Professional Master's Degree

Water Engineering and Urban Waste Management

tech global university

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Professional Master's Degree

Water Engineering and Urban Waste Management

- 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-water-engineering-urban-waste-management**

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01

Introduction

Innovation in water collection, regulation, control and industrial production techniques makes specialization in this field essential in order to be able to offer efficient technical solutions that optimize economic investment and also incorporate the necessary environmental respect. This program will allow you to update your knowledge in this field incorporating to your skills the ability to act according to the most up-to-date procedures of the moment, in Water Engineering and Urban Waste Management.

A comprehensive and multidisciplinary educational program that will allow you to learn and integrate into your professional activity the latest advances in the field of water engineering"

The Professional Master's Degree in Water Engineering and Urban Waste Management is characterized by the deepening in these areas, from a comprehensive perspective, considering all the advances and interrelationships between both disciplines, including the most relevant aspects in legislation and circular economy.

In this way, the section on legislation offers the student a repository with all the legislation applicable to the topics covered during the Professional Master's Degree, facilitating its sectorial application. At the same time, the study of the circular economy is necessary because of its direct influence on water and waste management, a subject that is not covered by most of the master's degrees offered on the market.

One of the most interesting aspects of this Professional Master's Degree is the block dedicated to water management, in which the complete traceability of water is analyzed, from a chemical vision to its treatment as drinking water or wastewater. It also includes the use as an energy resource, through biogas or hydrogen vectors, an aspect to be taken into account in the coming years.

To conclude the study on waste, after a first module that covers from the classification and determination of waste, to the particularities of solid urban waste, industrial waste and hazardous waste, an in-depth analysis of all these types of waste is also necessary, given their coexistence in both urban and business environments.

It should be noted that as it is a 100% online Professional Master's Degree, 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 **Professional Master's Degree in Water Engineering and Urban Waste Management** contains the most complete and up-to-date program on the market. The most important features include:

- The development of case studies presented by experts in water engineering and urban waste management
- The graphic, schematic and practical contents, with which they are conceived, gather scientific and practical information , on those disciplines that are essential for professional practice
- Practical exercises where self-assessment can be used to improve learning
- Special focus on innovative methodologies in Water Engineering and Urban Waste Management
- 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

A comprehensive study, covering knowledge of procedures for dealing with different types of urban waste"

Incorporate into your intervention and management capacity in the water sector, the most interesting innovations, through a high-quality and high-impact qualification"

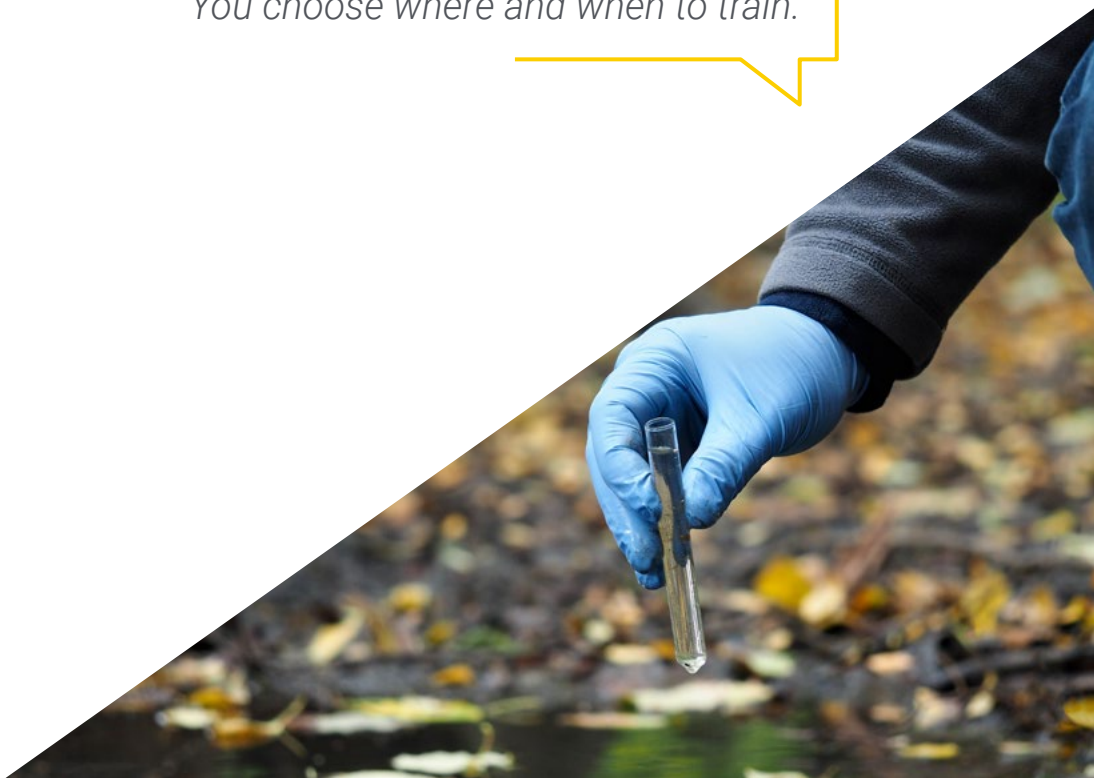
With a specific approach, including interdisciplinary learning, it uses the synergies between Water Engineering and Urban Resource Management.

This 100% online Professional Master's Degree will allow you to combine your studies with your professional work. You choose where and when to train.

It includes, in its teaching staff, professionals belonging to the field of and the management of Water Engineering and Urban Waste Management, who pour into this program the experience of their work, in addition to recognized specialists reference societies and prestigious universities.

