

# Postgraduate Certificate Hydrology and Hydraulics for Civil Engineering



## Postgraduate Certificate Hydrology and Hydraulics for Civil Engineering

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

Website: [www.techtute.com/us/engineering/postgraduate-certificate/hydrology-hydraulics-civil-engineering](http://www.techtute.com/us/engineering/postgraduate-certificate/hydrology-hydraulics-civil-engineering)

# Index

01

Introduction

---

*p. 4*

02

Objectives

---

*p. 8*

03

Course Management

---

*p. 12*

04

Structure and Content

---

*p. 16*

05

Methodology

---

*p. 20*

06

Certificate

---

*p. 28*

# 01

# Introduction

One of the biggest causes of tragedies in the world are those caused by rain. This type of catastrophes are practically inevitable and uncontrollable, due to the cycles and movements of the planet. That is why hydrology is fundamental to understand the behavior of water around the areas built by man, avoiding problems of flooding, erosion and sedimentation. Therefore, this program will offer the professionals a great first level content to develop specialized skills around flood studies of fluvial areas. All this, through a 100% online pedagogical modality and with the best quality didactic material to make the academic experience effective and unique.







“

*This program offers you an exclusive content on Hydrology and Hydraulics for Civil Engineering in only 6 weeks”*

Engineers specialized in hydraulic works have been working on the implementation of new drainage techniques to promote sustainability, efficiency and avoid environmental disasters. These advances are applicable to other environments and require advanced in-depth knowledge of hydrological and hydraulic modeling.

In this sense, research in this field has continued to advance in order to provide constructive solutions to various questions, making it clear that professionals in Civil Engineering are essential for their implementation in any project. Thus, this Postgraduate Certificate will provide the graduate with innovative updates regarding Hydrology and Hydraulics for Civil Engineering in only 6 weeks.

The students will strengthen their knowledge in specific aspects on the analysis of the elements of general hydraulics to the design of hydraulic infrastructures, focusing on concepts such as Hydrological Modeling and Hydraulic Modeling. In addition, it will delve into the hydrological parameters of watersheds. A program that integrates a specialized teaching team and at the same time, supported in quality multimedia content that offers dynamism.

Furthermore, TECH takes into account comfort and excellence, that is why this program offers a complete and quality learning, while providing flexibility to study it. Graduates only need a device with an Internet connection to easily access the virtual platform, 24 hours a day and from anywhere in the world.

This **Postgraduate Certificate in Hydrology and Hydraulics for Civil Engineering** 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 Hydrology and Hydraulics
- ◆ 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



*This program provides you with a theoretical and practical perspective on the fundamentals of hydraulics”*

“

*With this highly flexible degree, you only need an electronic device with an Internet connection to access the virtual platform 24 hours a day”*

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.

*This course integrates a teaching team specialized in Civil Engineering together with a high quality multimedia support.*

*It delves into the properties of flow in open channels through the best didactic material.*



# 02

# Objectives

This Postgraduate Certificate in Hydrology and Hydraulics for Civil Engineering has been designed primarily to provide the engineers with the latest developments in the area of Hydraulic Works. Therefore, TECH provides a great content of academic innovation, guaranteeing the success of this intensive learning process. In this way, the students will have increased their skills in the application of concepts in surface hydrology to natural environments to perform hydrological models of basins and urban hydrological models.





“

*The objective of TECH is you: give your career the boost it needs and specialize in the Urban Hydrology sector. Enroll now”*



## General Objectives

---

- ◆ Specify the most relevant concepts of hydrology and hydraulics for their application in civil engineering
- ◆ Analyze the key elements that apply, in particular, to hydraulic infrastructures of the water cycle
- ◆ Develop specialized knowledge on the application of these concepts to the design of such infrastructures
- ◆ Present practical cases to apply the knowledge acquired
- ◆ Identify the main elements of a water collection, storage and purification system
- ◆ Evaluate different alternatives for the selection of collection and/or purification systems
- ◆ Develop the main criteria for the design of the elements that are part of the system
- ◆ Base the practical cases on the theoretical knowledge acquired
- ◆ Develop new knowledge on BIM methodology, the concept of information model, collaborative workflows and modeling tools
- ◆ Generate skills in dam modeling using advanced softwares
- ◆ Extrapolate theoretical concepts to the design and modeling of these types of structures
- ◆ Analyze the use and application of BIM methodology in the project, construction and dam operation
- ◆ Develop new knowledge in the hydraulics of free sheet pipelines
- ◆ Determine the particular elements that are part of a piping system
- ◆ Extrapolate this knowledge to real civil engineering problems, proposing solutions and establishing construction procedures
- ◆ Analyze canal and channel works with computer software, basing the results on canal hydraulics
- ◆ Develop new knowledge about drinking water storage, the construction of storage structures and their operation
- ◆ Analyze the main elements that make up tanks, their materials and uses
- ◆ Define the main criteria for reservoir design, installation of control and control equipment and asset management
- ◆ Determine the use and application of the BIM methodology in modeling and information management



