

# Postgraduate Diploma Water Treatment





## Postgraduate Diploma Water Treatment

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

Website: [www.techitute.com/in/engineering/postgraduate-diploma/postgraduate-diploma-water-treatment](http://www.techitute.com/in/engineering/postgraduate-diploma/postgraduate-diploma-water-treatment)

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# 01

# Introduction

Water purification is the process by which water is treated so that it can be consumed by people without posing any risk to human health. But it is also very important to treat the water used, in order to avoid possible environmental problems. This course will offer you the opportunity to learn all aspects related to Water Treatment in an easy way and with the highest educational quality.





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*A comprehensive and multidisciplinary training course that will allow you to excel in your career, following the latest advances in Water Treatment”*

The **Postgraduate Diploma in Water Treatment** has been designed to train the professional in this sector with the latest developments in the field. Thus, experts will learn about its properties, both physical and chemical, its structure and types of bonds, as well as the chemical reactions in which it plays an essential role in the life cycle and the different water purification processes.

On the other hand, wastewater treatment is key in the field of water engineering, since it is necessary to treat the water used to reduce the environmental impact derived from its use. The purpose of a wastewater treatment plant (WWTP) is to remove pollutants from wastewater in order to return the water to its source without the presence of pollutants. For this reason, this course is focused on the study of the processes and equipment associated with a wastewater treatment plant from a chemical engineering point of view.

This very complete training course covers the types of contamination, drinking water treatment plants (DWTP), their operation and the different processes carried out, with special emphasis on the most important ones in this process, such as flocculation, coagulation, purification and disinfection.

Upon completion of this Postgraduate Diploma, the skills acquired by the student will enable him/her to understand the importance of water treatment, the drinking water treatment plants that process water for use and consumption in daily life and in the industrial sector, as well as to understand the methods of analysis, management and economics involved in the drinking water treatment process for the production of drinking water.

It should be noted that since it is a 100% online Postgraduate Diploma, the student is not conditioned by fixed schedules or the need to move to another physical location, but can access the contents at any time of the day, balancing their work or personal life with their academic life.

This **Postgraduate Diploma in Water Treatment** contains the most complete and up to date educational program on the market. The most important features of the program include:

- » The development of case studies presented by experts in water treatment.
- » 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 the self-assessment process can be carried out to improve learning.
- » Special emphasis on innovative methodologies in Water Treatment.
- » 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.



*Don't miss the opportunity to take this Postgraduate Diploma in Water Treatment with us. It's the perfect opportunity to advance your career"*

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*This Postgraduate Diploma is the best investment you can make in selecting a refresher program to update your knowledge in Water Treatment"*

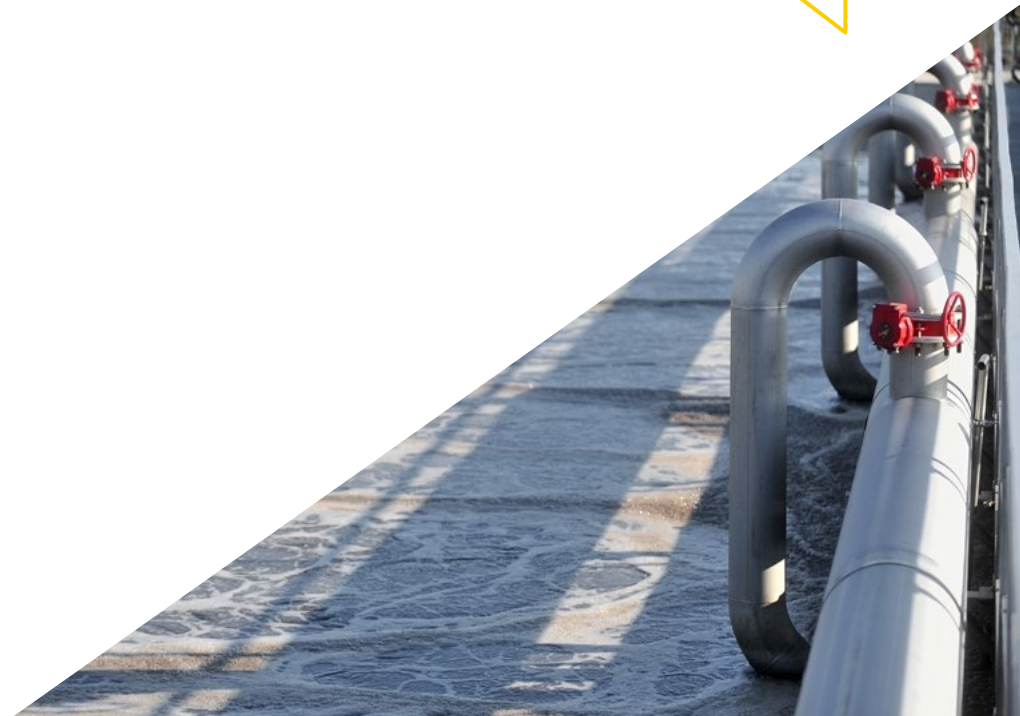
Its teaching staff includes professionals belonging to the field of water treatment, who bring to this training the experience of their work, as well as recognized specialists from leading companies and prestigious universities.

