Professional Master's Degree

Urban Water Services Engineering

tech global university

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Professional Master's Degree
Urban Water Services Engineering

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Global University**
- Credits: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/us/engineering/professional-master-degree/master-urban-water-services-engineering**

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01

Introduction

The continuous changes in the legislative framework, environmental sustainability and the population's demand for an optimal urban water service have led to the growth of an increasingly specialized professional profile in this field. Both public management, through its clear vocation towards users, and private management with its technological drive, require professionals from different branches of engineering who know how to respond to the needs of innovation and adaptation of the sector. In addition, the regulation of this resource is becoming increasingly international due to globalization, so the program in Urban Water Services Engineering has been designed so that, upon completion, the student will be able not only to provide innovative technological solutions to the problems posed, but also to integrate them into global reference solutions.

Acquire the skills of a professional specialized in Urban Water Services with a highly comprehensive program that will open up new job opportunities and boost your competitiveness in the sector"

This program aims to boost the careers of engineers who wish to delve into urban water services on a global level, providing them with in-depth knowledge of the subject through a program developed by experts in the industry. The program stands out for the scope of its content, as it encompasses all the stages of what is known as the Integrated Water Cycle, from the collection of the resource to the treatment plant.

The student will not only acquire in-depth knowledge related to the specificity of this field, but will also increase his strategic vision competencies if his profile is more focused on the global management of the service. Although there are some differences in each territory according to the type of resource, regulatory framework or pricing policies, urban water services have a marked international component that has been strengthened in recent years through globalization.

During the course of this program, the engineering professional will delve into everything related to the urban water cycle, its sustainability and the cross-cutting nature of its application, involving all types of actors that make the service allude to responsible consumption. In addition, due to the demand for process improvement in the sector, the program presents the most widely implemented technological innovations, so that students can apply them in their current position, acquiring in this way a differential value in their competencies.

The extensive experience of the teaching staff and their education in this area of engineering position this program above others in the market, so that the graduate will have a reference of excellence. Therefore, this Professional Master's Degree will provide you with accelerated knowledge on all aspects related to the management of the Urban Water Service. A 100% online educational program that provides students with the ease of being able to study it comfortably, wherever and whenever they want. All you need is a device with internet access to take your career one step further. A modality according to the current times with all the guarantees to position the engineer in a highly demanded sector.

This **Professional Master's Degree in Urban Water Services Engineering** contains the most complete and up-to-date academic program on the market. Its most important features are:

- The development of case studies presented by experts in Engineering focused on the Integrated Water Cycle
- 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

Add to your work capacity, the most updated knowledge in the urban water cycle, including new technologies related to water treatment and access to the resource"

A high-impact career path that will allow you to work in line with environmental protection, one of the main challenges of the water sector"

Enhance your knowledge and become an expert engineer in hydraulic infrastructures.

Learn how to manage water catchment and water resources in a sustainable way and acquire the way of working that environmental efficiency criteria demand nowadays.

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

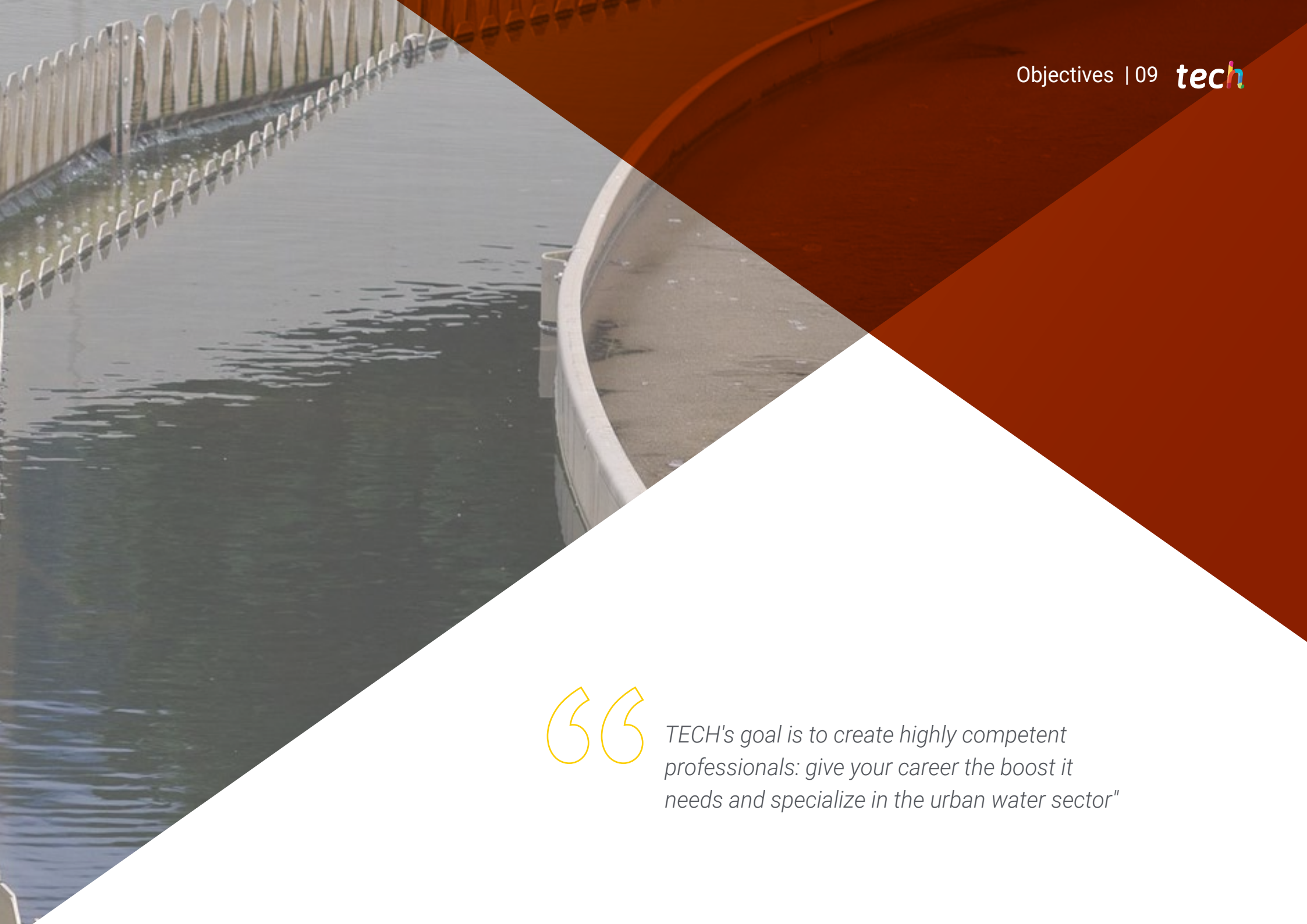
The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive education programmed to learn in real situations.