The multimedia content, developed with the latest educational technology, will provide professionals with situated and contextual learning, i.e., a simulated environment that will provide immersive training, designed for training oneself 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 throughout the program. For this purpose, the professional will be assisted by an innovative interactive video system, created by renowned and experienced experts in Water Engineering and Urban Waste Management.



02

Objectives

The Professional Master's Degree in Water Engineering and Urban Waste Management aims to provide students with the most up-to-date compendium of knowledge and skills, in terms of new developments and protocols or techniques of action, in order to enable or boost their ability to work in this field.

An intensive and efficient study, which will allow the student to acquire, complete or update their knowledge, getting up to date in all aspects of Water Engineering and Urban Waste Management"

General Objectives

- Know the latest applicable legislation that supports waste management and water engineering, allowing the student to know the legal instruments used in environmental management
- Apply the circular economy in water and waste management systems, using appropriate tools and methodologies quantify the economic and environmental impact of water and waste reuse and revaluation improvements in the organization
- Address the relationship between water and the environment and describe the physicochemical processes involved in a wastewater treatment plant, thus enabling the student to design equipment for a wastewater treatment plant
- In-depth study of the different energy carriers, such as biogas or hydrogen in its molecular form (H2), for its subsequent energy use, allowing the student to carry out designs based on hydrogen or biogas
- Acquire the knowledge of chemistry, 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
- 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 service of drinking water
- Provide the student with the knowledge to identify waste, classify it and understand its flow
- Know the characteristics of waste and the problems involved in its management and final treatment

- Identify the origin of urban or municipal waste and the evolution of waste production
- Have key knowledge on the potential health and environmental effects of municipal waste and landfill issues
- Know the main digital technologies available in municipal solid waste management
- Know the optimal management of industrial waste, mainly through minimization at source and recycling of by-products
- Know the most relevant aspects of industrial waste, and the environmental legislation applicable to industrial waste management, together with the procedure for the correct management of industrial waste and its obligations as a producer
- Master the latest industrial waste treatment and disposal techniques
- Optimize industrial waste management by using waste minimization techniques
- Know the types of hazardous waste, generated depending on the sector, and the existing recovery options, providing the student with the skills to develop waste management plans and environmental awareness activities in different sectors

Specific Objectives

- Acquire knowledge of environmental law at the community, state and autonomous community levels
- Have an up-to-date legislation repository to ensure proper compliance with applicable regulations
- Know the necessary procedures for the figures of waste producer and manager
- Understand the requirements of the different environmental management systems, ISO 14001 and EMAS
- In-depth knowledge of the circular economy, for its strategic implementation, through proposals for the efficient and sustainable use of water and the revalorization of waste and by-products
- Measure, through life cycle analysis, eco-design and zero discharge tools, the environmental impact of products and/or processes, in order to develop improvement plans capable of becoming benchmark success stories
- Know the criteria of green public procurement, and the innovative public procurement tool to face and meet proposals derived from public administrations
- Establish an environmental accounting system to quantify and classify the proposed improvements and environmental costs, integrating it into the organization's accounting system
- Know the process steps 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 technologies for nitrogen and phosphorus removal
- Study low-cost purification technologies such as lagooning and green filtering
- Learn more about the production, conditioning, storage and utilization of biogas
- Analyze the global energy landscape, as well as other energy solutions based on renewable energies
- Understand the hydrogen economy
- Study fuel cells, whose purpose is the production of electrical energy from hydrogen
- 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
- Address the great importance of this molecule as a universal solvent in the cycle of life, also dealing with the main thermodynamic laws
- Delve into the different processes of water purification, and to know the components that determine its quality as drinking water
- Delve into the types and effects of contamination in drinking water, in order to subsequently 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
- In-depth study of the economic considerations and costs of drinking water services, in order to establish relevant actions to address the scarcity of fresh water, aligned with the strategies set out in the 2030 Agenda of the Sustainable Development Goals (SDGs)
- Know how to identify waste
- Identify and differentiate the types of existing wastes
- Understand, from a practical point of view, the different management options, the range of which opens up for different waste streams
- Be able to propose different treatment schemes, according to the waste characteristics
- In-depth knowledge of the existing problems related to waste production
- Analyze the evolution of waste production, by origin and type of waste
- Know how to analyze and assess the health and environmental impact of waste management
- Propose measures to reduce, recycle and reuse the waste generated
- Propose landfill management and restoration models
- Deepen in the latest digital technologies available in municipal solid waste management
- Know how to propose internal waste management models
- Know about the development and evaluation of waste management plans
- Have the capacity to reduce industrial waste, through the use of by-product bags
- Identify and understand the market for waste as a secondary raw material, understanding its market
- In-depth breakdown of the obligations of waste producers according to their sector of activity
- Analyze the type of waste generated by different activities
- Acquire transversal skills, necessary for work performance, in the new cultural frameworks of the current productive system
- Know how to manage waste, mainly hazardous waste, applying the regulations that regulate them
- In-depth study of valorization methods
- Develop environmental awareness activities

03

Skills

A complete educational process, created to offer you contextual learning, direct and focused on practical learning, which will allow you to incorporate new knowledge and professional skills, in line with the current profession in this field of work.

