

# Postgraduate Diploma Hydraulic Infrastructure Networks



## Postgraduate Diploma Hydraulic Infrastructure Networks

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

Website: [www.techtitute.com/us/engineering/postgraduate-diploma/postgraduate-diploma-hydraulic-infrastructure-networks](http://www.techtitute.com/us/engineering/postgraduate-diploma/postgraduate-diploma-hydraulic-infrastructure-networks)

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# 01

# Introduction

In some regions, the state of the infrastructure represents a threat to the safety of people and their property. The devices and materials that are implemented exceed their useful life and do not receive the necessary maintenance to keep their operation in optimal conditions. According to the relevance of the multiple problems in the sector, research has been carried out to provide solutions to the different failures in this field of study. Therefore, this program has been created with the purpose of providing students with a vast advanced content, using fundamentals and general aspects that make up an urban drainage network. All this can be done in a 100% online modality and with a specialized team in Hydraulic Infrastructures.





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*TECH has created this program in order to provide the graduates with a vast advanced content, using fundamentals and aspects of Hydraulic Infrastructure Networks”*

In order to have equitable access to drinking water, sanitation and hygiene services, it is necessary to maintain the hydraulic infrastructure and, at the same time, to develop new projects. This is where irrigation, sanitation and drainage networks come into play. Research on how to improve water quality, create innovative irrigation techniques, analyze whether drainage mechanisms are optimal or need changes and at the same time preserve the environment, these and more studies do not cease. In this way, the Civil Engineers will delve into aspects such as types of irrigation, system sizing and Geotechnics in hydraulic drainage works

In this sense, research in this field has continued to advance in order to provide solutions to different deficiencies in hydraulic infrastructure. Making it clear that professionals in Civil Engineering must remain at the forefront in this area of knowledge. That is why this Postgraduate Diploma will provide the professionals with updates on Hydraulic Infrastructure Networks

Students will acquire specific knowledge on irrigation networks and the physical characteristics of the soil in relation to the factors influencing irrigation, deepening in concepts such as gravity, sprinkler and drip irrigation, being these the types of irrigation. This Postgraduate Diploma integrates a teaching team specialized in the field, supported with quality academic content that offers flexibility and convenience with the online modality

In this way TECH is at the forefront of current education, which provides a first class academic program along with a didactic material that will help the student to successfully complete this Postgraduate Diploma. Thus, the students must have a device that provides internet access and thus be able to access the virtual platform at any time and from any location without a fixed schedule

This **Postgraduate Diploma in Hydraulic Infrastructure Networks** contains the most complete and up-to-date program on the market. The most important features include:

- ◆ The development of case studies presented by experts in Civil Engineering focused on Hydraulic Infrastructure Networks
- ◆ The graphic, schematic, and practical contents with which they are created, provide practical information on the disciplines that are essential for professional practice
- ◆ Practical exercises where self-assessment can be used to improve learning
- ◆ Its special emphasis on innovative methodologies
- ◆ Theoretical lessons, questions for experts, discussion forums on controversial issues and individual reflection work
- ◆ Content that is accessible from any fixed or portable device with an Internet connection



*The Civil Engineer will deepen in aspects such as types of irrigation, system sizing and Geotechnics in hydraulic sanitation works"*

“

*The students will acquire specific skills in the physical characteristics of the soil, deepening in concepts such as gravity, sprinkler and drip irrigation"*

The program's teaching staff includes professionals from sector who contribute their work experience to this educational program, as well as renowned specialists from leading societies and prestigious universities.

Its multimedia content, developed with the latest educational technology, will provide the professionals with situated and contextual learning, i.e., a simulated environment that will provide an immersive education programmed to learn in real situations.

The design of this program focuses on Problem-Based Learning, by means of which the professionals must try to solve the different professional practice situations that are presented throughout the academic course. For this purpose, the students will be assisted by an innovative interactive video system created by renowned experts.

*TECH provides you with a first class academic program together with didactic material that will help you to successfully complete this Postgraduate Diploma.*

*Expand your knowledge and become an expert engineer in hydraulic infrastructures.*



# 02

# Objectives

This Postgraduate Diploma in Hydraulic Infrastructure Networks has been designed with the objective of providing the graduates with the most recent developments in the field of Civil Engineering. Therefore, TECH provides different tools of academic innovation, ensuring the successful development of the program. At the end, the professionals will have strengthened their knowledge in the application of the BIM methodology in design and analysis of high distribution systems, as well as the different studies in irrigation and drainage techniques that are currently being used.