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.

02

Objectives

The design of the program of this Professional Master's Degree will allow the student to acquire the necessary competences to update in the profession after delving into the key aspects of Urban Water Services Engineering. The mastery of the curriculum will boost the professional from a global perspective, with full preparation for the achievement of the proposed objectives. You will be fully empowered in a field of engineering that is versatile, global and essential, leading you to excellence in an industry in continuous environmental adaptation. To this end, TECH establishes a series of general and specific objectives to fulfill future graduates' expectations.



TECH's goal is to create highly competent professionals: give your career the boost it needs and specialize in the urban water sector"

General Objectives

- Delve into key aspects of Urban Water Services Engineering
- Leading integral water cycle departments
- Manage distribution and sanitation departments
- Management of drinking water treatment, desalination and purification plants
- Manage the technical office and studies of companies in the sector
- Acquire a strategic vision of the field
- Coordinate concessions and administrative relations
- 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

Specific Objectives

Module 1. Water and Sustainability in the Urban Water Cycle

- Delve into the concept of water footprint to be able to implement reduction policies in an urban water utility
- Understand the problem of water stress in cities
- Influence stakeholders related to the integrated water cycle to improve the position of the student's organization
- Orient the student's professional activity towards the achievement of the Water objective in the 2030 Agenda

Module 2. Drinking Water Distribution. Layouts and practical criteria for network design

- Quickly identify the problems associated with a supply network based on the design typology of the network itself
- Diagnose the deficiencies of an existing network based on the most important operating parameters. With the possibility of catching them in the most implemented simulation software in the sector such as EPANET
- Be able to draw up and supervise a preventive and corrective maintenance plan for the drinking water distribution network
- Control the revenues and costs of a supply system in order to maximize the economic performance of an administrative concession

Module 3. Pumping Stations

- Complete Sizing of a Water Pumping Station
- Select the electromechanical equipment best suited to the needs of a water lifting system
- Analyze the latest hydrodynamic simulation tools that facilitate the successful design of a pumping system prior to its commissioning
- Be able to apply the latest technological innovations to establish a state-of-the-art management of pumping stations

Module 4. Desalination. Design and Operation

- Understand in detail the seawater osmosis process to diagnose the causes of deviations from process standards
- Carry out 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 5. 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 6. Sanitation Networks

- Obtain a strategic vision of the importance of sanitation networks within the integral water cycle
- Know in depth the elements of the sewerage network in order to act with criterion in making decisions in case of failures
- Identify the main problems of wastewater pumping stations in order to optimize their operation
- Analyze the main computer tools related to a sewerage system such as GIS and SWM

Module 7. 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 8. 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

Module 9. Reuse

- Gain a detailed knowledge of the current regulatory framework on water reclamation and its possible uses, as well as why it is necessary to implement water reuse policies
- Gain an in-depth understanding of the treatments available to enable water reuse
- Analyze examples of projects already carried out in order to extrapolate them to the student's needs

Module 10. Metrology. Measurement and instrumentation

- Understand the need for the implementation of different process sensors in an urban water system
- Select the most appropriate flow measurement technologies for each application
- Make a general projection of the appropriate metering devices for a general urban water service

You will achieve your objectives gradually, but with a high impact, turning your knowledge into real intervention capacity"