An intensive qualification that will provide you with the professional growth you need to compete, with the support of a fully up-to-date faculty"

General Skills

- Enforce water and waste regulations
- Develop transformation processes in the circular economy, in administrations or companies in the water and waste management sector
- Analyze and design Drinking Water Treatment Plants (DWTP), as well as Wastewater Treatment Plants (WWTP)
- Correctly and adequately classify the different types of solid urban, industrial and hazardous waste for subsequent management or revaluation

Up-to-date, comprehensive, intensive and flexible: this program will allow you to advance unimpeded to the highest working capacity in this field"

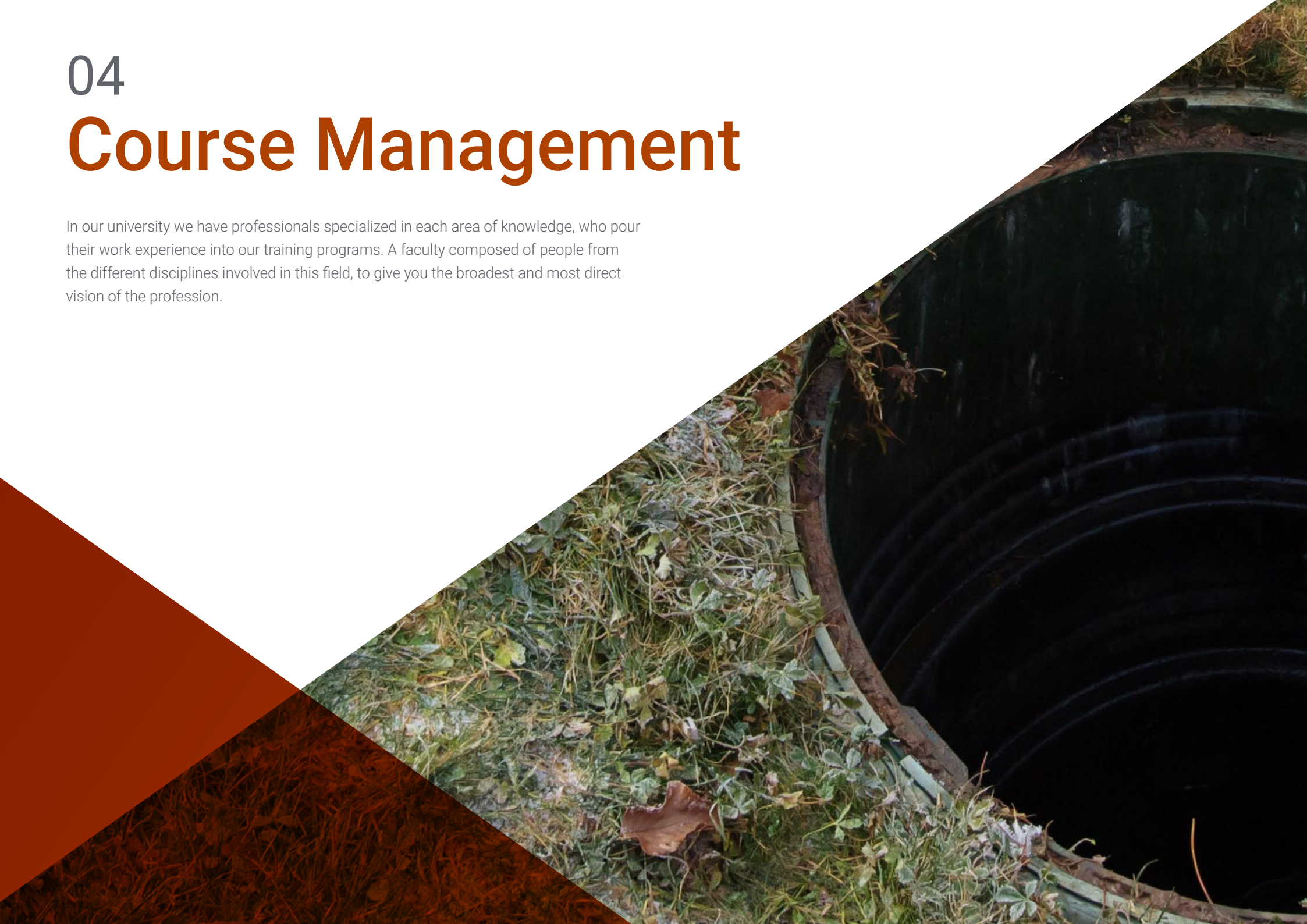
Specific Skills

- Apply current legislation in the field of water engineering and urban waste management
- Implement proposals for efficient and sustainable water use
- Implement all the necessary processes and machinery in wastewater treatment plants
- Design and introduce renewable energies in different aspects of life
- Have a thorough knowledge of all aspects of water issues
- Carry out water purification treatments
- Differentiate the different types of waste and know how to manage them appropriately
- Reduce the environmental impact of municipal solid waste
- Reduce industrial waste, thanks to the implementation of waste management improvements
- Distinguish wastes considered hazardous and apply the regulations in force for their management

04

Course Management

In our university we have professionals specialized in each area of knowledge, who pour their work experience into our training programs. A faculty composed of people from the different disciplines involved in this field, to give you the broadest and most direct vision of the profession.



A faculty made up of professionals from the sector and related areas, who will give you an immediate and real vision of the work in Water Engineering and Urban Waste Management"

International Guest Director

Considered as a true reference in the field of Waste Management for his sustainable initiatives, Frederick Jeske - Schoenhoven is a prestigious Environmental Engineer. In this sense, his philosophy has focused on the optimization of recycling processes, minimization of waste generation and promotion of environmentally friendly practices.

In this way, he has developed his professional work in recognized organizations such as the Treasury Department or the French Ministry of Economy, Finance and Industry, as well as the American World Bank. There, he has been in charge of multiple functions ranging from active portfolio management to the digital transformation of institutions. This has enabled companies to handle innovative technological tools such as Artificial Intelligence, Big Data and even the Internet of Things. As such, institutions have managed to set up advanced automation solutions to optimize their strategic processes considerably. In addition, it has created multiple online platforms that have facilitated the exchange and reuse of materials, thereby fostering a circular economy model.

