

# Postgraduate Certificate

## Hydrogeology Applied to the Ground





## Postgraduate Certificate Hydrogeology Applied to the Ground

Course Modality: **Online**

Duration: **6 weeks**

Certificate: **TECH - Technological University**

**6 ECTS Credits**

Teaching Hours: **150 hours.**

Website: [www.techtute.com/us/engineering/postgraduate-certificate/hydrogeology-applied-ground](http://www.techtute.com/us/engineering/postgraduate-certificate/hydrogeology-applied-ground)

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# 01

# Introduction

This Postgraduate Certificate was created with the global objective of deepening in the behavior of soils and rocks in the presence of water. How to identify its presence and degree, and short-, medium- and long-term developments. Thus, this program will address the contents and techniques of geotechnical engineering and its application in aqueous soils, which are present in many civil engineering projects and works. These contents will allow the professional to carry out an original and application-oriented analysis of the theoretical concepts developed throughout the Postgraduate Certificate.





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*A high-level training specially designed to lead the engineer to success in their profession"*

The Postgraduate Certificate in Hydrogeology Applied to the Ground is academically designed to provide a deep knowledge, starting from advanced concepts already acquired in the world of civil engineering and from a practical application point of view, of the most important geotechnical aspects that can be found in different types of civil works.

The content ranges from the specific behavior of soils and rocks, with a constant differentiation of both types of terrain throughout all the topics, to their direct application in foundations and structures.

The Postgraduate Certificate, has a syllabus that mixes some of them with more applied theoretical load (such as those related to the models of ground behavior, the necessary requirements for a good identification of soils and rocks or the interaction of the ground with seismic disturbances), with others with eminent component of practical analysis, where the knowledge acquired on the behavior of the ground and its stress-strain states of this first part, are applied to the usual structures of Geotechnical Engineering: slopes, walls, walls, screens, tunnels.....

The topics covered during this training end with an approach to the statistical calculation and the safety coefficients used in the calculations of these elements in both provisional and definitive stages.

This Postgraduate Certificate in Hydrogeology Applied to the Ground integrates the most complete and innovative educational program in the current market in terms of knowledge and latest available technologies, in addition to encompassing all the sectors or parties involved in this field. In addition, the Postgraduate Certificate consists of exercises based on real cases of situations currently managed or previously faced by the teaching team.

All this, through a 100% online specialization that provides the student with the ease of being able to take it wherever and whenever they want. All you need is a device with internet access, and you will be able to access a universe of knowledge that will be the main asset of the engineer when positioning themselves in a sector that is increasingly in demand by companies in various sectors.

This **Postgraduate Certificate in Hydrogeology Applied to the Ground** is the most comprehensive and up-to-date educational program on the market. The most important features of the program include:

- ◆ The development of practical cases presented in Courses in Civil and Geotechnical Engineering
- ◆ 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 course, discussion forums on controversial issues and individual reflection papers.
- ◆ Content that is accessible from any fixed or portable device with an Internet connection



*Having an in-depth knowledge of how hydrogeology works is a skill that is in high demand in today's job market"*



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*You will be provided with innovative teaching materials and resources that will facilitate the learning process and the retention of the contents learned for a longer period of time"*

*A 100% online specialization that will allow you to combine your studies with the rest of your daily activities*

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.

Its Multimedia Content, elaborated with the latest Educational Technology, will allow the Professional a situated and contextual learning, that is to say, a Simulated Environment that will provide an immersive specialization programmed to train in real situations.