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 training 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 developed by renowned and experienced water treatment experts.

*This training comes with the best didactic material, providing you with a contextual approach that will facilitate your learning.*

*This 100% online Postgraduate Diploma will allow you to combine your studies with your professional work. You choose where and when to train.*



02

# Objectives

The Postgraduate Diploma in Water Treatment is oriented to facilitate the professional's performance in order to acquire and know the main advances in this field.







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*Our goal is to make you the best professional in your sector. And for this we have the best methodology and content"*



## General Objectives

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- » Apply the discipline of chemistry in this module, the objective is to acquire the knowledge related to its function, composition, structure and reactivity, in order to understand its importance in the life cycle and in the other fields that concern it.
- » Approach the relationship between water and the environment and make a description of the physical-chemical processes involved in a wastewater treatment plant, which will allow the student to design the equipment corresponding to a wastewater treatment plant.
- » Understand the processes involved in the potabilization of water for human and industrial consumption, as well as the analytical methods and management that control it considering the costs in the drinking water service.





## Specific Objectives:

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- » Discuss in detail the water molecule, structure, states of aggregation, chemical bonds, and physical and chemical properties.
- » Study the reactivity of the water molecule in organic and inorganic reactions.
- » Addressing the great importance of this molecule as a universal solvent in the life cycle, also dealing with the main thermodynamic laws.
- » Deepen the understanding of the different water purification processes and learn about the components that determine its quality as drinking water.
- » Knowing the process stages of a wastewater treatment plant.
- » Design equipment such as tanks, piping, pumps, compressors and heat exchangers, as well as specific WWTP equipment dedicated to sedimentation or flotation.
- » Study biological processes and associated technologies such as biofilters, aerobic digesters or activated sludge digesters.
- » Understand the technologies for nitrogen and phosphorus removal.
- » Study low-cost purification technologies such as lagooning and green filtering.
- » Delve into the types and effects of contamination in drinking water, and then study the processes of drinking water treatment.
- » Compare the different equipment used in water purification.
- » Study water analysis methods in order to confirm its potability.
- » Understand the role of water in different industrial processes to learn how to manage it as a resource.
- » Deepen understanding of the economic considerations and costs of drinking water services in order to establish relevant actions to address freshwater scarcity and aligned with the strategies set out in the 2030 Agenda of the Sustainable Development Goals (SDGs).



*Take the step to get up to date on the latest developments in Water Treatment"*

03

# Course Management

In our university we have professionals specialized in each area of knowledge, who pour their work experience into our training programs.





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*Our university employs the best professionals in all areas who share their knowledge to help you"*

## Management



### Mrs. NietoSandoval González, Nicolás David

- Industrial Technical Engineer by the E.U.P. of Malaga.
- Industrial Engineer from E.T.S.I.I.
- Master's Degree in Integral Management of Quality, Environment and Health and Safety at Work by the University of the Balearic Islands.
- He has been working for more than 11 years, both for companies and on his own account, for clients in the private agri-food industry and the institutional sector, as a consultant in engineering, project management, energy saving and circularity in organizations.
- Professor certified by the EOI in the areas of Industry, Entrepreneurship, Human Resources, Energy, New Technologies and Technological Innovation.
- Trainer of the European INDUCE project.
- Trainer in institutions such as COGITI and COIIM.

## Professors

### Mrs. Mullor Real, Cristina

- » Graduated in Environmental Sciences at the Miguel Hernández University of Elche.
- » Master's Degree in Environmental Engineering, specializing in Industrial Environmental Management and Water Treatment Plant Management from the University of Valencia.
- » Experience as an Environmental Consultant in various industrial sectors.
- » Safety Advisor for the transport of dangerous goods by road.