On the other hand, he has balanced this facet with his work as a researcher. In this regard, he has published numerous articles in specialized journals on topics such as new recycling technologies, the most innovative techniques to improve the efficiency of waste management systems or cutting-edge strategies to ensure a sustainable approach in the industrial production chain. As a result, he has contributed to an increase in recycling rates in several communities.

In addition, he is a strong advocate for education and awareness of the treatment of waste from manufacturing activities. As such, he has spoken at numerous conferences globally to share his solid understanding of this field.

Mr. Jeske-Schoenhoven, Frederick

- Director of Strategy and Sustainability at SUEZ in Paris, France
- Strategy and Marketing Director of Dormakaba in Zurich, Switzerland.
- Vice President of Strategy and Business Development at Siemens in Berlin, Germany
- Director of Communications, Siemens Healthineers, Germany
- Executive Director of the World Bank in Washington, United States
- Head of Management at the General Directorate of the Treasury, Government of France
- Advisory Counselor at the International Monetary Fund in Washington, United States
- Financial Consultant at the French Ministry of Economy, Finance and Industry of France
- Master's Degree in Administration and State Policy, École Nationale d'Administration, France
- Master's Degree in Management Sciences, HEC Paris
- Master's Degree in Political Science from Sciences Po
- Degree in Environmental Engineering from IEP Paris

Thanks to TECH, you will be able to learn with the best professionals in the world"

Management

Mr. Nicolás, David, Nieto-Sandoval González

- Industrial Technical Engineer from the EUP of Malaga
- Industrial Engineer from ETSII
- Master's Degree in Integral Management of Quality, Environment and Health and Safety at Work from the University of the Balearic Islands
- He has been working for more than 11 years, both for companies and independently, for clients in the private agri-food industrial sector and the institutional sector, as a consultant in engineering, project manager, 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 for the European INDUCE project
- Trainer at institutions such as COGITI or COIIM

Professors

Ms. 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, industry, 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

Ms. 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 "Hysys simulation, optimization and energy analysis in the wastewater treatment unit of the urea plant (PAR)" at Fertiberia Puertollano
- Co-author of "Methodology for calculating energy efficiency in waste to energy recovery facilities"
- Member of ACMIQ

Ms. Mullor Real, Cristina

- Graduated in Environmental Sciences from the Miguel Hernández University of Elche
- Master's degree in Environmental Engineering, specializing in industrial environmental management and management of water treatment plants 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 Castilla La Mancha University
- Master's Degree in Integrated Quality and Environmental Management
- Senior Technician in Occupational Risk Prevention
- Partner-Consultant of Implantación Integral de Sistemas de Calidad, SL, 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
- He has been developing his activity for more than 12 years, advising and auditing companies in sectors as varied as waste, water, food, industrial, transportation, renewable energy, etc.
- Teacher of Certificates of Professionalism
- He is currently the administrator of Imsica Formación, SL, an entity specialized in in companytraining for its clients
- Teacher of the Recicla2 Project for the promotion of waste management and recycling and the creation of green companies

05

Structure and Content

The syllabus has been designed based on educational effectiveness, carefully selecting the contents to offer a complete course that includes all the essential fields of study and allows to reach the real knowledge of the subject. With the latest updates and aspects of the sector.

The most complete and up-to-date program on the market, which includes all the up-to-date knowledge that the professional needs to acquire in order to compete in this sector"

Module 1. Legislation

1.1. 2030 Agenda for Sustainable Development
- 1.1.1. SDG 6. Clean Water and Sanitation
- 1.1.2. SDG 12. Responsible Production and Consumption

1.2. European Strategy
- 1.2.1. Municipal Waste Target
- 1.2.2. Target Waste of Greatest Generation/Impact
- 1.2.3. Circular Economy

1.3. Main European Legislation
- 1.3.1. European Directives on Waste and Circular Economy
- 1.3.2. European Drinking Water Directives
- 1.3.3. Europe Residual Water Directives

1.4. Waste Producer Proceedings
- 1.4.1. Registration Procedures
- 1.4.2. Generation Control Declarations
- 1.4.3. Minimization

1.5. Waste Manager Procedures
- 1.5.1. Manager Types and Registration Procedures
- 1.5.2. Transportation Control and Management
- 1.5.3. Final Destination of Waste Declarations

1.6. International Regulations
- 1.6.1. Environmental Management systems
- 1.6.2. ISO 14001
- 1.6.3. EMAS

Module 2. Circular Economy

2.1. Aspects and Characteristics of Circular Economy
- 2.1.1. Origin of Circular Economy
- 2.1.2. Principles of Circular Economy
- 2.1.3. Key Features

2.2. Adaptation to Climate Change
- 2.2.1. Circular Economy as a Strategy
- 2.2.2. Economic Advantages
- 2.2.3. Social Benefits
- 2.2.4. Business Benefits
- 2.2.5. Environmental Benefits

2.3. Efficient and Sustainable Water Use
- 2.3.1. Rainwater
- 2.3.2. Gray Water
- 2.3.3. Irrigation Water Agriculture and Gardening
- 2.3.4. Process Water Agrifood Industry

2.4. Revaluation of Wastes and By-Products
- 2.4.1. Waste Water Footprint
- 2.4.2. From Waste to By-Product
- 2.4.3. Classification According to Production Sector
- 2.4.4. Revaluation Undertakings

2.5. Life Cycle Analysis
- 2.5.1. Life Cycle Assessment (LCA)
- 2.5.2. Stages
- 2.5.3. Reference Standards
- 2.5.4. Methodology
- 2.5.5. Tools