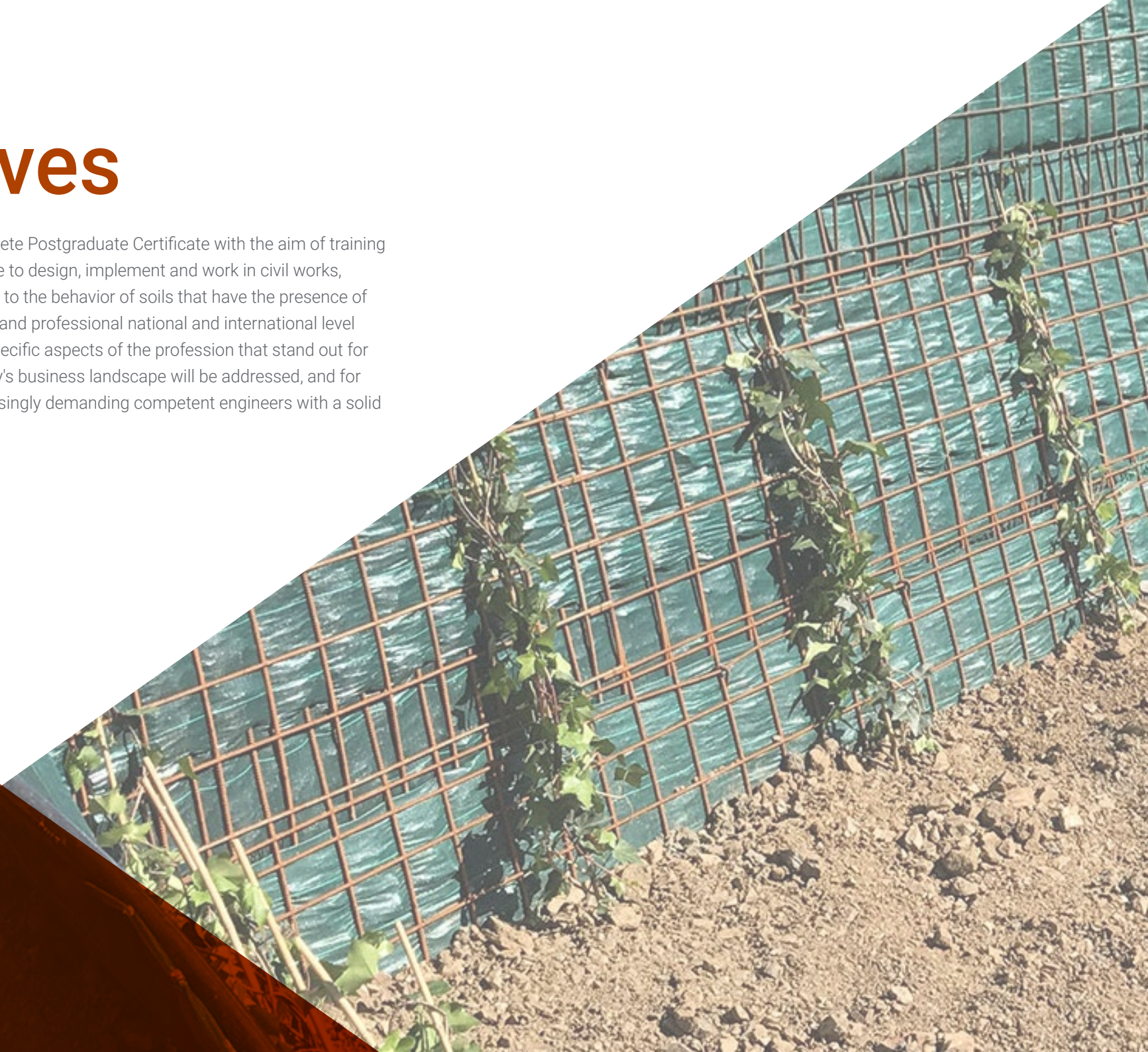
This program is designed around Problem Based Learning, whereby the professional must try to solve the different professional practice situations that arise during the academic year. For this purpose, the professional will be assisted by an innovative interactive video system created by renowned and experienced engineers.



# 02

# Objectives

TECH has designed this very complete Postgraduate Certificate with the aim of training engineering professionals to be able to design, implement and work in civil works, knowing in depth everything related to the behavior of soils that have the presence of water, and the aspects of technical and professional national and international level that directly affect it. To this end, specific aspects of the profession that stand out for their enormous importance in today's business landscape will be addressed, and for which large corporations are increasingly demanding competent engineers with a solid specialized training.







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*Tech pursues only one goal with its specializations: to catapult students toward professional success”*





## General Objectives

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- ◆ Delve deeper into kinds of grounds, not only in their typology but also in their behavior Not only in the evident differentiation of stresses and deformations of soils and rocks, but also under particular but very common conditions, such as the presence of water or seismic disturbances.
- ◆ Efficiently recognize the needs for soil characterization, being able to design campaigns with the optimal means for each type of structure, optimizing and giving added value to the study of materials
- ◆ Identify the behavior of slopes and semi-subterranean structures such as foundations or walls in their different typologies This complete identification must be based on understanding and being able to anticipate the behavior of the terrain, the structure and its interface Know in detail the possible faults that each set can produce and as a consequence have a deep understanding of the repair operations or improvement of materials to mitigate damage
- ◆ Receive a complete tour of tunnel and gallery excavation methodologies, analyzing all drilling procedures, design constraints, support and lining