03

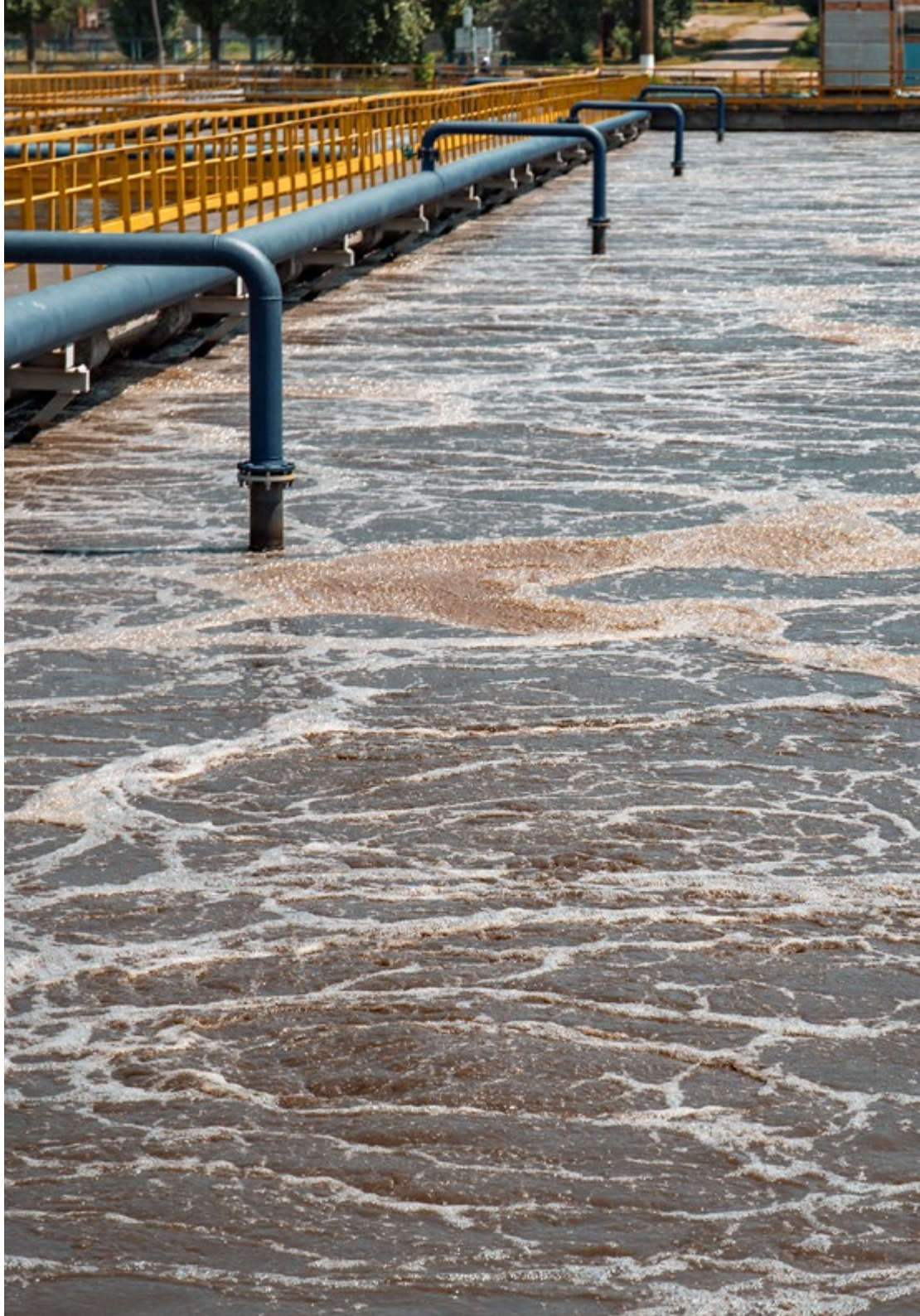
Skills

The structure of this Professional Master's Degree has been designed in such a way that the professional to whom it is addressed will be able to identify and solve problems related to urban water management. TECH guarantees students quality content that meets their expectations, giving them the opportunity to excel in their field. You will be able to perform the various functions related to this Professional Master's Degree, together with the most innovative proposals in this field of action, guiding you towards excellence. A series of aspects demanded by industry professionals and today's world.

Turn your knowledge into real work capacity with a high-level educational program designed to optimize your effort and turn it into professional growth"

General Skills

- Master the necessary tools for urban water service, from the international context, through the development of projects, operation and maintenance plans for water sectors
- Apply acquired knowledge and problem-solving skills in current and global environments within broader contexts related to urban water services
- Be able to integrate knowledge and achieve a deep understanding of the different uses of urban water service management, as well as the importance of its use in today's world
- Know how to communicate concepts of design, development and management of the different hydraulic engineering systems
- Understand and internalize the scope of digital and industrial transformation applied to the sector's systems for their efficiency and competitiveness in today's market
- Be able to carry out a critical analysis, evaluation and synthesis of new and complex ideas related to the field of water engineering
- Be able to promote, in professional contexts, technological, social or cultural advancement within a knowledge-based society, following sustainable precepts



Specific Skills

- Be able, from a management point of view, to establish, implement and enforce the necessary water sustainability policies to minimize the water footprint in the service
- Delve into the current models of sustainable management in the cities of the future and will be able to manage the available water resources
- Be able to establish the necessary strategies to maintain an appropriate balance between demand and sustainability of water catchment. In addition, you will understand the importance of the current means of connectivity to optimize water resources management
- Develop a future in the integrated water cycle activity to design efficient and innovative water lifting solutions. In addition, it will provide the keys to optimal maintenance and control in order to ensure the continuous operation of this key stage in a supply and sanitation network
- Obtain an exhaustive knowledge of the usual problems of pumping station installations, their maintenance and control
- Acquire a complete vision of all aspects related to the pumping network, an essential stage in any drinking water distribution network and sanitation system
- Be able to adequately measure the processes involved in a desalination plant and to optimize its performance to the maximum through cost control, taking full responsibility for the technical control and management of a desalination plant
- Master the design of the main stages of a desalination plant and solve problems arising during plant operation
- Be able to establish an effective control plan of the network, as well as to carry out its follow-up
- Knowledge of drinking water distribution and knowledge of existing network typologies. Use of EPANET software as a support tool for network modeling
- Be able to be skilled in the development of responsible engineering tasks applied to the sanitation network
- Be able to size and select the most appropriate equipment for the design or renovation of a new sewerage system
- Size the treatment stages of a water treatment plant
- Implement a quality control plan to quickly identify deviations from service standards
- Create a record of operations to enable continuous improvement and optimization of the service
- Delve into the economic aspects that will allow him/her to make the best technical decisions based on the above management tools
- Know in depth the stages of headworks, pre-treatment and primary, secondary and tertiary treatment in a WWTP. In this way, you will be able to coordinate the complete project of a WWTP and be responsible for the site management of this type of treatment plant
- Enable the site engineer to follow up more easily the budget control and the certification of the work execution, as well as to be able to coordinate effectively with the client in relation to these aspects, a topic on site control software is included
- Acquire a strategic vision that will enable you to make decisions regarding the possible introduction of water reuse and reclamation policies in your field of work
- Analyze, implement and supervise a complete telemetering system for all parameters involved in an integrated urban water system

04

Course Management

In its maxim of offering a global-quality program, TECH has professionals with long experience in this sector, which will lead the student to the acquisition of a solid knowledge in the specialty of Public Water Services. To this end, this program has a highly qualified teaching team with extensive experience in the sector, which will offer the best tools to boost their competitiveness in this interesting field of work.

The teachers of this program have been selected for their experience in the industry and their ability to transmit knowledge while maximizing student growth"

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

Ms. Arias Rodríguez, Ana

- Project technician at Canal de Isabel II: management, maintenance and operation of sanitation and supply networks in the Community of Madrid
- Technical Engineer in Public Works, Polytechnic University of de Madrid
- Degree in Civil Engineering from the Polytechnic University of Avila, University of Salamanca
- Master's Degree in Professional Development from the University of Alcalá, Madrid

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 sector, 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

05

Structure and Content

The syllabus has been designed based on the requirements of engineering applied to the specificity of this sector. Therefore, a syllabus has been established whose modules offer a broad perspective of the services involved in all areas of urban water, from the point of view of its application at the international level, incorporating all the fields of work involved in the development of its functions, both in the public and private spheres.