2.6. Ecodesign
- 2.6.1. Ecodesign Principles and Criteria
- 2.6.2. Characteristics of the Products
- 2.6.3. Ecodesign Methodologies
- 2.6.4. Ecodesign Tools
- 2.6.5. Success Stories

2.7. Zero Discharge
- 2.7.1. Principles of Zero Discharge
- 2.7.2. Benefits
- 2.7.3. Systems and Processes
- 2.7.4. Success Stories

2.8. Environmental Accounting
- 2.8.1. Best Available Environmental Technologies (BAT)
- 2.8.2. Ecotaxes
- 2.8.3. Ecological Account
- 2.8.4. Environmental Cost

Module 3. Wastewater Treatment

3.1. Water Pollution Assessment
- 3.1.1. Water Transparency
- 3.1.2. Water Pollution
- 3.1.3. Water Pollution Effects
- 3.1.4. Pollution Parameters

3.2. Sample Collection
- 3.2.1. Collection Procedure and Conditions
- 3.2.2. Sample Size
- 3.2.3. Frequency of Sampling
- 3.2.4. Sampling Program

3.3. WWTP Pretreatment
- 3.3.1. Water Reception
- 3.3.2. Dimensioning
- 3.3.3. Physical Processes

3.4. WWTP Primary Treatment
- 3.4.1. Sedimentation
- 3.4.2. Flocculation-Coagulation
- 3.4.3. Types of Decanters
- 3.4.4. Decanter Design

3.5. WWTP Secondary Treatment (I)
- 3.5.1. Biological Processes
- 3.5.2. Factors Affecting the Biological Process
- 3.5.3. Active Sludge
- 3.5.4. Percolating Sludge
- 3.5.5. Rotary Biological Contact Reactor

3.6. WWTP Secondary Treatment (II)
- 3.6.1. Biofilters
- 3.6.2. Digesters
- 3.6.3. Agitation Systems
- 3.6.4. Aerobic Digesters: Perfect Mixing and Piston Flow
- 3.6.5. Activated Sludge Digester
- 3.6.6. Secondary Decanter
- 3.6.7. Activated Sludge Systems

3.7. Tertiary Treatment (I)
- 3.7.1. Nitrogen Elimination
- 3.7.2. Phosphorus Elimination
- 3.7.3. Membrane Technology
- 3.7.4. Oxidation Technologies Applied to Generated Wastes
- 3.7.5. Disinfection

3.8. Tertiary Treatment (II)
- 3.8.1. Adsorption with Activated Carbon
- 3.8.2. Steam or Air Entrainment
- 3.8.3. Gas Washing: Stripping
- 3.8.4. Ion Exchange
- 3.8.5. pH Regulation

3.9. Sludge Study
- 3.9.1. Sludge Treatment
- 3.9.2. Flotation
- 3.9.3. Assisted Flotation
- 3.9.4. Dosing and Mixing Tank for Coagulants and Flocculants
- 3.9.5. Sludge Stabilization
- 3.9.6. High-Load Digester
- 3.9.7. Low-Load Digester
- 3.9.8. Biogas

3.10. Low-Cost Purification Technologies
- 3.10.1. Septic Tanks
- 3.10.2. Digester-Decanter Tank
- 3.10.3. Aerobic Lagooning
- 3.10.4. Anaerobic Lagooning
- 3.10.5. Green Filter
- 3.10.6. Sand Filter
- 3.10.7. Peat Bed

Module 4. Energy Production

4.1. Biogas Production
- 4.1.1. Products from the Activated Sludge Process
- 4.1.2. Anaerobic Digestion
- 4.1.3. Fermentation Stage
- 4.1.4. Biodigestor
- 4.1.5. Production and Characterization of the Biogas Generated

4.2. Biogas Conditioning
- 4.2.1. Elimination of Hydrogen Sulfide
- 4.2.2. Elimination of Humidity
- 4.2.3. Elimination of CO2
- 4.2.4. Elimination of Siloxanes
- 4.2.5. Elimination of Oxygen and Halogenated Organic Compounds

4.3. Biogas Storage
- 4.3.1. Gasometer
- 4.3.2. Biogas Storage
- 4.3.3. High-Pressure Systems
- 4.3.4. Low-Pressure Systems

4.4. Biogas Burning
- 4.4.1. Burners
- 4.4.2. Burner Characteristics
- 4.4.3. Installation of Burners
- 4.4.4. Flame Control
- 4.4.5. Low-Cost Burners

4.5. Uses of Biogas
- 4.5.1. Biogas Boiler
- 4.5.2. Gas Motor Generator
- 4.5.3. Turbine
- 4.5.4. Gas Rotating Machine
- 4.5.5. Injection into the Natural Gas Grid
- 4.5.6. Energy Calculations from the Use of Natural Gas

4.6. Current Energy Scenario
- 4.6.1. Use of Fossil Fuels
- 4.6.2. Nuclear Energy
- 4.6.3. Renewable Energies

4.7. Renewable Energies
- 4.7.1. Photovoltaic Solar Power
- 4.7.2. Wind Energy
- 4.7.3. Hydraulic Energy
- 4.7.4. Geothermal Energy
- 4.7.5. Energy Storage

4.8. Hydrogen as an Energy Carrier
- 4.8.1. Integration of Renewable Energies
- 4.8.2. Hydrogen Economy
- 4.8.3. Hydrogen Production
- 4.8.4. Use of Hydrogen
- 4.8.5. Electricity Production

