



# Postgraduate Diploma Water Resources and Urban Water Treatment Plants

» Modality: online

» Duration: 6 months

» Certificate: TECH Technological University

» Dedication: 16h/week

» Schedule: at your own pace

» Exams: online

Website: www.techtitute.com/pk/engineering/postgraduate-diploma/postgraduate-diploma-water-resources-urban-water-treatment-plants

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# tech 06 | Introduction

The management of water resources is a determining factor in a globalized world, since the control of urban water, which is used by all citizens, depends on it. Therefore, it is important to know how to establish the necessary strategies to maintain an adequate balance between demand and sustainability of water catchment. All of this is based on current connectivity means to provide optimal resource management. This work has become essential in recent years, due to the scarcity of water and its poor quality, which continues to hinder the growth of urban centers today.

Similarly, the student will learn more about urban drinking water treatment plants, since the scarcity of the resource and anthropogenic factors force the future expert engineer in this area to know about the appropriate treatments for each type of pollutant, ensuring adequate water purification in the water treatment plants. The syllabus thus develops all the relevant aspects that the student should know, from the design phase - where the contaminants present in the water and the modeling of the parameters with the greatest influence on its subsequent treatment must be considered - to the field of operation, in which the day-to-day problems in the management of a drinking water treatment plant are developed with a practical approach, from the main processes of disinfection and turbidity reduction, to the treatment of salts and new contaminants.

For decades, the European Union has allocated considerable economic resources to the construction of wastewater treatment plants in those medium-sized urban centers that lacked them. At present, these policies are not only maintained, but have been strengthened, since the aim is to completely eliminate water discharged without any treatment and the requirements regarding the quality of the effluent received by the environment have been raised. With its focus on excellence, TECH offers a Postgraduate Diploma in Water Resources and Urban Water Treatment Plants that is unique in the market, to propel the engineer's career into the work environment of the future. The management, the teaching staff and quality content provide the future graduate with all the tools to develop professionally in a highly demanded sector.

This Postgraduate Diploma in Water Resources and Urban Water Treatment Plants contains the most complete and up-to-date program on the market. The most important features include:

- Practical cases presented by experts in engineering focused on the integral water cycle with special attention to the different pumping systems and supply and sanitation networks
- The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- Practical exercises where self-assessment can be used to improve learning
- Its special emphasis on innovative methodologies
- Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- Content that is accessible from any fixed or portable device with an Internet connection



Applying the knowledge of this
Postgraduate Diploma you will minimize
the cost of water production through the
optimization of the available resources
in a water treatment plant"



No other program in the water sector focused on urban water treatment plants offers you so many guarantees of success"

Opt for the excellence provided by TECH and specialize in a field that already applies the sustainable objectives of the 2030 Agenda.

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

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

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

Master the complete water cycle: become an expert in Pumping Systems.







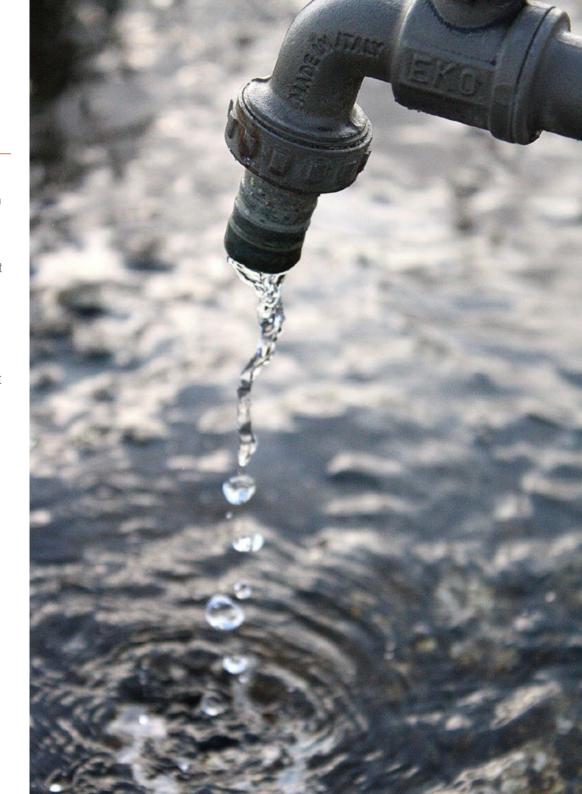
# tech 10 | Objectives



## **General Objectives**

- Delve into key aspects of water resources and urban water sustainability, as well as urban water treatment plants
- Mastering a strategic vision of the subject
- Have a solid knowledge to coordinate projects and execute water resources management works plans
- Orient the student's professional activity towards the achievement of the Water objective in the 2030 Agenda
- Acquiring skills related to the implementation of the urban water system
- Being able to apply the latest technological innovations to set up an optimal management of the service
- Characterizing water abstractions in order to manage water abstractions in a sustainable manner
- Understand in detail the possibilities that full connectivity between devices offers for water resource management