*With TECH you will increase your competences in the application of surface hydrology concepts to natural environments in order to carry out hydrological models of basins"*



## Specific Objectives

---

- ◆ Apply the concepts of surface hydrology to natural environments in order to carry out watershed hydrological models and urban hydrological models
- ◆ Compile the different methods applied in surface hydrology to assess their potentialities
- ◆ Develop specialized skills to carry out flood studies of fluvial areas
- ◆ Analyze the elements of general hydraulics in the design of hydraulic infrastructures
- ◆ Generate new knowledge on the particular elements that are part of a hydraulic infrastructure
- ◆ Define the hydraulic variables that must intervene in our design of channels and pipelines, identifying the hydrodynamics of the infrastructure



03

# Course Management

This program has renowned specialists in the civil engineering sector, who have poured into this program their deep knowledge of Hydrology and Hydraulics. In this way, the graduates will get a learning with solid bases from the hand of real experts. Thus TECH, provides students with a quality education, which is enhanced not only by its material, but also by the proximity of the faculty that will allow them to resolve any doubts that may arise during the course of this program.





“

*In this Postgraduate Diploma you will obtain the best didactic tools in the process of the academic”*

## 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

### D. Pedraza Martínez, Horacio

- ◆ Pavement and layout specialist in the Drafting and Project Management Area of the Public Works Agency of the Andalusian Regional Government
- ◆ Layout, earth and pavement specialist for the construction project of the San Martín de Valdeiglesias Bypass, for the Ministry of Public Works
- ◆ Author and project manager of several road maintenance projects in the provinces of Granada and Jaén
- ◆ Specialist in earthworks, pavements and drainage for the bidding project: New Road M-410
- ◆ Co-author of the construction project for the extension of Line 2 of the Malaga Subway
- ◆ Author of the layout project for the A-318 Olivar Highway
- ◆ Graduate in Civil Engineering from the University of Granada
- ◆ Master's Degree BIM in Civil Engineering from the University of Seville



# 04

# Structure and Content

This program has been designed and thought according to the most recent research in the field of Hydraulic Works, establishing a syllabus that provides a great content on Hydrology and Hydraulics for Civil Engineering. This program is aimed at providing the students with innovative material on the different methods applied in surface hydrology to evaluate its potentialities, as well as the design and analysis of water systems. In this way, students will be able to broaden their professional options within the engineering sector. Expert syllabus and quality content are the key to successful learning in Hydrology and Hydraulics.