An expertly crafted curriculum and comprehensive, high-quality, comprehensive content will be the keys to your success"

Module 1. Water and Sustainability in the Urban Water Cycle

1.1. Social Commitment for the Reduction of Water Consumption in the Urban Cycle
- 1.1.1. Water Footprint
- 1.1.2. Importance of our Water Footprint
- 1.1.3. Generation of Goods
- 1.1.4. Generation of Services
- 1.1.5. Social Commitment to Reduce Consumption
- 1.1.6. Citizen Commitment
- 1.1.7. Commitment of Public Administrations
- 1.1.8. Commitment of the Company. RSC

1.2. Water Problems in the Cities. Analysis of Sustainable Use
- 1.2.1. Water Stress in Today's Urban Areas
- 1.2.2. Water Stress
- 1.2.3. Causes and Consequences of Water Stress
- 1.2.4. The Sustainable Environment
- 1.2.5. The Urban Water Cycle as a Vector of Sustainability
- 1.2.6. Coping with Water Scarcity. Response Options

1.3. Sustainability Policies in Urban Water Cycle Management
- 1.3.1. Control of Water Resources
- 1.3.2. The Triangle of Sustainable Management: Society, Environment and Efficiency
- 1.3.3. Integral Water Management as a Support for Sustainability
- 1.3.4. Expectations and Commitments in Sustainable Management

1.4. Sustainability Indicators: Ecosocial Water
- 1.4.1. Triangle of Hydrosustainability
- 1.4.2. Society -Economy-Ecology
- 1.4.3. Ecosocial Water: Scarce Commodity
- 1.4.4. Heterogeneity and Innovation as a Challenge in the Fight against Water Misallocation

1.5. Agents Involved in Water Management. The Role of Water Managers
- 1.5.1. Agents Involved in the Action or Situation of the Water Environment
- 1.5.2. Agents Involved in the Duties and Rights
- 1.5.3. Agents that May be Affected and/or Benefited by the Action or Situation of the Water Environment
- 1.5.4. Role of Managers in the Urban Water Cycle

1.6. Water Uses. Training and Good Practices
- 1.6.1. Water as a Source of Supply
- 1.6.2. Water as a Means of Transport
- 1.6.3. Water as a Receiving Medium for Other Water Flows
- 1.6.4. Water as a Source and Receiving Medium for Energy
- 1.6.5. Good Practices in the Use of Water. Training and Information

1.7. Circular Water Economy
- 1.7.1. Indicators to Measure the Circularity of Water
- 1.7.2. Catchment and its Indicators
- 1.7.3. Supply and its Indicators
- 1.7.4. Sanitation and its Indicators
- 1.7.5. Reuse and its Indicators
- 1.7.6. Water Uses
- 1.7.7. Proposals for Action in Water Reuse

1.8. Analysis of the Integral Urban Water Cycle
- 1.8.1. Upstream Supply. Capture
- 1.8.2. Downstream Supply. Distribution
- 1.8.3. Sanitation. Rainwater Collection
- 1.8.4. Wastewater Treatment
- 1.8.5. Wastewater Regeneration. Reuse

1.9. A Look into the Future of Water Uses
- 1.9.1. Water in the 2030 Agenda
- 1.9.2. Ensuring the Availability, Management, and Sanitation of Water for All People
- 1.9.3. Resources Used/Total Resources Available in the Short, Medium and Long Term
- 1.9.4. Widespread Participation of Local Communities in Improved Management

1.10. New Cities. More Sustainable Management
- 1.10.1. Technological Resources and Digitalization
- 1.10.2. Urban Resilience. Collaboration Among Actors
- 1.10.3. Factors to Become a Resilient Population
- 1.10.4. Linkages Between Urban, Peri-urban and Rural Areas

Module 2. Water Resources in a Water Supply

2.1. Groundwater. Groundwater Hydrology
- 2.1.1. Groundwater
- 2.1.2. Characteristics of Groundwater
- 2.1.3. Groundwater Types and Location
- 2.1.4. Water Flow Through Porous Media. Darcy's Law

2.2. Distribution Network Design Criteria. Modeling
- 2.2.1. Surface Water Characteristics
- 2.2.2. Division of Surface Water
- 2.2.3. Difference Between Groundwater and Surface Water

2.3. Alternative Water Resources
- 2.3.1. Use of Groundwater. Runoff and Rainwater
- 2.3.2. Renewable Versus Polluted Resource
- 2.3.3. Reusable Water from WWTPs. Reused From Buildings
- 2.3.4. Initiatives, Measures and Control Bodies

2.4. Water Balances
- 2.4.1. Methodology and Theoretical Considerations for Water Balances
- 2.4.2. Quantitative Water Balance
- 2.4.3. Qualitative Water Balance
- 2.4.4. The Sustainable Environment
- 2.4.5. Resources and Risks in Unsustainable Environments. Climate Change

2.5. Capture and Storage. Environmental Protection
- 2.5.1. Catchment and Storage Components
- 2.5.2. Surface Catchment or Underground Catchment
- 2.5.3. Potabilization (DWTP)
- 2.5.4. Storage
- 2.5.5. Distribution and Sustainable Consumption
- 2.5.6. Sewage Network
- 2.5.7. Wastewater Treatment Plant (WWTP)
- 2.5.8. Discharge and Reuse
- 2.5.9. Ecological Flow
- 2.5.10. Eco-Social Urban Water Cycle

2.6. Optimal Water Management Model. Principles of Supply
- 2.6.1. Set of Sustainable Actions and Processes
- 2.6.2. Provision of Supply and Sewerage Services
- 2.6.3. Quality Assurance. Knowledge Generation
- 2.6.4. Actions to Be Taken to Ensure the Quality of Water and its Installations
- 2.6.5. Knowledge Generation for the Prevention of Errors

2.7. Optimal Water Management Model. Socioeconomic Principles
- 2.7.1. Current Financing Model
- 2.7.2. Taxes in the Management Model
- 2.7.3. Financing Alternatives. Proposals for the Creation of Financing Platforms
- 2.7.4. Security of Water Supply (Distribution and Supply) for All
- 2.7.5. Involvement of Local, National and International Communities in Financing

2.8. Monitoring Systems. Prediction, Prevention and Contingency Situations
- 2.8.1. Identification of Water Bodies and their Status
- 2.8.2. Water Distribution Proposals According to Needs
- 2.8.3. Water Knowledge and Control
- 2.8.4. Maintenance of the Installations

2.9. Good Practices in Water Supply and Sustainability
- 2.9.1. Posadas Periurban Park, Córdoba
- 2.9.2. Palma del Río Periurban Park, Córdoba
- 2.9.3. State of the Art. Others

2.10. Telecommunication Systems in Supply
- 2.10.1. Telecommunication via WiMAX Wi-Fi
- 2.10.2. Telecommunication via GPRS GSM
- 2.10.3. Telecommunication via Radio