#### Module 1. Water Resources in a Water Supply

- Characterizing water abstractions in order to manage water abstractions in a sustainable manner
- Carrying out rigorous water balances that influence the adoption of regulatory governance measures for resource management
- Establish monitoring systems to prevent contingency situations
- Understand in detail the possibilities that full connectivity between devices offers for water resource management

#### Module 2. Desalination. Design and Operation

- Understand in detail the seawater osmosis process to diagnose the causes of deviations from process standards
- Make an exhaustive analysis of the most important equipment of a desalination plant to know how to allocate the appropriate resources in case of incidence in any of them
- Comprehensively manage the operation of a seawater desalination plant
- Identify the possibilities of energy savings in a desalination plant in order to improve the economic performance of a concession

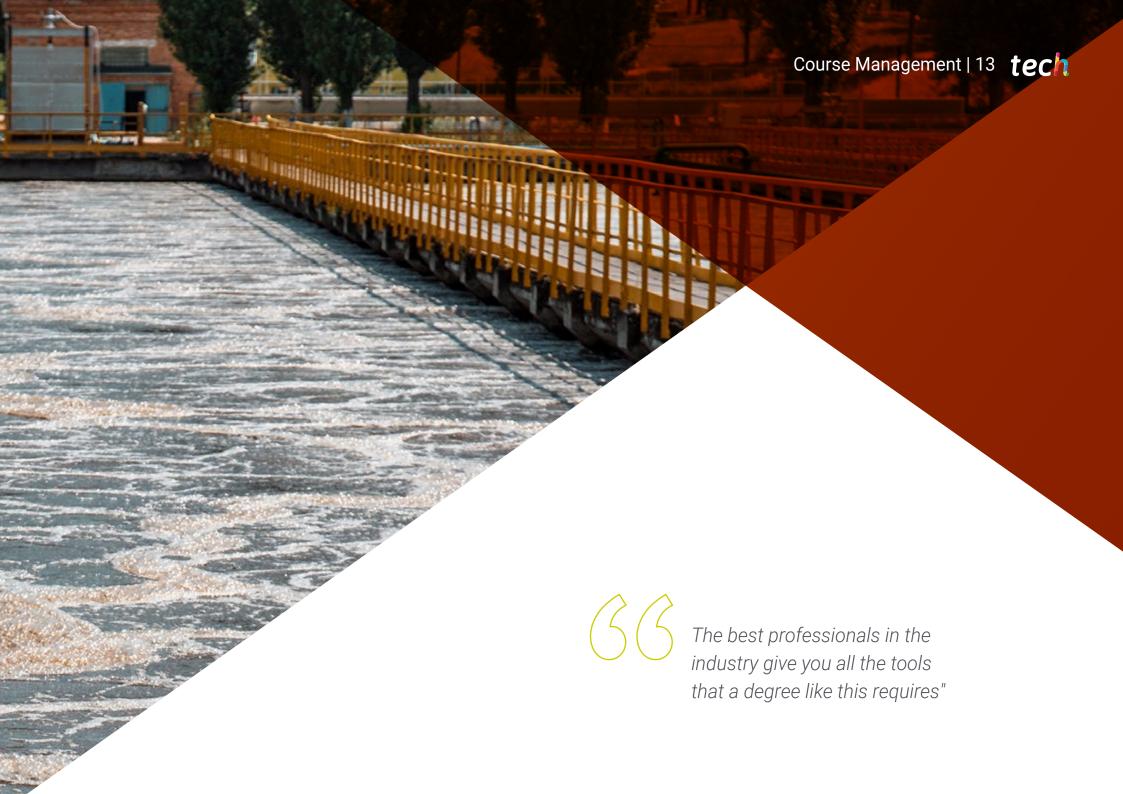
#### Module 3. Urban Drinking Water Treatment Plants. Design and operation