## Specific Objectives

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- ◆ Identification of the presence of water in the behavior of soils and acquiring a correct knowledge of the different storage functions and characteristic curves
- ◆ Discuss the terms of effective and total pressures and determine the exact influence of effective and total pressures on the loadings of the land.
- ◆ Identify the most common errors regarding the use of these terms of effective and total pressures, and show practical applications of these concepts that are of great importance
- ◆ Apply knowledge of the behavior of semi-saturated soils in data collection and sample analysis, with regard to laboratory tests: drained and undrained tests
- ◆ Determine the uses of soil compaction as a measure to reduce soil saturation  
Correct handling of the compaction curve by analyzing the most common errors and their applications
- ◆ Analyze the most common saturation processes such as swelling, suction and liquefaction in soils, describing the characteristics of the processes and their consequences in soils
- ◆ Apply all these concepts to the modeling of stresses and their variation according to the degree of saturation of the soil
- ◆ Know in detail the applications of saturation in surface works and saturation removal processes in superficial linear works
- ◆ Correctly define the zonal hydrogeology in a project or work. Determine the concepts that should encompass its study and the consequences it may have in the long term on the structural elements



03

# Course Management

TECH applies a criterion based on high quality in all its specializations. This guarantees students that by studying here they will find the best didactic content taught by the best professionals in the sector. In this sense, this Postgraduate Certificate in Hydrogeology Applied to the Ground counts on highly prestigious professionals in this field, who bring to the training the experience of their years of work, as well as the knowledge acquired from research in the field. All to provide the engineer with a high-level program, which will enable them to practice in national and international environments with greater guarantees of success.





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*Learn with the best and acquire the knowledge and skills you need to intervene in this area of development with total success”*

## Management



### Mr. Estébanez Aldona, Alfonso

- ◆ Civil Engineer graduated from the Polytechnic University of Madrid
- ◆ Studying the E.T.S.I. Ph.D Roads, Canals and Ports U.P.M. in the Department of Terrain Engineering.
- ◆ Course of Health and Safety Coordinator in Construction Works registered by the CAM nº 3508
- ◆ Engineering and Technical Director at ALFESTAL
- ◆ International Consultant and Project Manager at D2
- ◆ Project Manager in the Department of Tunnels and Underground Works in Inarsa S.A
- ◆ Assistant Technician in the Geology and Geotechnical Department of Intecsa-Inarsa



## Professors

### Mr. Sandin Sainz-Ezquerro, Juan Carlos

- ◆ Specialist in the calculation of structures and foundations, fields in which he has developed his entire professional career over the last 25 years
- ◆ Civil Engineer graduated the ETSI of, Canals and Ports from the Polytechnic University of Madrid (U.P.M.).
- ◆ Studying the E.T.S.I. Ph.D Roads, Canals and Ports U.P.M. in the Structures Department
- ◆ Course on integration of BIM technology in structural design 2017
- ◆ Lecturer in the BIM Master developed at the Colegio de Caminos 2019
- ◆ Technical assistance for SOFISTIK AG for Spain and Latin America, finite element modeling software for terrain and structures

### Mr. Clemente Sacristan, Carlos

- ◆ Civil Engineer graduated from the Polytechnic University of Madrid
- ◆ Development of large-scale linear works for different administrations (ADIF, Ministry of Public Works, Provincial Council of Vitoria...) being a reference project manager in the field of linear works.
- ◆ Executive at BALGORZA S.A.
- ◆ Occupational risk prevention course for construction company managers
- ◆ Advanced course in management of large turnkey projects (EPC)

### Ms. Lope Martín, Raquel

- ◆ Geological Engineer Complutense University of Madrid UCM
- ◆ PROINTEC's technical department has been involved in various projects requiring improvement treatments, both nationally and internationally: jet grouting, gravel columns, vertical drainage, etc.
- ◆ Course on Geotechnics Applied to Building Foundations
- ◆ Course on Technical Control for Property and Casualty Insurance Geotechnics, foundations and structures


# 04

# Structure and Content

The syllabus of the Postgraduate Certificate is structured as a comprehensive tour through each and every one of the concepts required to understand and work in this field. Thus, through a novel didactic approach, based on the practical application of the contents, the engineer will learn and understand the functioning of geotechnics and foundations, knowing how to design and implement projects in this sense, providing high safety indexes and services to the companies. This, in addition to adding value to your professional profile, will make you a much better prepared professional to work in a variety of environments.







“A comprehensive syllabus focused on acquiring knowledge and converting it into real skills, created to propel you to excellence”