Module 3. Pumping Stations

3.1. Applications
- 3.1.1. Supply
- 3.1.2. Purification and EBAR's
- 3.1.3. Singular Applications

3.2. Hydraulic Pumps
- 3.2.1. Evolution of Hydraulic Pumps
- 3.2.2. Types of Impellers
- 3.2.3. Advantages and Disadvantages of Different Types of Pumps

3.3. Engineering and Design of Pumping Stations
- 3.3.1. Submersible Pumping Stations
- 3.3.2. Dry Chamber Pumping Stations
- 3.3.3. Economic Analysis

3.4. Installation and Operation
- 3.4.1. Economic Analysis
- 3.4.2. Real Case Designs
- 3.4.3. Pump Testing

3.5. Monitoring and Control of Pumping Stations
- 3.5.1. Pump Start-Up Systems
- 3.5.2. Pump Protection Systems
- 3.5.3. Optimization of Pump Control Systems

3.6. Enemies of Hydraulic Systems
- 3.6.1. Water Hammer
- 3.6.2. Cavitation
- 3.6.3. Noise and Vibration

3.7. Total Life Cycle Cost of a Pumping Unit
- 3.7.1. Costs
- 3.7.2. Cost Distribution Model
- 3.7.3. Identification of Opportunity Areas

3.8. Hydrodynamic Solutions. CFD Modeling
- 3.8.1. Importance of CFD
- 3.8.2. CFD Analysis Process in Pumping Stations
- 3.8.3. Interpretation of Results

3.9. Latest Innovations Applied to Pumping Stations
- 3.9.1. Innovation in Materials
- 3.9.2. Intelligent Systems
- 3.9.3. Digitization of the Industry

3.10. Unique Designs
- 3.10.1. Singular Design in Sourcing
- 3.10.2. Singular Design in Sanitation
- 3.10.3. Pumping Station in Sitges

Module 4. Desalination. Design and Operation

4.1. Desalination
- 4.1.1. Separation and Desalination Processes
- 4.1.2. Water Salinity
- 4.1.3. Water Characterization

4.2. Reverse Osmosis
- 4.2.1. Reverse Osmosis Process
- 4.2.2. Key Parameters of Osmosis
- 4.2.3. Layout

4.3. Reverse Osmosis Membranes
- 4.3.1. Materials
- 4.3.2. Technical Parameters
- 4.3.3. Parameter Evolution

4.4. Description of the Installation. Water Intake
- 4.4.1. Pre-treatment
- 4.4.2. High Pressure Pumping
- 4.4.3. Racks
- 4.4.4. Instruments

4.5. Physical Treatments
- 4.5.1. Filtration
- 4.5.2. Coagulation-Flocculation
- 4.5.3. Membrane Filters

4.6. Chemical Treatments
- 4.6.1. Regulation
- 4.6.2. Reduction
- 4.6.3. Stabilization
- 4.6.4. Remineralization

4.7. Design
- 4.7.1. Water to be Desalinated
- 4.7.2. Required Capacity
- 4.7.3. Membrane Surface
- 4.7.4. Recovery
- 4.7.5. Number of Membranes
- 4.7.6. Stages
- 4.7.7. Other Aspects
- 4.7.8. High Pressure Pumps

4.8. Operation
- 4.8.1. Dependence of the Main Operating Parameters
- 4.8.2. Fouling
- 4.8.3. Membrane Washing
- 4.8.4. Seawater Discharge

4.9. Materials
- 4.9.1. Corrosion
- 4.9.2. Selection of Materials
- 4.9.3. Collectors
- 4.9.4. Tanks
- 4.9.5. Pumping Equipment

4.10. Economic Optimization
- 4.10.1. Energy Consumption
- 4.10.2. Energy Optimization
- 4.10.3. Energy Recovery
- 4.10.4. Costs

Module 5. Drinking Water Distribution. Layouts and Practical Criteria for Network Design

5.1. Types of Distribution Networks
- 5.1.1. Classification Criteria
- 5.1.2. Branched Distribution Networks
- 5.1.3. Mixed Distribution Networks
- 5.1.4. Upstream Distribution Networks
- 5.1.5. Downstream Distribution Networks
- 5.1.6. Piping Hierarchy

5.2. Distribution Network Design Criteria. Modeling
- 5.2.1. Demand Modulation
- 5.2.2. Flow Velocity
- 5.2.3. Pressure
- 5.2.4. Chlorine Concentration
- 5.2.5. Dwell Time
- 5.2.6. Modeling with Epanet

5.3. Elements of a Distribution Network
- 5.3.1. Fundamental Principles
- 5.3.2. Collection Elements
- 5.3.3. Pumping
- 5.3.4. Storage Elements
- 5.3.5. Distribution Elements
- 5.3.6. Control and Regulation Elements (Suction Cups, Valves, Drainage, etc.)
- 5.3.7. Measuring Elements

5.4. Pipelines
- 5.4.1. Features
- 5.4.2. Plastic Pipes
- 5.4.3. Non-Plastic Pipes

5.5. Valves
- 5.5.1. Shut-off Valves
- 5.5.2. Manifold Valves
- 5.5.3. Check or Non-Return Valves
- 5.5.4. Regulating and Control Valves

5.6. Remote Control and Remote Management
- 5.6.1. Elements of a Remote-Control System
- 5.6.2. Communication Systems
- 5.6.3. Analog and Digital Information
- 5.6.4. Management Software
- 5.6.5. Digital Twins

5.7. Efficiency of Distribution Networks
- 5.7.1. Fundamental Principles
- 5.7.2. Calculation of Hydraulic Efficiency
- 5.7.3. Efficiency Improvement. Minimization of Water Losses
- 5.7.4. Monitoring Indicators

5.8. Maintenance Plan
- 5.8.1. Objectives of the Maintenance Plan
- 5.8.2. Preparation of the Preventive Maintenance Plan
- 5.8.3. Preventive Maintenance of Tanks
- 5.8.4. Preventive Maintenance of Distribution Networks
- 5.8.5. Preventive Maintenance of Catchments
- 5.8.6. Corrective Maintenance

5.9. Operational Logging
- 5.9.1. Water Volumes and Flow Rates
- 5.9.2. Water Quality
- 5.9.3. Energy Consumption
- 5.9.4. Malfunctions
- 5.9.5. Pressure
- 5.9.6. Maintenance Plan Records