- Provide an overview of the importance of drinking water treatment in a drinking water treatment plant
- Delve into the treatments involved in the drinking water treatment processes in order to effectively detect the source of the problem in the event of non-compliant water analysis at the plant outlet
- Minimize the cost of water production by optimizing the resources available in a water treatment plant

#### Module 4. Wastewater Treatment Plants. Engineering and construction execution

- Acquire the competences related to a site manager in the execution of wastewater treatment plants, the most relevant of which are: order management, subcontracting coordination and budget control
- Delve into the design criteria, as well as the most relevant aspects to be taken into account during the execution of the work in the main stages of a wastewater treatment plant
- Know in detail the commercial computer programs for the elaboration of budgets and work certifications before the client





# tech 14 | Course Management

#### Management



#### Mr. Ortiz Gómez, Manuel

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

#### **Professors**

#### Mr. Llopis Yuste, Edgar

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

#### Mr. Sánchez Cabanillas, Marciano

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

#### Mr. Salaix, Rochera, Carlos

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

#### Mr.Simarro Ruiz, Mario

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





### tech 18 | Structure and Content

#### **Module 1.** Water Resources in a Water Supply

- 1.1. Groundwater. Groundwater Hydrology
  - 1.1.1. Groundwater
  - 1.1.2. Characteristics of Groundwater
  - 1.1.3. Groundwater Types and Location
  - 1.1.4. Water Flow Through Porous Media. Darcy's Law
- 1.2. Surface Water
  - 1.2.1. Surface Water Characteristics
  - 1.2.2. Division of Surface Water
  - 1.2.3. Difference Between Groundwater and Surface Water
- 1.3. Alternative Water Resources
  - 1.3.1. Use of Groundwater. Runoff and Rainwater.
  - 1.3.2. Renewable Versus Polluted Resource
  - 1.3.3. Reusable Water from WWTPs. Reused From Buildings
  - 1.3.4. Initiatives, Measures and Control Bodies
- 1.4. Water Balances
  - 1.4.1. Methodology and Theoretical Considerations for Water Balances
  - 1.4.2. Quantitative Water Balance
  - 1.4.3. Oualitative Water Balance
  - 1.4.4. The Sustainable Environment
  - 1.4.5. Resources and Risks in Unsustainable Environments. Climate Change.
- 1.5. Capture and Storage. Environmental Protection
  - 1.5.1. Catchment and Storage Components
  - 1.5.2. Surface Catchment or Underground Catchment
  - 1.5.3. Potabilization (DWTP)
  - 1.5.4. Storage
  - 1.5.5. Distribution and Sustainable Consumption
  - 1.5.6. Sewage Network
  - 1.5.7. Wastewater Treatment Plant (WWTP)
  - 1.5.8. Discharge and Reuse
  - 1.5.9. Ecological Flow
  - 1.5.10. Eco-Social Urban Water Cycle

- 1.6. Optimal Water Management Model. Principles of Supply
  - 1.6.1. Set of Sustainable Actions and Processes
  - 1.6.2. Provision of Supply and Sewerage Services.
  - 1.6.3. Quality Assurance. Knowledge Generation
  - 1.6.4. Actions to Be Taken to Ensure the Quality of Water and its Installations
  - .6.5. Knowledge Generation for the Prevention of Errors
- 1.7. Optimal Water Management Model. Socioeconomic Principles
  - 1.7.1. Current Financing Model
  - 1.7.2. Taxes in the Management Model
  - 1.7.3. Financing Alternatives. Proposals for the Creation of Financing Platforms
  - 1.7.4. Security of Water Supply (Distribution and Supply) for All
  - 1.7.5. Involvement of Local, National and International Communities in Financing.
- 1.8. Monitoring Systems. Prediction, Prevention and Contingency Situations
  - 1.8.1. Identification of Water Bodies and their Status
  - 1.8.2. Water Distribution Proposals According to Needs
  - 1.8.3. Water Knowledge and Control
  - 1.8.4. Maintenance of the Installations
- 1.9. Good Practices in Water Supply and Sustainability
  - 1.9.1. Posadas Periurban Park, Córdoba
  - 1.9.2. Palma del Río Periurban Park. Córdoba
  - 1.9.3. State of the Art. Others
- 1.10. The 5G in Water Resources Management
  - 1.10.1. Characteristics of 5G
  - 1.10.2. Importance of 5G
  - 1.10.3. Relationship of the 5G with the Water Resource