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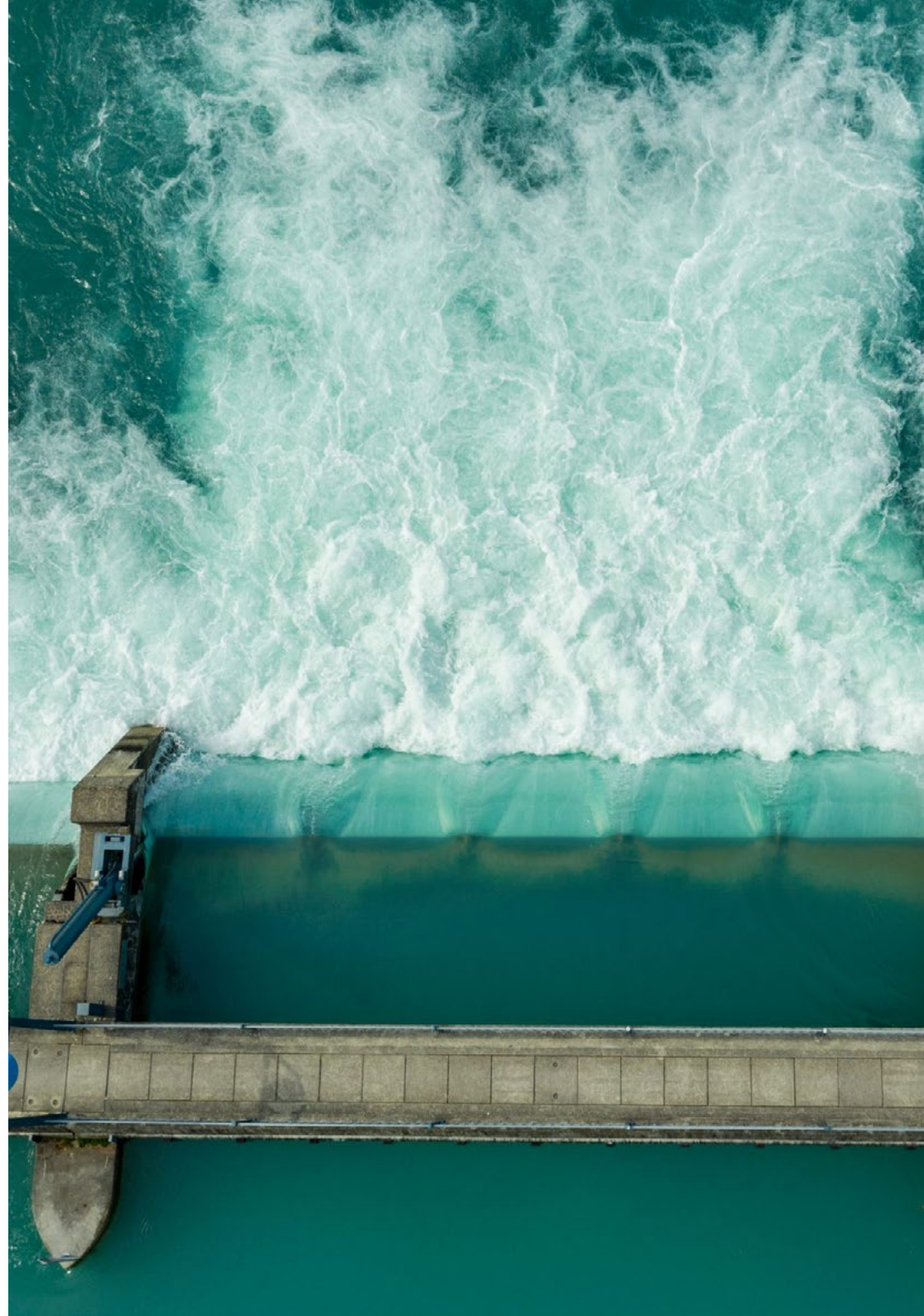
*This program has been designed with the objective of providing the graduates with the most recent developments in the field of Civil Engineering”*