5.10. Financial Management
- 5.10.1. Importance of Economic Management
- 5.10.2. Revenues
- 5.10.3. Costs

Module 6. Sanitation Networks

6.1. Importance of Sewerage Networks
- 6.1.1. Needs of Sewerage Networks
- 6.1.2. Types of Networks
- 6.1.3. Sanitation Networks in the Integral Water Cycle
- 6.1.4. Regulatory Framework and Legislation

6.2. Main Elements of Gravity Sewerage Networks
- 6.2.1. General Structure
- 6.2.2. Types of Pipelines
- 6.2.3. Manholes
- 6.2.4. Connections and Connections

6.3. Other Elements of the Gravity Sewage Systems
- 6.3.1. Surface Drainage
- 6.3.2. Spillways
- 6.3.3. Other Elements
- 6.3.4. Easements

6.4. Road Works
- 6.4.1. Execution of Road Works
- 6.4.2. Safety Measures
- 6.4.3. Trenchless Renovation and Rehabilitation
- 6.4.4. Asset Management

6.5. Wastewater Elevation. WWTP
- 6.5.1. Intake Works and Coarse Wells
- 6.5.2. Roughing
- 6.5.3. Pump Well
- 6.5.4. Pumps
- 6.5.5. Delivery Piping

6.6. Complementary Elements of a WWTP
- 6.6.1. Valves and Flow Meters
- 6.6.2. CS, CT, CCM and Power Generators
- 6.6.3. Other Elements
- 6.6.4. Operation and Maintenance

6.7. Rolling Mills and Storm Tanks
- 6.7.1. Features
- 6.7.2. Laminators
- 6.7.3. Storm Tanks
- 6.7.4. Operation and Maintenance

6.8. Operation of Gravity Drainage Networks
- 6.8.1. Surveillance and Cleaning
- 6.8.2. Inspection
- 6.8.3. Cleaning
- 6.8.4. Conservation Works
- 6.8.5. Improvement Works
- 6.8.6. Usual Incidents

6.9. Network Design
- 6.9.1. Background Information
- 6.9.2. Trace
- 6.9.3. Materials
- 6.9.4. Joints and Connections
- 6.9.5. Special Parts
- 6.9.6. Design Flow Rates
- 6.9.7. Network Analysis and Modeling with SWMM

6.10. Management Support Software Tools
- 6.10.1. Cartographic Maps, GIS
- 6.10.2. Recording of Incidents
- 6.10.3. WWTP Support

Module 7. Urban Drinking Water Treatment Plants. Design and Operation

7.1. Importance of Water Quality
- 7.1.1. Global Water Quality
- 7.1.2. Population Health
- 7.1.3. Water-Borne Diseases
- 7.1.4. Risks in the Short and Medium to Long Term

7.2. Water Quality Criteria. Parameters
- 7.2.1. Microbiological Parameters
- 7.2.2. Physical Parameters
- 7.2.3. Chemical Parameters

7.3. Water Quality Modeling
- 7.3.1. Time Spent in the Network
- 7.3.2. Reaction Kinetics
- 7.3.3. Water Origin

7.4. Water Disinfection
- 7.4.1. Chemical Products Used in Disinfection
- 7.4.2. Behavior of Chlorine in Water
- 7.4.3. Chlorine Dosing Systems
- 7.4.4. Chlorine Measurement in the Network

7.5. Turbidity Treatments
- 7.5.1. Possible Causes of Turbidity
- 7.5.2. Problems of Turbidity in Water
- 7.5.3. Turbidity Measurement
- 7.5.4. Limits of Turbidity in Water
- 7.5.5. Treatment Systems

7.6. Treatment of Other Pollutants
- 7.6.1. Treatment of Other Pollutants
- 7.6.2. Ion Exchange Resins
- 7.6.3. Membrane Treatments
- 7.6.4. Activated Carbon

7.7. Tank and Pipeline Cleaning
- 7.7.1. Emptying of Water
- 7.7.2. Removal of Solids
- 7.7.3. Disinfection of Walls
- 7.7.4. Rinsing of Walls
- 7.7.5. Filling and Service Restitution

7.8. Quality Control Plan
- 7.8.1. Objectives of the Control Plan
- 7.8.2. Sampling Points
- 7.8.3. Types of Analysis and Frequency
- 7.8.4. Analysis Laboratory

7.9. Operational Logging
- 7.9.1. Chlorine Concentration
- 7.9.2. Organoleptic Examination
- 7.9.3. Other Specific Contaminants
- 7.9.4. Laboratory Analysis

7.10. Economic Considerations
- 7.10.1. Personal
- 7.10.2. Cost of Chemical Reagents
- 7.10.3. Dosing Equipment
- 7.10.4. Other Treatment Equipment
- 7.10.5. Cost of Water Analysis
- 7.10.6. Cost of Metering Equipment
- 7.10.7. Energy

Module 8. Wastewater Treatment Plants. Engineering and construction execution

8.1. Auxiliary Stages
- 8.1.1. Pumping
- 8.1.2. Header Wells
- 8.1.3. Reliefs

8.2. Follow-Up of the Work
- 8.2.1. Management of Subcontracts and Orders
- 8.2.2. Economic Follow-Up
- 8.2.3. Deviations and Budget Compliance

8.3. General Diagram of a WWTP. Provisional Works
- 8.3.1. The Water Line
- 8.3.2. Provisional Works
- 8.3.3. BIM. Distribution of Elements and Interferences

8.4. Auxiliary Stages
- 8.4.1. Pumping
- 8.4.2. Header Wells
- 8.4.3. Reliefs

8.5. Pre-treatment
- 8.5.1. Stakeout
- 8.5.2. Execution and Connections
- 8.5.3. Finishing

8.6. Primary Treatment
- 8.6.1. Stakeout
- 8.6.2. Execution and Connections
- 8.6.3. Finishing

8.7. Secondary Treatment
- 8.7.1. Stakeout
- 8.7.2. Execution and Connections
- 8.7.3. Finishing

8.8. Tertiary Treatment
- 8.8.1. Stakeout
- 8.8.2. Execution and Connections
- 8.8.3. Finishing

8.9. Equipment and Automation
- 8.9.1. Suitability
- 8.9.2. Variants
- 8.9.3. Commissioning

8.10. Software and Certification
- 8.10.1. Stockpile Certification
- 8.10.2. Work Certifications
- 8.10.3. Computer Programs