#### Module 2. Desalination. Design and Operation

- 2.1. Desalination
  - 2.1.1. Separation and Desalination Processes
  - 2.1.2. Water Salinity
  - 2.1.3. Water Characterization
- 2.2. Reverse Osmosis
  - 2.2.1. Reverse Osmosis Process
  - 2.2.2. Key Parameters of Osmosis
  - 2.2.3. Layout
- 2.3. Reverse Osmosis Membranes
  - 2.3.1. Materials
  - 2.3.2. Technical Parameters
  - 2.3.3. Parameter Evolution
- 2.4. Description of the Installation. Water Intake
  - 2.4.1. Pre-treatment
  - 2.4.2. High Pressure Pumping
  - 2.4.3. Racks
  - 2.4.4. Instruments
- 2.5. Physical Treatments
  - 2.5.1. Filtration
  - 2.5.2. Coagulation-Flocculation
  - 2.5.3. Membrane Filters
- 2.6. Chemical Treatments
  - 2.6.1. Regulation
  - 2.6.2. Reduction
  - 2.6.3. Stabilization
  - 2.6.4. Remineralization
- 2.7. Design
  - 2.7.1. Water to be Desalinated
  - 2.7.2. Required Capacity
  - 2.7.3. Membrane Surface

- 2.7.4. Recovery
- 2.7.5. Number of Membranes
- 2.7.6. Stages
- 2.7.7. Other Aspects
- 2.7.8. High Pressure Pumps
- 2.8. Operation
  - 2.8.1. Dependence of the Main Operating Parameters
  - 2.8.2. Fouling
  - 2.8.3. Membrane Washing
  - 2.8.4. Seawater Discharge
- 2.9. Materials
  - 2.9.1. Corrosion
  - 2.9.2. Selection of Materials
  - 2.9.3. Collectors
  - 2.9.4. Tanks
  - 2.9.5. Pumping Equipment
- 2.10. Economic Optimization
  - 2.10.1. Energy Consumption
  - 2.10.2. Energy Optimization
  - 2.10.3. Energy Recovery
  - 2.10.4. Costs

#### Module 3. Urban Drinking Water Treatment Plants. Design and Operation

- 3.1. Importance of Water Quality
  - 3.1.1. Global Water Quality
  - 3.1.2. Population Health
  - 3.1.3. Water-Borne Diseases
  - 3.1.4. Risks in the Short and Medium to Long Term
- 3.2. Water Quality Criteria. Parameters.
  - 3.2.1. Microbiological Parameters
  - 3.2.2. Physical Parameters
  - 3.2.3. Chemical Parameters

# tech 20 | Structure and Content

3.3 Water Quality Medaling

0.0.	Water Quality Modelling		
	3.3.1.	Time Spent in the Network	
	3.3.2.	Reaction Kinetics	
	3.3.3.	Water Origin	
3.4.	Water Disinfection		
	3.4.1.	Chemical Products Used in Disinfection	
	3.4.2.	Behavior of Chlorine in Water	
	3.4.3.	Chlorine Dosing Systems	
	3.4.4.	Chlorine Measurement in the Network	
3.5.	Turbidity Treatments		
	3.5.1.	Possible Causes of Turbidity	
	3.5.2.	Problems of Turbidity in Water	
	3.5.3.	Turbidity Measurement	
	3.5.4.	Limits of Turbidity in Water	
	3.5.5.	Treatment Systems	
3.6.	Treatment of Other Pollutants		
	3.6.1.	Treatment of Other Pollutants	
	3.6.2.	Ion Exchange Resins	
	3.6.3.	Membrane Treatments	
	3.6.4.	Activated Carbon	
3.7.	Tank and Pipeline Cleaning		
	3.7.1.	Emptying of Water	
	3.7.2.	Removal of Solids	
	3.7.3.	Disinfection of Walls	
	3.7.4.	Rinsing of Walls	
	3.7.5.	Filling and Service Restitution	
3.8.	Quality Control Plan		
	3.8.1.	Objectives of the Control Plan	
	3.8.2.	Sampling Points	
	3.8.3.	Types of Analysis and Frequency	
	3.8.4.	Analysis Laboratory	