## Module 1. Behaviour of water in the ground

- 1.1. Partially Saturated Soils
  - 1.1.1. Storage Function and Characteristic Curve
  - 1.1.2. Condition and Properties of Semi-saturated Soils
  - 1.1.3. Characterization of Partially Saturated Soils in Modeling
- 1.2. Effective and Total Pressure
  - 1.2.1. Total, Neutral and Effective Pressure
  - 1.2.2. Darcy's Law in Terrain
  - 1.2.3. Permeability
- 1.3. Drainage Incidence in Tests
  - 1.3.1. Drained and Undrained Shear Tests
  - 1.3.2. Drained and Undrained Consolidation Tests
  - 1.3.3. Post-rupture Drainage
- 1.4. Soil Compaction
  - 1.4.1. Principle Fundamentals in Compaction
  - 1.4.2. Compaction Methods
  - 1.4.3. Tests, Trials and Results
- 1.5. Saturation Processes
  - 1.5.1. Swelling
  - 1.5.2. Suction
  - 1.5.3. Liquefaction
- 1.6. Stresses in Saturated Soils
  - 1.6.1. Tensional Spaces in Saturated Soils
  - 1.6.2. Evolution and Transformation in Stresses
  - 1.6.3. Associated Displacements
- 1.7. Application to Roads and Plains
  - 1.7.1. Compaction Values
  - 1.7.2. Bearing Capacity of the Soil
  - 1.7.3. Specific Tests
- 1.8. Hydrogeology in Structures
  - 1.8.1. Hydrogeology in Different Soil Types
  - 1.8.2. Hydrogeology Model
  - 1.8.3. Problems that Groundwater Can Cause





- 1.9. Compressibility and Preconsolidation
  - 1.9.1. Compressibility in Soils
  - 1.9.2. Preconsolidation Pressure Terms
  - 1.9.3. Water Table Oscillations in Preconsolidation
- 1.10. Fluid Analysis
  - 1.10.1. One-dimensional Flow
  - 1.10.2. Critical Hydraulic Gradient
  - 1.10.3. Flow Modelling

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*This training will allow you to advance in your career comfortably”*



05

# Methodology

This specialization provides you with a different way of learning. Our methodology uses a cyclical learning approach: Re-learning.

This teaching system is used 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 Re-learning, 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 you a revolutionary approach to developing your skills and knowledge. Our goal is to strengthen your skills in a changing, competitive, and highly demanding environment.

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*With TECH you can experience a way of learning that is shaking the foundations of traditional universities around the world”*



*Our school is the first in the world to combine Harvard Business School case studies with a 100% online learning system based on repetition*



### A learning method that is different and innovative.

This Engineering program at TECH- Technological University is an intensive program that prepares you to face all the challenges in this area, both nationally and internationally. The main objective is to promote your personal and professional growth. For this purpose, we rely on the case studies of Harvard Business School, with which we have a strategic agreement that allows us to use the materials used in the most prestigious university in the world: HARVARD.

**“** We are the only online university that offers Harvard materials as teaching materials on its courses”

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

The case method has been the most widely used learning system among the world's leading business schools for as long as they have existed. 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.

In a given situation, what would you do? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the course, you will be presented with multiple real cases. You will have to combine all your knowledge, and research, argue, and defend your ideas and decisions.



## Re-Learning Methodology

Our University is the first in the world to combine Harvard University case studies with a 100%-online learning system based on repetition, which combines 16 different teaching elements in each lesson.

We enhance Harvard case studies with the best 100% online teaching method: Re-learning.

*In 2019 we obtained the best learning results of all Spanish-language 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 Re-learning.

Our University is the only one in Spanish-speaking countries licensed to incorporate 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 Spanish online university indicators.



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

With this methodology we have 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, markets, and financial 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.

*Re-learning 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 to success*

Based on the latest evidence in neuroscience, not only do we know how to organize information, ideas, images, memories, but we also know that the place and context where we have learned something is crucial for us to be able to remember it and store it in the hippocampus, and 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.



In this program you will have access to the best educational material, prepared with you 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.

This content is then adapted in an audiovisual format that will create our way of working online, with the latest techniques that allow us to offer you high quality in all of the material that we provide you with.



### 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 our future difficult decisions.



### Practising Skills and Abilities

You 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 we live in.



### Additional Reading

Recent articles, consensus documents, international guides. In our virtual library you will have access to everything you need to complete your training.







### Case Studies

You 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 Latin America.



### Interactive Summaries

We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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



### Testing & Re-testing

We periodically evaluate and re-evaluate your knowledge throughout the program. We do this on 3 of the 4 levels of Miller's Pyramid.



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 training a TECH Postgraduate Certificate in Hydrogeology Applied on the Ground: a highly qualified added value for any professional in this area"*

This **Postgraduate Certificate in Hydrogeology Applied to the Ground** is the most comprehensive and up-to-date educational program on the market.

After the student has passed the evaluations, they will receive by mail with acknowledgment of receipt their corresponding Postgraduate Certificate issued by **TECH- Technological University**.

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

Title: **Postgraduate Certificate in Hydrogeology Applied to the Ground**

ECTS: **6**

Official Number of Hours: **150**



\*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 quality

online training

development languages

classroom

**tech** technological  
university

Postgraduate  
Certificate

Hydrogeology Applied  
to the Ground

Course Modality: Online

Duration: 6 weeks

Certificate: TECH - Technological University

6 ECTS Credits

Teaching Hours: 150 hours.

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