4.9. Fuel Cells
- 4.9.1. Operation
- 4.9.2. Types of Fuel Cells
- 4.9.3. Microbial Fuel Cells

4.10. Gas Handling Safety
- 4.10.1. Risks: Biogas and Hydrogen
- 4.10.2. Explosion Safety
- 4.10.3. Security Measures
- 4.10.4. Inspection

Module 5. Water Chemistry

5.1. Water Chemistry
- 5.1.1. Alchemy
- 5.1.2. Evolution of Chemistry

5.2. The Water Molecule
- 5.2.1. Crystallography
- 5.2.2. Crystalline Structure of Water
- 5.2.3. Aggregation States
- 5.2.4. Links and Properties

5.3. Physicochemical Properties of Water
- 5.3.1. Physical Properties of Water
- 5.3.2. Chemical Properties of Water

5.4. Water as a Solvent
- 5.4.1. Ion Solubility
- 5.4.2. Solubility of Neutral Molecules
- 5.4.3. Hydrophilic and Hydrophobic Interactions

5.5. Organic Chemistry of Water
- 5.5.1. The Water Molecule in Organic Reactions
- 5.5.2. Hydration Reactions
- 5.5.3. Hydrolysis Reactions
- 5.5.4. Hydrolysis of Amides and Esters
- 5.5.5. Other Water Reactions Enzymatic Hydrolysis

5.6. Inorganic Water Chemistry
- 5.6.1. Hydrogen Reactions
- 5.6.2. Oxygen Reactions
- 5.6.3. Reactions to Obtain Hydroxides
- 5.6.4. Reactions to Obtain Acids
- 5.6.5. Reactions to Obtain Salts

5.7. Analytical Chemistry of Water
- 5.7.1. Analytical Techniques
- 5.7.2. Water Analysis

5.8. Thermodynamics of Water Phases
- 5.8.1. Laws of Thermodynamics
- 5.8.2. Phase Diagram Phase Equilibrium
- 5.8.3. Water Triple Point

5.9. Water Quality
- 5.9.1. Organoleptic Characteristics
- 5.9.2. Physical-Chemical Characteristics
- 5.9.3. Anions and Cations
- 5.9.4. Undesirable Components
- 5.9.5. Toxic Components
- 5.9.6. Radioactivity

5.10. Chemical Water Purification Processes
- 5.10.1. Water Demineralization
- 5.10.2. Reverse Osmosis
- 5.10.3. Decalcification
- 5.10.4. Distillation
- 5.10.5. Ozone and UV Disinfection
- 5.10.6. Filtration

Module 6. Drinking and Process Water Treatment

6.1. The Water Cycle
- 6.1.1. The Water Cycle
- 6.1.2. Drinking Water Contamination
  - 6.1.2.1. Chemical Contamination
  - 6.1.2.2. Biological Contamination
- 6.1.3. Effects of Drinking Water Contamination

6.2. Drinking Water Treatment Plants (DWTP)
- 6.2.1. The Water Purification Process
- 6.2.2. Diagram of a DWTP Stages and Processes
- 6.2.3. Functional Calculations and Process Design
- 6.2.4. Environmental Impact Study

6.3. Flocculation and Coagulation in DWTPs
- 6.3.1. Flocculation and Coagulation
- 6.3.2. Types of Flocculants and Coagulants
- 6.3.3. Mixing Plant Design
- 6.3.4. Control Parameters and Strategies

6.4. Chlorine-Derived Treatments
- 6.4.1. Chlorine Treatment Residual Products
- 6.4.2. Disinfection Products
- 6.4.3. Chlorine Application Points in DWTP
- 6.4.4. Other Ways of Disinfection

6.5. Water Purification Equipment
- 6.5.1. Demineralization Equipment
- 6.5.2. Reverse Osmosis Equipment
- 6.5.3. Decalcification Equipment
- 6.5.4. Filtration Equipment

6.6. Water Desalination
- 6.6.1. Types of Desalination
- 6.6.2. Choosing the Desalination Method
- 6.6.3. Design of a Desalination Plant
- 6.6.4. Economic Study

6.7. Methods of Analysis of Drinking Water and Wastewater
- 6.7.1. Sample Collection
- 6.7.2. Description of Analysis Methods
- 6.7.3. Frequency of Analysis
- 6.7.4. Quality Control
- 6.7.5. Representation of Results

6.8. Water in Industrial Processes
- 6.8.1. Water in the Food Industry
- 6.8.2. Water in the Pharmaceutical Industry
- 6.8.3. Water in the Mining Industry
- 6.8.4. Water in the Agricultural Industry

6.9. Drinking Water Management
- 6.9.1. Infrastructures Used for Water Collection
- 6.9.2. Costs of Drinking Water Production
- 6.9.3. Drinking Water Storage and Distribution Technology
- 6.9.4. Management Tools for Water Scarcity

6.10. Drinking Water Economy
- 6.10.1. Economic Considerations
- 6.10.2. Service Costs
- 6.10.3. Freshwater Scarcity
- 6.10.4. The 2030 Agenda

Module 7. Waste Management

7.1. What Is Considered Waste
- 7.1.1. Evolution of Waste
- 7.1.2. Current Situation
- 7.1.3. Future Perspectives

7.2. Existing Waste Streams
- 7.2.1. Analysis of Waste Streams
- 7.2.2. Grouping Streams
- 7.2.3. Characteristics of the Streams

7.3. Classification of Waste and Characteristics
- 7.3.1. Classification According to Standards
- 7.3.2. Classification According to Management
- 7.3.3. Classification According to Origin

7.4. Characteristics and Properties
- 7.4.1. Chemical Characteristics
- 7.4.2. Physical Characteristics
  - 7.4.2.1. Humidity
  - 7.4.2.2. Specific Weight
  - 7.4.2.3. Granulometry
- 7.4.3. Hazard Characteristics