### Mr. Titos Lombardo, Ignacio

- » Degree in Environmental Sciences from the University of Castilla-La Mancha.
- » Master's Degree in Integrated Quality and Environmental Management.
- » Senior Technician in Occupational Risk Prevention.
- » Partner-Consultant of Implantación Integral de Sistemas de Calidad, S.L., a consulting firm created in 1998 and specialized in the development of quality, environmental and prevention consulting and auditing projects and in advising local corporations on environmental matters.
- » The company has been developing its activity for more than 12 years, advising and auditing companies in a wide variety of sectors such as waste, water, food, industrial, transportation, renewable energy, etc.
- » Teacher of Certificates of Professionalism.
- » Currently, he is the administrator of Imsica Formación, S.L., an entity specialized in in-company training for its clients.
- » Teacher of the Recicla2 Project for the promotion of Waste Management and Recycling and the creation of green companies.

### Mrs. Castillejo de Tena, Nerea

- » Graduate in Chemical Engineering from the University of Castilla-La Mancha.
- » Master's Degree in Environmental Engineering and Management at the Institute of Chemical and Environmental Technology of the University of Castilla - La Mancha.
- » Author of projects such as "Simulation hysysys, Optimization and energy analysis".
- » in the Residual Water Treatment unit of the Urea Plant (PAR)" at Fertiberia Puertollano.
- » Co-author of "Methodology for Calculating Energy Efficiency in Waste-to-Energy Facilities".
- » Member of ACMIQ

### Mrs. Álvarez Cabello, Begoña

- » Degree in Biology from the University of Córdoba.
- » Master's Degree in Environmental Quality and Sustainability in Local and Territorial Development from the University of Castilla-La Mancha.
- » Technician in Occupational Risk Prevention by the Fundación de la Construcción.
- » Specialist in Geographic Information Systems (GIS).
- » Extensive experience as an Environmental and Occupational Risk Prevention Technician, with more than 15 years of experience in different sectors: waste, renewable energies, industries, environmental impact assessment, local and regional administration, and conservation biology.
- » Teacher of Certificate of Professionalism and approved by the EOI in environmental, waste and water issues.
- » Member of the Association Harmush Estudio y Conservación de Fauna, which develops international projects on endangered species and various publications.

04

# Structure and Content

The structure of the contents has been designed by the best professionals in the Water Treatment sector, with extensive experience and recognized prestige in the profession.







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*We have the most complete and up-to-date academic program in the market. We strive for excellence and for you to achieve it too”*

## Module 1. Water Chemistry

- 1.1. Water Chemistry
  - 1.1.1. Alchemy
  - 1.1.2. Evolution of Chemistry
- 1.2. The Water Molecule
  - 1.2.1. Crystallography
  - 1.2.2. Crystalline Structure of Water
  - 1.2.3. Aggregation States
  - 1.2.4. Links and Properties
- 1.3. Physical and Chemical Properties of Water
  - 1.3.1. Physical Properties of Water
  - 1.3.2. Chemical Properties of Water
- 1.4. Water as a Solvent
  - 1.4.1. Ion Solubility
  - 1.4.2. Solubility of Neutral Molecules
  - 1.4.3. Hydrophilic and Hydrophobic Interactions
- 1.5. Organic Water Chemistry
  - 1.5.1. The Water Molecule in Organic Reactions
  - 1.5.2. Hydration Reactions
  - 1.5.3. Hydrolysis Reactions
  - 1.5.4. Hydrolysis of Amides and Esters
  - 1.5.5. Other Water Reactions. Enzymatic Hydrolysis
- 1.6. Inorganic Water Chemistry
  - 1.6.1. Hydrogen Reactions
  - 1.6.2. Oxygen Reactions
  - 1.6.3. Reactions to Obtain Hydroxides
  - 1.6.4. Reactions to Obtain Acids
  - 1.6.5. Reactions to Obtain Salts
- 1.7. Analytical Chemistry of Water
  - 1.7.1. Analytical Techniques
  - 1.7.2. Water Analysis
- 1.8. Thermodynamics of Water Phases
  - 1.8.1. Laws of Thermodynamics
  - 1.8.2. Phase Diagram. Phase Equilibrium
  - 1.8.3. Water Triple Point
- 1.9. Water Quality
  - 1.9.1. Organoleptic Characteristics
  - 1.9.2. Physical-chemical Characteristics
  - 1.9.3. Anions and Cations
  - 1.9.4. Undesirable Components
  - 1.9.5. Toxic Components
  - 1.9.6. Radioactivity
- 1.10. Chemical Water Purification Processes
  - 1.10.1. Water Demineralization
  - 1.10.2. Reverse Osmosis
  - 1.10.3. Decalcification
  - 1.10.4. Distillation
  - 1.10.5. Ozone and UV Disinfection
  - 1.10.6. Filtration