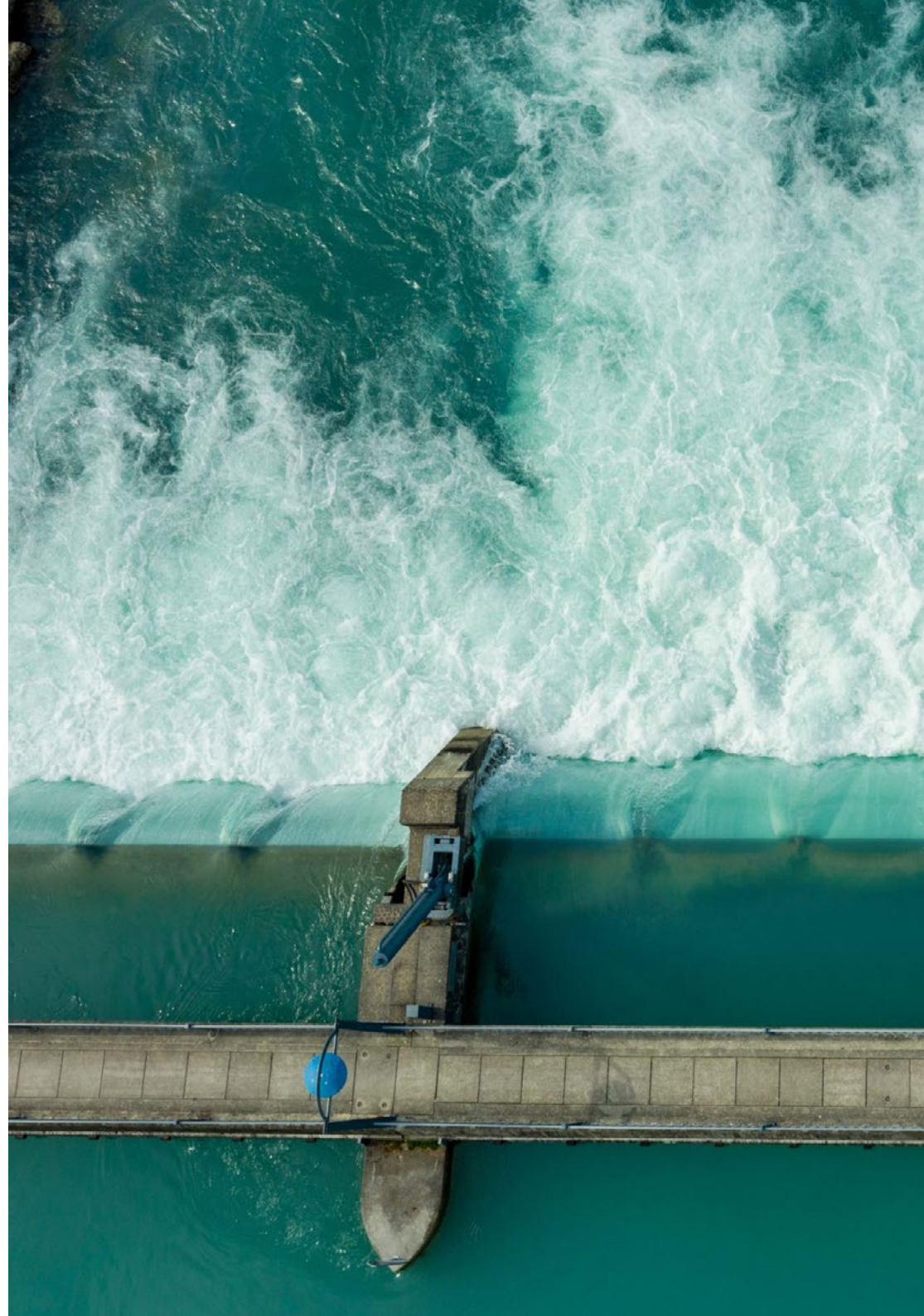


“

*An expert syllabus and quality content are the key to successful learning in Hydrology and Hydraulics”*

## Module 1. Hydrology and Hydraulics for Civil Engineering

- 1.1. Surface and urban hydrology
  - 1.1.1. Precipitation
  - 1.1.2. Infiltration
  - 1.1.3. Groundwater
  - 1.1.4. Flow rate. Duration and mass curves
  - 1.1.5. Probability distribution functions used in hydrology
  - 1.1.6. Analysis of drought frequencies
  - 1.1.7. Stochastic Processes Time series models
- 1.2. Rainfall. Precipitation - Runoff Ratio
  - 1.2.1. The design storm
  - 1.2.2. Historical analysis of maximum rainfall intensities
  - 1.2.3. Flood hydrographs
- 1.3. Hydrological parameters of catchment areas
  - 1.3.1. Typical hydrograph
  - 1.3.2. Unit Hydrograph
  - 1.3.3. Dimensionless Hydrographs
  - 1.3.4. Triangular Hydrographs
- 1.4. Determination of discharge flow rates
  - 1.4.1. Flood flow
  - 1.4.2. Transit of reservoirs
  - 1.4.3. Transit in natural watercourses
- 1.5. Hydrological Modeling
  - 1.5.1. Témez method
  - 1.5.2. Rational Method
  - 1.5.3. Horton Method
  - 1.5.4. Hydraulic Modeling
- 1.6. Hydraulic Modeling
  - 1.6.1. Hydromechanics
  - 1.6.2. Flows and currents
  - 1.6.3. Movements in hydraulic infrastructures







- 1.7. Free sheet pipelines. Hydraulic fundamentals
  - 1.7.1. Water flow in pipelines
  - 1.7.2. Classification of flows in channels
  - 1.7.3. Flow states
- 1.8. Properties of flow in open channels
  - 1.8.1. Types of open channels
  - 1.8.2. Geometry of an artificial channel
  - 1.8.3. Elements of a channel section
  - 1.8.4. Velocity and pressure distribution in channels
  - 1.8.5. Flow energy in open channels
  - 1.8.6. Critical flow status
  - 1.8.7. Local phenomena. Hydraulic Highlighting
- 1.9. Uniform motion in channels
  - 1.9.1. Uniform flow characteristics
  - 1.9.2. Uniform flow equations
  - 1.9.3. Common formulas for uniform motion in channels
- 1.10. Varied motions
  - 1.10.1. Gradually varied motion in rivers and streams
  - 1.10.2. Wave propagation
  - 1.10.3. Pressures and dynamic forces
  - 1.10.4. Waves and Water hammer
  - 1.10.5. Valve closure. Gradual, rapid and instantaneous



*This qualification will provide you with innovative teaching material on the different methods applied in surface hydrology”*

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.







“

*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.

“

*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 Certificate in Hydrology and Hydraulics for Civil Engineering guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological University.





“

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

This **Postgraduate Certificate in Hydrology and Hydraulics for Civil Engineering** 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 Certificate** issued by **TECH Technological University** via tracked delivery\*.

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

Title: **Postgraduate Certificate in Hydrology and Hydraulics for Civil Engineering**

Official N° of hours: **150 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 languages  
virtual classroom

**tech** technological  
university

## Postgraduate Certificate Hydrology and Hydraulics for Civil Engineering

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



# Postgraduate Certificate Hydrology and Hydraulics for Civil Engineering