## General Objectives

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- ◆ Develop new knowledge on irrigation, problems, solutions, infrastructure and new technologies
- ◆ Determine the main elements that make up an irrigation network according to the different typologies
- ◆ Establish the main design criteria of the elements that make up the network
- ◆ Analyze the use and application of the BIM methodology in the design, modeling and operation of networks of networks
- ◆ Develop new knowledge on large water supply pipelines
- ◆ Identify the main elements that compose the high head supply systems, and the main materials
- ◆ Deepen the concept of water hammer, and the protection elements necessary in upstream supply systems
- ◆ Develop the main design criteria of the elements that make up the system, as well as their application in the simulation with computer software
- ◆ Analyze the use and application of BIM methodology in the design, modeling and operation of large pipelines
- ◆ Develop new knowledge on irrigation, problems, solutions, infrastructure and new technologies
- ◆ Determine the main elements that make up an urban drainage network and the materials used in its construction
- ◆ Establish the main design criteria of the elements that make up the network, as well as their application in the simulation with computer software
- ◆ Analyze the use and application of BIM methodology in the design, modeling and operation of urban drainage networks





## Specific Objectives

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### Module 1. Irrigation. Elements and design

- ◆ Specify the factors involved in irrigation
- ◆ Address the fundamentals of irrigation network design
- ◆ Develop the general aspects that make up an irrigation network
- ◆ Determine the main criteria for sizing irrigation networks
- ◆ Analyze solutions using drip and sprinkler network techniques
- ◆ Apply BIM methodology in the design and analysis of irrigation networks
- ◆ Examine BIM deliverables of an irrigation network providing the student with knowledge applicable to any piping system

### Module 2. Upstream supply systems. Water transport pipelines

- ◆ Specify the basic hydraulic fundamentals of large water conveyance pipelines
- ◆ Develop the fundamentals of water hammer phenomena
- ◆ Determine the general design aspects of an upstream water supply system
- ◆ Identify the main sizing criteria
- ◆ Analyze solutions for system protection elements using specialized water hammer software
- ◆ Propose solutions for the commissioning, maintenance and operation of upstream water supply systems
- ◆ Apply BIM methodology in the design and analysis of upstream distribution systems

### Module 3. Urban drainage and design

- ◆ Specify the problems of sanitary engineering
- ◆ Examine the fundamentals of urban drainage network design
- ◆ Develop the general aspects that make up an urban drainage network
- ◆ Identify the main criteria for sizing a drainage network
- ◆ Analyze solutions through the simulation of sewerage networks
- ◆ Propose solutions to urban flooding problems based on rainwater retention basins
- ◆ Apply BIM methodology in the design and analysis of urban drainage networks



*You will strengthen your knowledge in the application of BIM methodology in the design and analysis of high bay distribution systems"*

03

# Course Management

TECH offers elite academic experiences, with a great teaching team that is fully trained and experienced. The graduates will have access to a syllabus created by specialists in areas such as New Materials Science, Nanotechnology, BIM Management in Infrastructure and Civil Engineering, Civil Engineering, Civil Engineering, Environmental Hydraulics and Technology and Management of the Integrated Water Cycle. In this way, you will have the guarantees to specialize at an international level in a booming sector that will lead you to professional success.





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*You will be able to access a syllabus created by specialists in areas such as Nanotechnology, BIM Management in Infrastructures and Civil Engineering and Environmental Hydraulics"*

## Management



### D. González González, Blas

- ♦ Manager of the Technical Institute of Digital Construction Bimous
- ♦ Managing Director at Tolvas Verdes Malacitanas S.A
- ♦ CEO in Andaluza de Traviesas
- ♦ Director of Engineering and Development at GEA 21, S.A. Head of the Technical Services of the UTE Metro of Seville and co-director of the Construction Projects for Line 1 of the Metro of Seville
- ♦ CEO in Bética de Ingeniería S.A.L
- ♦ Teacher of several university master's degrees related to Civil Engineering, as well as subjects of the Degree in Architecture at the University of Seville
- ♦ Degree in Civil Engineering from the Polytechnic University of Madrid
- ♦ Master's Degree in New Materials Science and Nanotechnology from the University of Seville
- ♦ Master's Degree in BIM Management in Infrastructure and Civil Engineering by EADIC - Rey Juan Carlos University