**Module 2. Waste from Water Treatment**

- 2.1. Water Pollution Assessment
  - 2.1.1. Water Transparency
  - 2.1.2. Water Contamination
  - 2.1.3. Effects of Water Contamination
  - 2.1.4. Contamination Parameters
- 2.2. Sample Collection
  - 2.2.1. Collection Procedure and Conditions
  - 2.2.2. Sample Size
  - 2.2.3. Sampling Frequency
  - 2.2.4. Sampling Program
- 2.3. EDAR. Pretreatment
  - 2.3.1. Receipt of Water
  - 2.3.2. Dimensioning
  - 2.3.3. Physical Processes
- 2.4. EDAR. Primary Treatment
  - 2.4.1. Sedimentation
  - 2.4.2. Flocculation-Coagulation
  - 2.4.3. Types of Decaners
  - 2.4.4. Decanter Design
- 2.5. EDAR. Secondary Treatment (I)
  - 2.5.1. Biological Processes
  - 2.5.2. Factors Affecting the Biological Process
  - 2.5.3. Active Sludge
  - 2.5.4. Percolating Sludge
  - 2.5.5. Rotary Biological Contact Reactor
- 2.6. EDAR. Secondary Treatment (II)
  - 2.6.1. Biofilters
  - 2.6.2. Digesters
  - 2.6.3. Agitation Systems
  - 2.6.4. Aerobic Digesters: Perfect Mixing and Piston Flow
  - 2.6.5. Active Sludge Digester
  - 2.6.6. Secondary Decanter
  - 2.6.7. Active Sludge Systems
- 2.7. Tertiary Treatment (I)
  - 2.7.1. Nitrogen Removal
  - 2.7.2. Phosphorus Removal
  - 2.7.3. Membrane Technology
  - 2.7.4. Oxidation Technologies Applied to Waste Generated
  - 2.7.5. Disinfection
- 2.8. Tertiary Treatment (II)
  - 2.8.1. Adsorption with Activated Carbon
  - 2.8.2. Steam or Air Entrainment
  - 2.8.3. Gas Washing: Stripping
  - 2.8.4. Ion Exchange
  - 2.8.5. pH Regulation
- 2.9. Sludge Study
  - 2.9.1. Sludge Treatment
  - 2.9.2. Flotation
  - 2.9.3. Assisted Flotation
  - 2.9.4. Dosing and Mixing Tank for Coagulants and Flocculants
  - 2.9.5. Sludge Stabilization
  - 2.9.6. High-load Digester
  - 2.9.7. Low-load Digestion
  - 2.9.8. Biogas
- 2.10. Low Cost Purification Technologies
  - 2.10.1. Septic Tanks
  - 2.10.2. Digester-decanter Tank
  - 2.10.3. Aerobic Lagooning
  - 2.10.4. Anaerobic Lagooning
  - 2.10.5. Green Filter
  - 2.10.6. Sand Filter
  - 2.10.7. Peat Bed

### Module 3. Drinking and Process Water Treatment

- 3.1. The Water Cycle
  - 3.1.1. The Hydrological Water Cycle
  - 3.1.2. Drinking Water Contamination
    - 3.1.2.1. Chemical Contamination
    - 3.1.2.2. Biological Contamination.
  - 3.1.3. Effects of Drinking Water Contamination
- 3.2. Drinking Water Treatment Plants (DWTP)
  - 3.2.1. The Water Purification Process
  - 3.2.2. Diagram of a DWTP. Stages and Processes
  - 3.2.3. Functional Calculations and Process Design
  - 3.2.4. Environmental Impact Study
- 3.3. Flocculation and Coagulation in DWTPs
  - 3.3.1. Flocculation and Coagulation
  - 3.3.2. Types of Flocculants and Coagulants
  - 3.3.3. Mixing Plant Design
  - 3.3.4. Parameters and Control Strategies
- 3.4. Chlorine-derived Treatments.
  - 3.4.1. Chlorine Treatment Residual Products
  - 3.4.2. Disinfection Products
  - 3.4.3. Chlorine Application Points in DWTP
  - 3.4.4. Other Forms of Disinfection
- 3.5. Water Purification Equipment
  - 3.5.1. Demineralization Equipment
  - 3.5.2. Reverse Osmosis Equipment
  - 3.5.3. Decalcification Equipment
  - 3.5.4. Filtration Equipment
- 3.6. Water Desalination
  - 3.6.1. Types of Desalination
  - 3.6.2. Desalination Method Selection
  - 3.6.3. Design of a Desalination Plant
  - 3.6.4. Economic Study
- 3.7. Methods of Analysis of Drinking Water and Wastewater.
  - 3.7.1. Sample Collection
  - 3.7.2. Description of the Methods of Analysis
  - 3.7.3. Frequency of Analysis
  - 3.7.4. Quality Control
  - 3.7.5. Representation of Results
- 3.8. Water in Industrial Processes
  - 3.8.1. Water in the Food Industry
  - 3.8.2. Water in the Pharmaceutical Industry
  - 3.8.3. Water in the Mining Industry
  - 3.8.4. Water in the Agricultural Industry
- 3.9. Drinking Water Management
  - 3.9.1. Infrastructures used for Water Catchment
  - 3.9.2. Drinking Water Production Costs
  - 3.9.3. Drinking Water Storage and Distribution Technology
  - 3.9.4. Management Tools for Water Scarcity
- 3.10. Drinking Water Economics
  - 3.10.1. Economic Considerations
  - 3.10.2. Service Costs
  - 3.10.3. Freshwater Scarcity
  - 3.10.4. The 2030 Agenda



