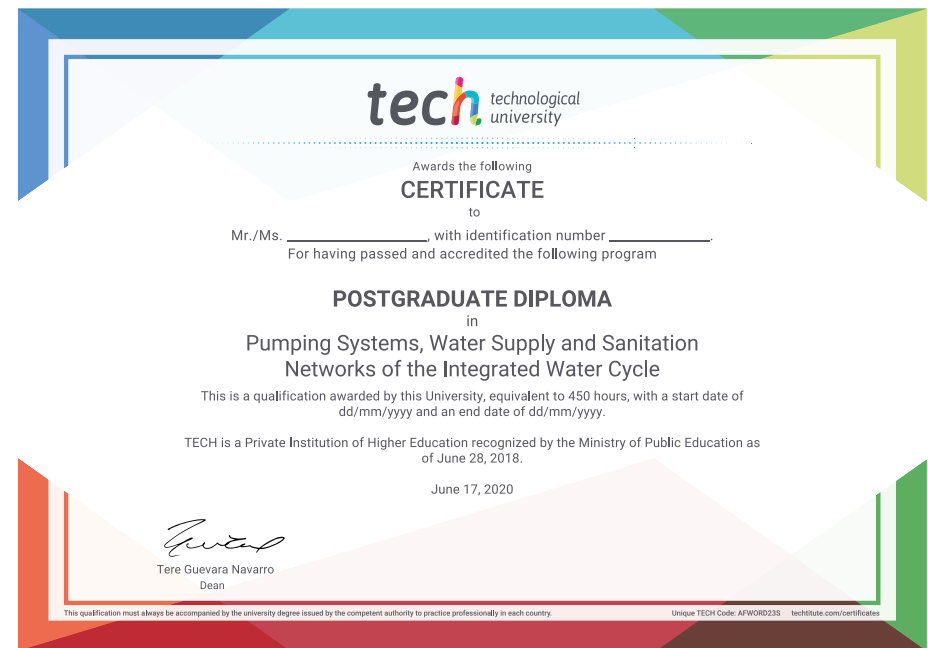
This **Postgraduate Diploma in Pumping Systems, Water Supply and Sanitation Networks of the Integrated Water Cycle** contains the most complete and up to date program on the market.

After the student has passed the assessments 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 **Postgraduate Diploma**, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Diploma in Pumping Systems, Water Supply and Sanitation Networks of the Integrated Water Cycle**

Official N° of hours: **450 h.**



*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.

future
health confidence people
education information tutors
guarantee accreditation teaching
institutions technology learning
community commitment
personalized service innovation
knowledge present
development language
classroom



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