3.9.	Operation	onal Logging		
		Chlorine Concentration		
	3.9.2.	Organoleptic Examination		
	3.9.3.	Other Specific Contaminants		
	3.9.4.	Laboratory Analysis		
3.10.	Economic Considerations			
	3.10.1.	Personal		
	3.10.2.	Cost of Chemical Reagents		
	3.10.3.	Dosing Equipment		
	3.10.4.	Other Treatment Equipment		
	3.10.5.	Cost of Water Analysis		
	3.10.6.	Cost of Metering Equipment		
	3.10.7.	Energy		
Module 4. Wastewater Treatment Plants. Engineering and				
cons	struction	n execution		
4.1.	Auxiliary	y Stages		
	4.1.1.	Pumping		
	4.1.2.	Header Wells		
	4.1.3.	Reliefs		
4.2.	Follow-L	Follow-Up of the Work		

4.2.2. Economic Follow-Up

4.3.1. The Water Line4.3.2. Provisional Works

4.4. Auxiliary Stages

4.4.1. Pumping4.4.2. Header Wells4.4.3. Reliefs

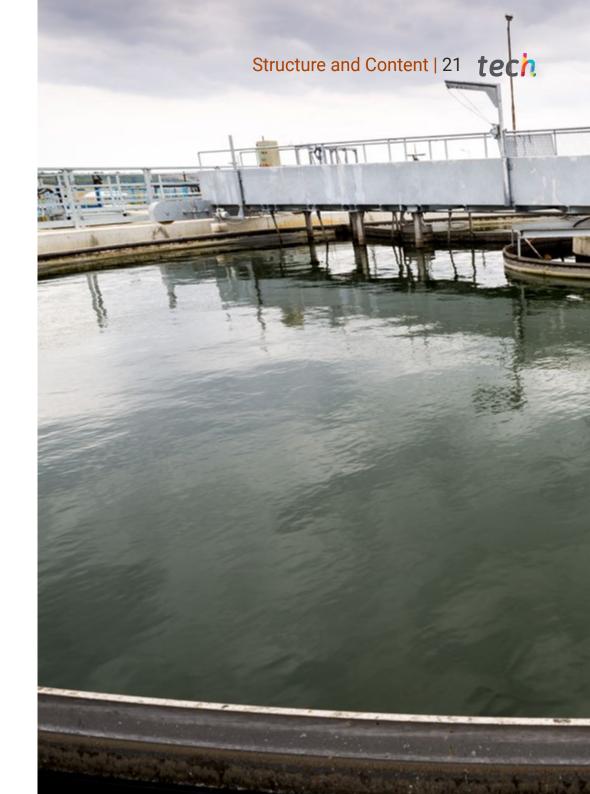
4.2.1. Management of Subcontracts and Orders