## Professors

### Mr. Rubio González, Carlos

- ◆ Head of the Development Department at TEAMBIMCIVIL S.L
- ◆ Specialist at the Interuniversity Institute for Research on the Earth System in Andalusia at the University of Granada
- ◆ Civil Engineer at TEAMBIMCIVIL S.L
- ◆ Double Master in Civil Engineering and Environmental Hydraulics by the University of Granada
- ◆ Master's Degree in Technology and Management of the Integral Water Cycle from the University of Seville
- ◆ Degree in Civil Engineering from the University of Seville with mention in Hydrology
- ◆ Lecturer in specialization courses on BIM Modeling of Water Supply and Irrigation Networks

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*Take the opportunity to learn about the latest advances in this field in order to apply it to your daily practice”*

# 04

## Structure and Content

This Postgraduate Diploma has been implemented according to the most recent research in the field of Engineering, establishing a syllabus that provides great content on Water Infrastructure Networks. This program intends to provide advanced information on irrigation, high water supply systems and urban drainage. All this, by means of multiple multimedia tools that offer dynamism and a greater attractiveness to this university program





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*This program will provide you with advanced information on irrigation, high head supply systems and urban drainage”*

## Module 1. Irrigation. Elements and design

- 1.1. Irrigation networks
  - 1.1.1. Irrigation network
  - 1.1.2. Physical characteristics of the soil
  - 1.1.3. Factors influencing irrigation
  - 1.1.4. Soil water storage
  - 1.1.5. Irrigation dosage
  - 1.1.6. Crop water requirements
- 1.2. Types of irrigation
  - 1.2.1. Gravity irrigation
  - 1.2.2. Sprinkler irrigation
  - 1.2.3. Drip irrigation
- 1.3. Pressure networks Hydraulic fundamentals
  - 1.3.1. Flow energy
  - 1.3.2. Bernoulli's Equation
  - 1.3.3. Energy losses in pipelines
- 1.4. Sprinkler irrigation networks Features
  - 1.4.1. Sprinklers
  - 1.4.2. System Types
  - 1.4.3. Hydraulic characteristics of sprinklers
  - 1.4.4. Distribution of sprinklers in conventional systems
  - 1.4.5. Uniformity and efficiency
- 1.5. Sizing of sprinkler irrigation networks
  - 1.5.1. Design Criteria
  - 1.5.2. Side branches
  - 1.5.3. Distribution Networks
- 1.6. Drip irrigation networks
  - 1.6.1. System Components
  - 1.6.2. Uniformity and efficiency
  - 1.6.3. Installation diagram
  - 1.6.4. Micro-sprinkler

- 1.7. Dimensioning of drip irrigation systems
  - 1.7.1. Design Criteria
  - 1.7.2. Side branches
  - 1.7.3. Bypass piping
  - 1.7.4. Distribution piping
- 1.8. Modeling of irrigation networks in Civil 3D
  - 1.8.1. Elements catalog
  - 1.8.2. Network modeling
  - 1.8.3. Irrigation network profile
- 1.9. Modeling of retention basins in Civil 3D
  - 1.9.1. Flattening element
  - 1.9.2. Footprint Design Volume measurements
- 1.10. Deliverables of an irrigation network
  - 1.10.1. Plan alignment drawings
  - 1.10.2. Plan and profile drawings
  - 1.10.3. Transversal Sections and Measurements

## Module 2. Upstream supply systems. Water transport pipelines

- 2.1. Types of Upstream supply systems
  - 2.1.1. Gravity conveyance systems
  - 2.1.2. Pressure transport systems
  - 2.1.3. Components
- 2.2. Design of upstream supply systems
  - 2.2.1. Plan Layout
  - 2.2.2. The pipeline profile
  - 2.2.3. Buried pipelines
  - 2.2.4. Headworks, midstream and tailrace reservoirs
  - 2.2.5. Components
- 2.3. System Dimensioning
  - 2.3.1. Magnitude and time distribution of demand
  - 2.3.2. Design Flow Rate
  - 2.3.3. Design Criteria
  - 2.3.4. Mechanical calculation of pipelines