7.5. Waste Problems. Origin and Types of Waste
- 7.5.1. Main Problems of Waste Management
- 7.5.2. Generation Problems
- 7.5.3. Problems with Transport and Final Treatment

7.6. Environmental Liabilities
- 7.6.1. Liabilities for Environmental Damage
- 7.6.2. Damage Prevention, Mitigation and Remediation
- 7.6.3. Financial Guarantees
- 7.6.4. Environmental Requirement Procedures

7.7. Integrated Pollution Prevention and Control
- 7.7.1. Fundamental Aspects
- 7.7.2. Environmental Requirement Procedures
- 7.7.3. Information and Communication

7.8. European Emission Source Inventory
- 7.8.1. Emission Inventory Background
- 7.8.2. European Pollutant Emission Inventory
- 7.8.3. European Pollutant Release and Transfer Register (E-PRTR)

7.9. Environmental Impact Assessment
- 7.9.1. Environmental Impact Assessment (EIA)
- 7.9.2. Administrative Procedures of EIA
- 7.9.3. Environmental Impact Assessment (EIA)
- 7.9.4. Abbreviated Procedures

7.10. Climate Change and the Fight against Climate Change
- 7.10.1. Elements and Factors that Determine the Climate
- 7.10.2. Definition of Climate Change Climate Change Effects
- 7.10.3. Actions Against Climate Change
- 7.10.4. Organizations Facing Climate Change
- 7.10.5. Predictions about Climate Change
- 7.10.6. Bibliographical References

Module 8. Urban Solid Waste Management

8.1. Sources and Production
- 8.1.1. Sources of Origin
- 8.1.2. Analysis of Composition
- 8.1.3. Evolution of Production

8.2. Urban Solid Waste Management
- 8.2.1. Classification According to Standards
- 8.2.2. Urban Solid Waste Features

8.3. Effects on Public Health and the Environment
- 8.3.1. Health Effects of Air Pollution
- 8.3.2. Health Effects of Chemical Substances
- 8.3.3. Effects on Wildlife

8.4. Importance of Minimization
- 8.4.1. Reducing Waste
- 8.4.2. The 5Rs and Their Benefits
- 8.4.3. Fractionation and Problems

8.5. Phases of Operational Waste Management
- 8.5.1. Waste Containerization
- 8.5.2. Waste Collection Types and Systems
- 8.5.3. Transfer and Transportation

8.6. Types of Urban Waste Treatment I
- 8.6.1. Classification Plants
- 8.6.2. Composting
- 8.6.3. Biomethanization
- 8.6.4. Energy Value

8.7. Types of Urban Waste Treatment II
- 8.7.1. Landfill
- 8.7.2. Environmental Impact of Landfills
- 8.7.3. Sealing Landfill

8.8. Municipal Management of USW Landfills
- 8.8.1. Social Perception and Physical Situation
- 8.8.2. Management Models of USW Landfills
- 8.8.3. Current Problems of USW Landfills

8.9. The Waste as a Source of Business
- 8.9.1. From Health Protection to Circular Economy
- 8.9.2. Economic Activity of Waste Management
- 8.9.3. From Waste to Resource
- 8.9.4. Waste as a Substitute for Raw Materials

8.10. Digitization in the Management Process
- 8.10.1. Classification Based on Deep Learning
- 8.10.2. Container Sensing
- 8.10.3. Smart Bins

Module 9. Industrial Waste Management

9.1. Industrial Waste Characterization
- 9.1.1. Classification According to Regulation 1357/2014, Based on the Amendments Introduced by Regulation 1272/08 (CLP) and Regulation 1907/06 (REACH)
- 9.1.2. Classification According to the European Waste List

9.2. Industrial Waste Management
- 9.2.1. Industrial Waste Producer
- 9.2.2. Industrial Waste Management
- 9.2.3. Fines

9.3. Internal Management of Industrial Waste
- 9.3.1. Compatibility and Initial Segregation
- 9.3.2. Internal Transport of Waste
- 9.3.3. Internal Storage of Waste

9.4. Minimization of Waste
- 9.4.1. Minimization Methods and Techniques
- 9.4.2. Minimization Plan

9.5. Fines
- 9.5.1. Enforcement of Environmental Legislation According to the Nature of the Waste

9.6. Waste Stream I
- 9.6.1. Management of Used Oils
- 9.6.2. Packaging Waste Management
- 9.6.3. Construction and Demolition Waste Management

9.7. Waste Stream II
- 9.7.1. Batteries and Accumulators Management
- 9.7.2. Packaging Waste Management

9.8. Waste Stream III
- 9.8.1. End-of-Life Vehicle Management
- 9.8.2. Decontamination, Treatment and Management Methods

9.9. Non-Hazardous Industrial Waste
- 9.9.1. Typology and Characterization of Non-Hazardous Industrial Waste
- 9.9.2. Transportation of Goods According to Their Volume

9.10. By-Products Market
- 9.10.1. Industrial By-Products
- 9.10.2. National and European Situation Analysis
- 9.10.3. By-Product Exchange

Module 10. Dangerous Waste

10.1. Agriculture and Livestock
- 10.1.1. Agricultural Waste
- 10.1.2. Types of Agricultural Waste
- 10.1.3. Types of Livestock Waste
- 10.1.4. Valuation of Agricultural Waste
- 10.1.5. Valuation of Livestock Waste

10.2. Trade, Office and Related Activities
- 10.2.1. Commercial, Office and Related Waste
- 10.2.2. Types of Commercial, Office and Related Waste
- 10.2.3. Valuation of Commercial, Office and Related Waste