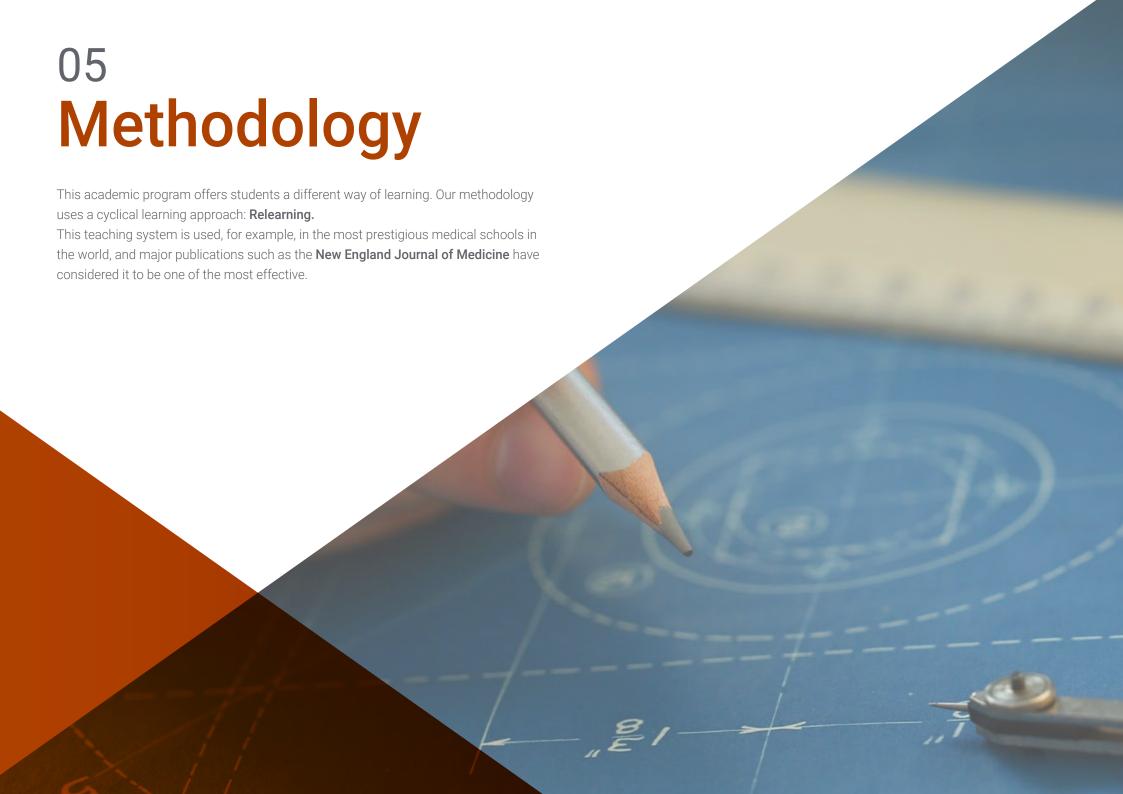
4.3.3. BIM. Distribution of Elements and Interferences

4.2.3. Deviations and Budget Compliance4.3. General Diagram of a WWTP. Provisional Works

- 4.5. Pre-treatment
  - 4.5.1. Stakeout
  - 4.5.2. Execution and Connections
  - 4.5.3. Finishing
- 4.6. Primary Treatment
  - 4.6.1. Stakeout
  - 4.6.2. Execution and Connections
  - 4.6.3. Finishing
- 4.7. Secondary Treatment
  - 4.7.1. Stakeout
  - 4.7.2. Execution and Connections
  - 4.7.3. Finishing
- 4.8. Tertiary Treatment
  - 4.8.1. Stakeout
  - 4.8.2. Execution and Connections
  - 4.8.3. Finishing
- 4.9. Equipment and Automation
  - 4.9.1. Suitability
  - 4.9.2. Variants
  - 4.9.3. Commissioning
- 4.10. Software and Certification
  - 4.10.1. Stockpile Certification
    - 4.10.2. Work Certifications
    - 4.10.3. Computer Programs









# tech 24 | Methodology

#### 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.

# tech 26 | Methodology

#### **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.



## Methodology | 27 tech

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.



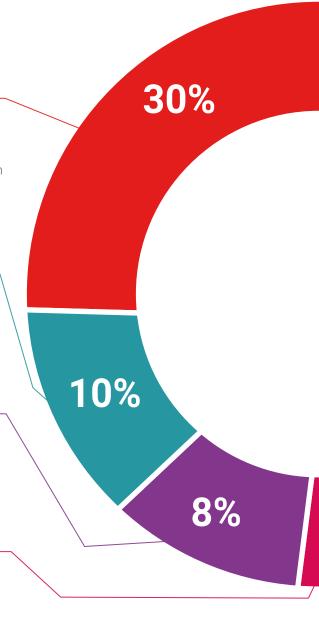
#### **Practising Skills and Abilities**

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.





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.

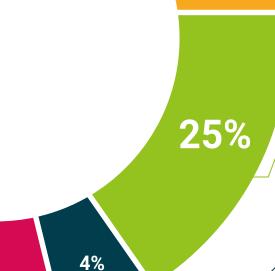


This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".

#### **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.





3%

20%





# tech 32 | Certificate

This **Postgraduate Diploma in Water Resources and Urban Water Treatment Plants** contains the most complete and up-to-date program on the market.

After the student has passed the assessments, they will receive their corresponding **Postgraduate Diploma** issued by **TECH Technological University** via tracked delivery\*.

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

Title: Postgraduate Diploma in Water Resources and Urban Water Treatment Plants
Official N° of Hours: **600 h**.



<sup>\*</sup>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
information futors
guarantee accreditation teaching
tash to have a technology technological
community

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