Module 9. Reuse

9.1. Motivation for Water Reclamation
- 9.1.1. Municipal Sector
- 9.1.2. Industrial Sector
- 9.1.3. Connections Between Municipal and Industrial Sector

9.2. Regulatory Framework
- 9.2.1. Local Legislation
- 9.2.2. European Legislation
- 9.2.3. Gaps in Legislation

9.3. Uses of reclaimed Water
- 9.3.1. Uses in the Municipal Sector
- 9.3.2. Uses in the Industrial Sector
- 9.3.3. Derived Problems

9.4. Treatment Technologies
- 9.4.1. Spectrum of Current Processes
- 9.4.2. Combination of Processes to Achieve the New European Framework Objectives
- 9.4.3. Comparative Analysis of a Selection of Processes

9.5. Fundamental Aspects in the Municipal Sector
- 9.5.1. Guidelines and Trends for Water Reuse Globally
- 9.5.2. Agricultural Demand
- 9.5.3. Benefits Associated with Agricultural Water Reuse

9.6. Fundamental Aspects in the Industrial Sector
- 9.6.1. General Context of the Industrial Sector
- 9.6.2. Opportunities in the Industrial Sector
- 9.6.3. Risk Analysis Change of Business Model

9.7. Main Aspects in Operation and Maintenance
- 9.7.1. Cost Models
- 9.7.2. Disinfection
- 9.7.3. Fundamental Problems. Brine

9.8. Reuse Projects: Experiences and Lessons Learned
- 9.8.1. Benidorm
- 9.8.2. Reuse in Industry
- 9.8.3. Lessons Learned

9.9. Socio-Economic Aspects of Reuse and Upcoming Challenges
- 9.9.1. Barriers to Reused Water Implementation
- 9.9.2. Aquifer Recharge
- 9.9.3. Direct Reuse

Module 10. Metrology. Measurement and Instrumentation

10.1. Parameters to be Measured
- 10.1.1. Metrology
- 10.1.2. Water Pollution Problems
- 10.1.3. Choice of Parameters

10.2. Importance of Process Control
- 10.2.1. Technical Aspects
- 10.2.2. Health and Safety Aspects
- 10.2.3. Supervision and External Control

10.3. Pressure Gauges
- 10.3.1. Pressure Gauges
- 10.3.2. Transducers
- 10.3.3. Pressure Switches

10.4. Level Gauges
- 10.4.1. Direct Measurement
- 10.4.2. Ultrasonic
- 10.4.3. Limnimeter

10.5. Flow Meters
- 10.5.1. In Open Channels
- 10.5.2. In Closed Pipelines
- 10.5.3. In Wastewater

10.6. Temperature Gauges
- 10.6.1. Temperature Effects
- 10.6.2. Temperature Measurement
- 10.6.3. Mitigating Actions

10.7. Volumetric Flow Meters
- 10.7.1. Choice of a Meter
- 10.7.2. Main Types of Meters
- 10.7.3. Legal Aspects

10.8. Water Quality Measurement. Analytical Equipment
- 10.8.1. Turbidity and PH
- 10.8.2. Redox
- 10.8.3. Integrated Samples

10.9. Location of Measuring Equipment in a Plant
- 10.9.1. Inlet and Pre-treatment Works
- 10.9.2. Primary and Secondary
- 10.9.3. Tertiary

10.10. Aspects to Consider Regarding Telemetry and Remote-Control Instrumentation
- 10.10.1. Control Loops
- 10.10.2. PLCs and Communication Gateways
- 10.10.3. Remote Management

Give your profession a boost of excellence and compete with the best in a sector of enormous projection and growth possibilities"

06

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.

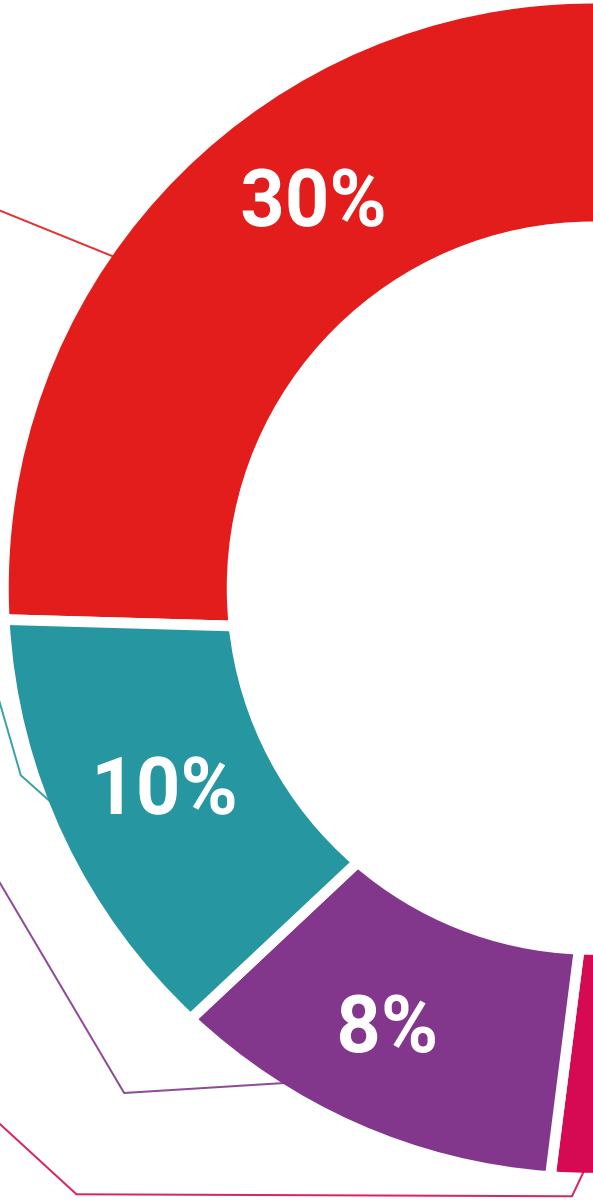
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