- 2.4. Head losses in pipelines
  - 2.4.1. Linear losses
  - 2.4.2. Localized losses
  - 2.4.3. Economic diameter
- 2.5. Tunnel pipelines
  - 2.5.1. State of rock mass loadings
  - 2.5.2. Excavation distortion
  - 2.5.3. Bearing
  - 2.5.4. Free sheet tunnels
  - 2.5.5. Pressurized galleries
- 2.6. Singular elements
  - 2.6.1. Lift stations
  - 2.6.2. Hydraulic study of the elevator
  - 2.6.3. Siphons operation
  - 2.6.4. Siphon calculation and design
- 2.7. Structural protection of the pipeline
  - 2.7.1. Water Hammer
  - 2.7.2. Calculation of water hammer in pipelines
  - 2.7.3. Elements of protection against the water hammer
- 2.8. Other protections
  - 2.8.1. Cathodic protections
  - 2.8.2. Coatings
  - 2.8.3. Types of Coatings for pipelines
  - 2.8.4. Valves and suction cups
- 2.9. Materials in high pressure supply systems
  - 2.9.1. Regulations and selection criteria
  - 2.9.2. Ductile iron pipes
  - 2.9.3. Helical welded steel pipes
  - 2.9.4. Reinforced and prestressed concrete pipelines
  - 2.9.5. Pipes made of plastic materials
  - 2.9.6. Other Materials
  - 2.9.7. Quality control of materials

- 2.10. Connecting, operating and control elements
  - 2.10.1. Types of joints and elements
  - 2.10.2. Valves
  - 2.10.3. Aeration valves or suction cups
  - 2.10.4. Complementary elements

### Module 3. Urban drainage and design

- 3.1. Sanitation Networks
  - 3.1.1. Sanitation Network
  - 3.1.2. Typologies of sewerage networks
  - 3.1.3. Network layout
- 3.2. Network Elements
  - 3.2.1. Pipelines
  - 3.2.2. Manholes
  - 3.2.3. Connections
  - 3.2.4. Surface catchment elements
  - 3.2.5. Spillways
- 3.3. Materials in sewerage networks
  - 3.3.1. Selection Criteria
  - 3.3.2. Concrete pipes
  - 3.3.3. Pipes
  - 3.3.4. Fiberglass reinforced polyester pipes
- 3.4. Geotechnics in the hydraulic works of sanitation
  - 3.4.1. Phases of a reconnaissance campaign
  - 3.4.2. Most common tests
  - 3.4.3. Calculation and stability parameters in trenches for sewerage collectors
- 3.5. Sizing criteria
  - 3.5.1. Design Criteria
  - 3.5.2. Main factors in the design
  - 3.5.3. Design parameters and variables

- 3.6. Dimensioning of sewerage networks
  - 3.6.1. Urban hydrology
  - 3.6.2. Fundamental Equations
  - 3.6.3. Performance criteria
- 3.7. Simulation of sewerage networks in SWWM
  - 3.7.1. Network Elements
  - 3.7.2. Contribution basin
  - 3.7.3. Design rainfall
  - 3.7.4. Hydraulic profile of conduits
  - 3.7.5. Results
- 3.8. Retention tanks
  - 3.8.1. Planning and location
  - 3.8.2. Cleaning systems
  - 3.8.3. Auxiliary Elements
- 3.9. Modeling of sewerage networks in Civil 3D
  - 3.9.1. Workflow in Civil 3D
  - 3.9.2. Networks Creation Tools
  - 3.9.3. Network creation
- 3.10. Network Analysis with Storm and Sanitary Analysis (SSA)
  - 3.10.1. Network export from Civil 3D to SSA
  - 3.10.2. Hydraulic-hydrologic modeling of the network
  - 3.10.3. Hydraulic calculations
  - 3.10.4. Results Obtained





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*TECH provides you with multiple multimedia tools that give dynamism and greater appeal to this university program”*

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.*





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

### A learning method that is different and innovative

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

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

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

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

## Relearning Methodology

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

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

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

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

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



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

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

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

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

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



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



### Study Material

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

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



### Classes

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

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



### Practising Skills and Abilities

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



### Additional Reading

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





**Case Studies**

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



**Interactive Summaries**

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

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



**Testing & Retesting**

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



06

# Certificate

The Postgraduate Diploma in Hydraulic Infrastructure Networks guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Diploma issued by TECH Technological University.



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*Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork”*

This **Postgraduate Diploma in Hydraulic Infrastructure Networks** 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 diploma 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 Hydraulic Infrastructure Networks**

Official N° of hours: **450 h.**



\*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.



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



## Postgraduate Diploma Hydraulic Infrastructure Networks

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

# Postgraduate Diploma Hydraulic Infrastructure Networks