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

04

# Methodology

This training 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.

“

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



*We are the first online university to combine Harvard Business School case studies with a 100% online learning system based on repetition.*





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

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

This Water Treatment course from TECH Technological University is an intensive program that prepares you to face all the challenges in this field, both nationally and internationally. We are committed to promoting your personal and professional growth, the best way to strive for success, that is why at TECH Technological University you will use Harvard case studies, with which we have a strategic agreement that allows us to offer you material from the best university in the world.

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

The case method 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 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 with an innovative methodology designed to train the managers 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 really 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 difficult future decisions.



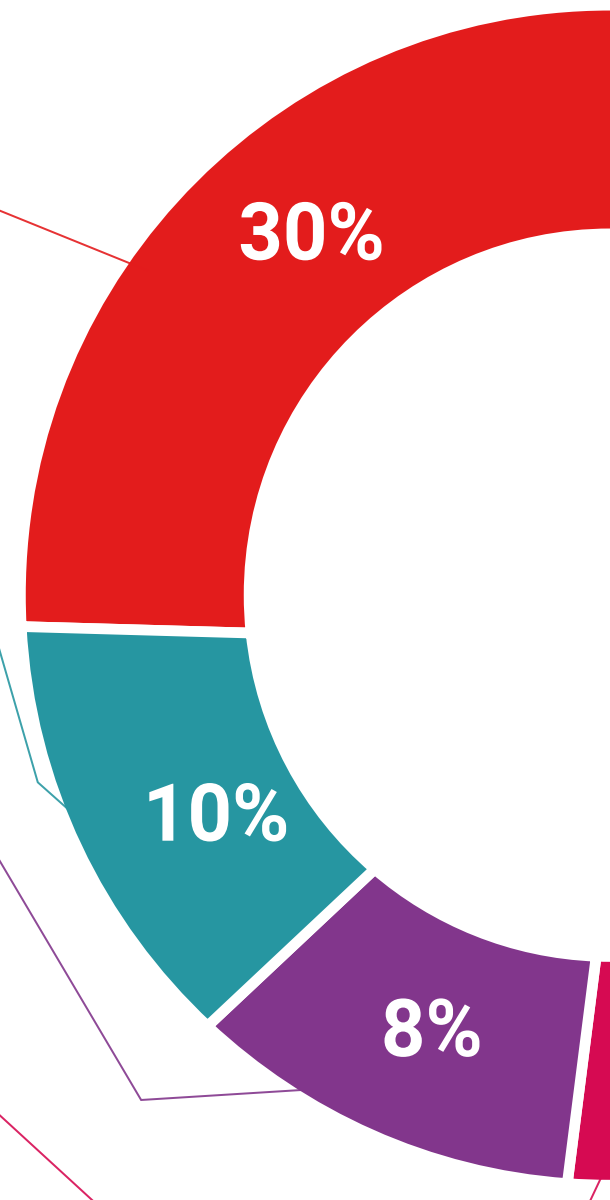
### Practising Skills and Abilities

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 multimedia content presentation training system 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.



05

# 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 Postgraduate Diploma in Water Treatment: a high added value qualification for any professional in this area.”*

This **Postgraduate Diploma in Water Treatment** contains the most complete and up to date scientific program on the market.

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

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

Title: **Postgraduate Diploma in Water Treatment**

ECTS: **18**

Official Number of Hours: **450**



\*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



## Postgraduate Diploma Water Treatment

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

# Specialist Diploma

## Water Treatment