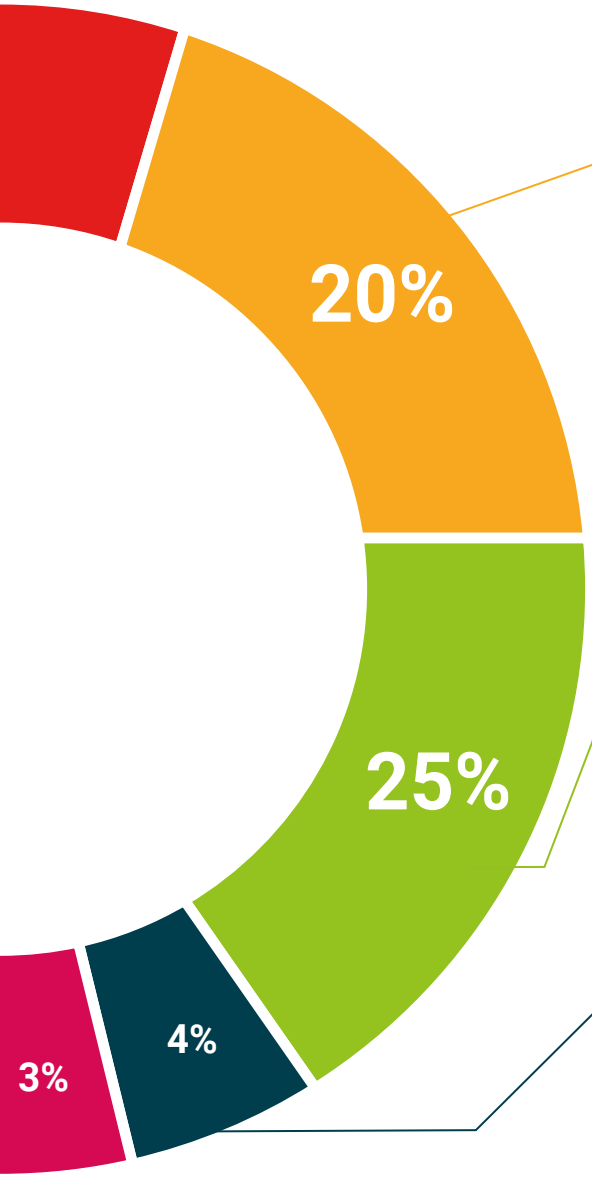
Practising Skills and Abilities

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.

07

Certificate

The Professional Master's Degree in Urban Water Services Engineering guarantees students, in addition to the most rigorous and up-to-date education, access to a Professional Master's Degree issued by TECH Global University.

Successfully complete this program and receive your university degree without travel or laborious paperwork"

This program will allow you to obtain your **Professional Master's Degree diploma in Urban Water Services Engineering** endorsed by **TECH Global University**, the world's largest online university.

TECH Global University is an official European University publicly recognized by the Government of Andorra (***official bulletin***). Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Professional Master's Degree in Urban Water Services Engineering**

Modality: **online**

Duration: **12 months**

Accreditation: **60 ECTS**

tech global university

Mr./Ms. _____ with identification document _____
has successfully passed and obtained the title of:

Professional Master's Degree in Urban Water Services Engineering

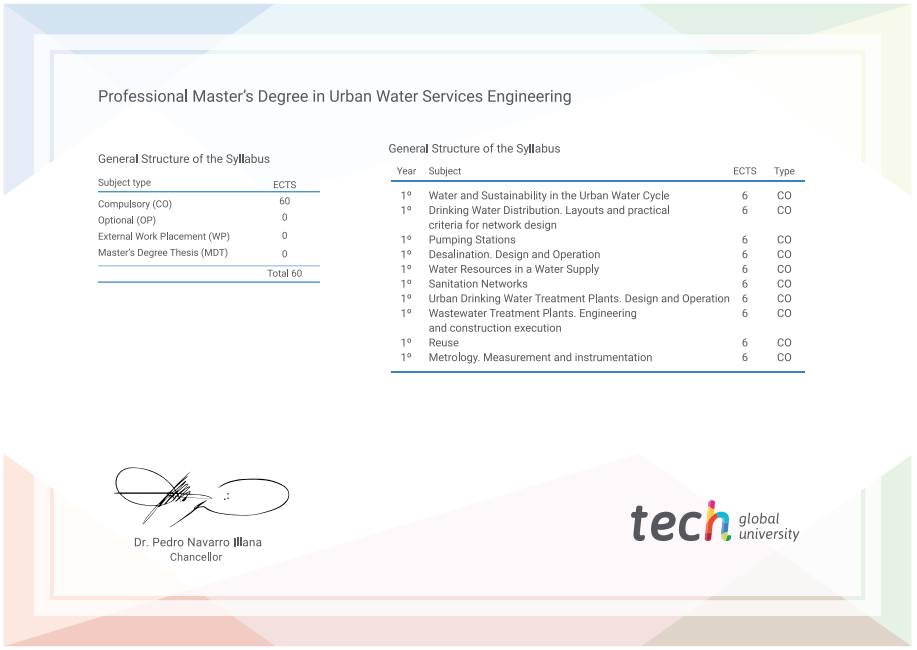
This is a program of 1,500 hours of duration equivalent to 60 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024

Dr. Pedro Navarro Illana
Rector

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country. Unique TECH Code: AFWORD23S techtitute.com/certificates



Professional Master's Degree in Urban Water Services Engineering

General Structure of the Syllabus

Subject type	ECTS
Compulsory (CO)	60
Optional (OP)	0
External Work Placement (WP)	0
Master's Degree Thesis (MDT)	0
	Total 60

General Structure of the Syllabus

Year	Subject	ECTS	Type
1º	Water and Sustainability in the Urban Water Cycle	6	CO
1º	Drinking Water Distribution. Layouts and practical criteria for network design	6	CO
1º	Pumping Stations	6	CO
1º	Desalination. Design and Operation	6	CO
1º	Water Resources in a Water Supply	6	CO
1º	Sanitation Networks	6	CO
1º	Urban Drinking Water Treatment Plants. Design and Operation	6	CO
1º	Wastewater Treatment Plants. Engineering and construction execution	6	CO
1º	Reuse	6	CO
1º	Metrology. Measurement and instrumentation	6	CO

Dr. Pedro Navarro Illana
Chancellor

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*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.

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Professional Master's Degree

Urban Water Services Engineering

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Global University**
- Credits: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Professional Master's Degree

Urban Water Services Engineering

tech global university