10.3. Construction and Civil Works
- 10.3.1. Construction and Demolition Waste (CDW)
- 10.3.2. Types of CDW
- 10.3.3. Valuation of CDW

10.4. Integrated Water Cycle
- 10.4.1. Waste Integrated Water Cycle
- 10.4.2. Types of Waste Integrated Water Cycle
- 10.4.3. Valuation of Waste Integrated Water Cycle

10.5. Chemical and Plastics Industry
- 10.5.1. Chemical and Plastics Industry Waste
- 10.5.2. Types of Chemical and Plastics Industry Waste
- 10.5.3. Valuation of Waste from the Chemical and Plastics Industry

10.6. Metal-Mechanical Industry
- 10.6.1. Metal-Mechanical Industry Waste
- 10.6.2. Types of Metal-Mechanical Industry Waste
- 10.6.3. Valuation of Metal-Mechanical Industry Waste

10.7. Healthcare
- 10.7.1. Healthcare Waste
- 10.7.2. Types of Healthcare Waste
- 10.7.3. Valuation of Healthcare Waste

10.8. IT and Telecommunications
- 10.8.1. IT and Telecommunications Waste
- 10.8.2. Types of IT and Telecommunications Waste
- 10.8.3. Valuation IT and Telecommunications Waste

10.9. Energy Industry
- 10.9.1. Energy Industry Waste
- 10.9.2. Types of Energy Industry Waste
- 10.9.3. Valuation of Energy Industry Waste

10.10. Transport
- 10.10.1. Transport Waste
- 10.10.2. Types of Transport Waste
- 10.10.3. Valuation of Transport Waste

This training will allow you to advance in your career in a comfortable way"

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

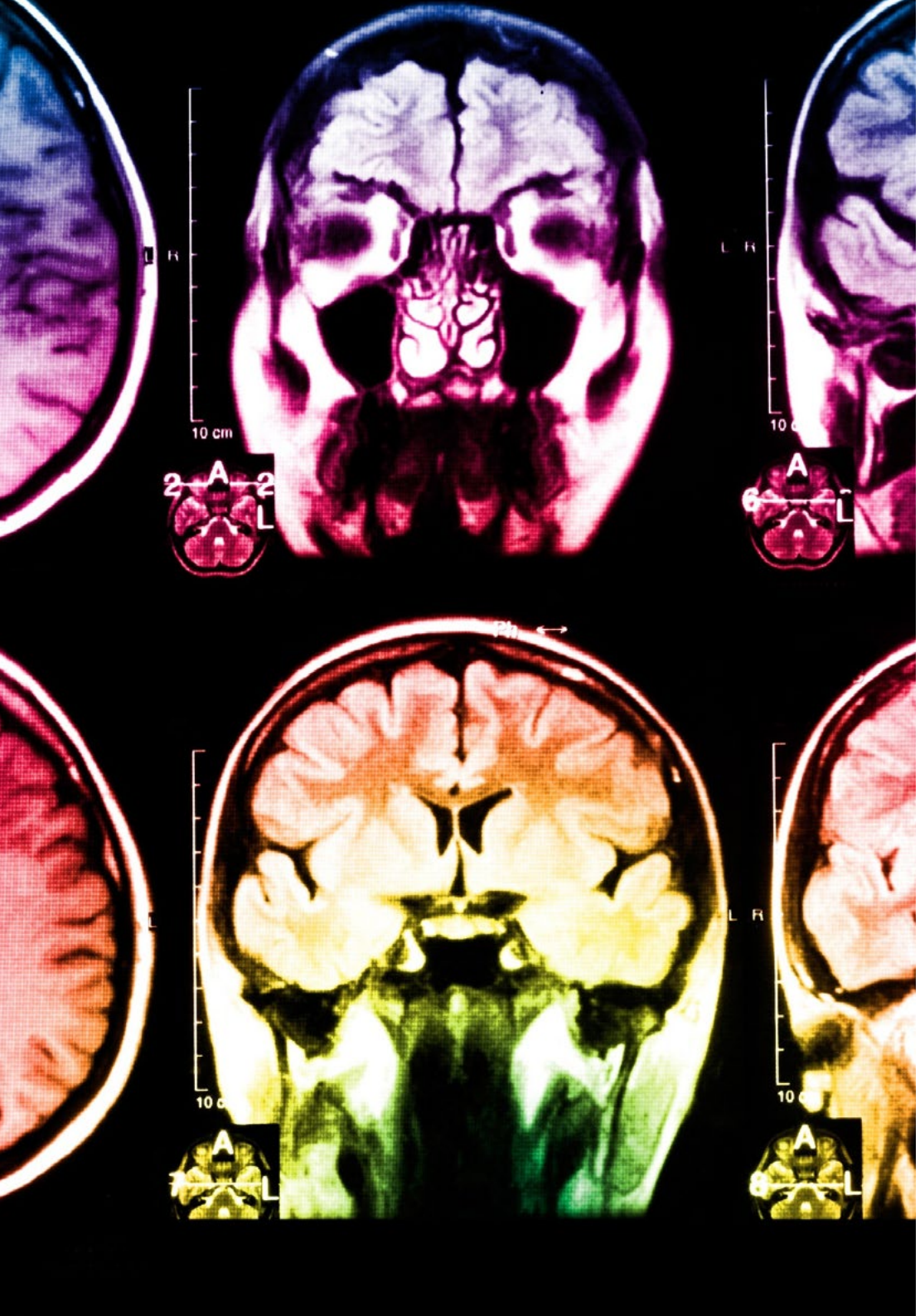
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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.

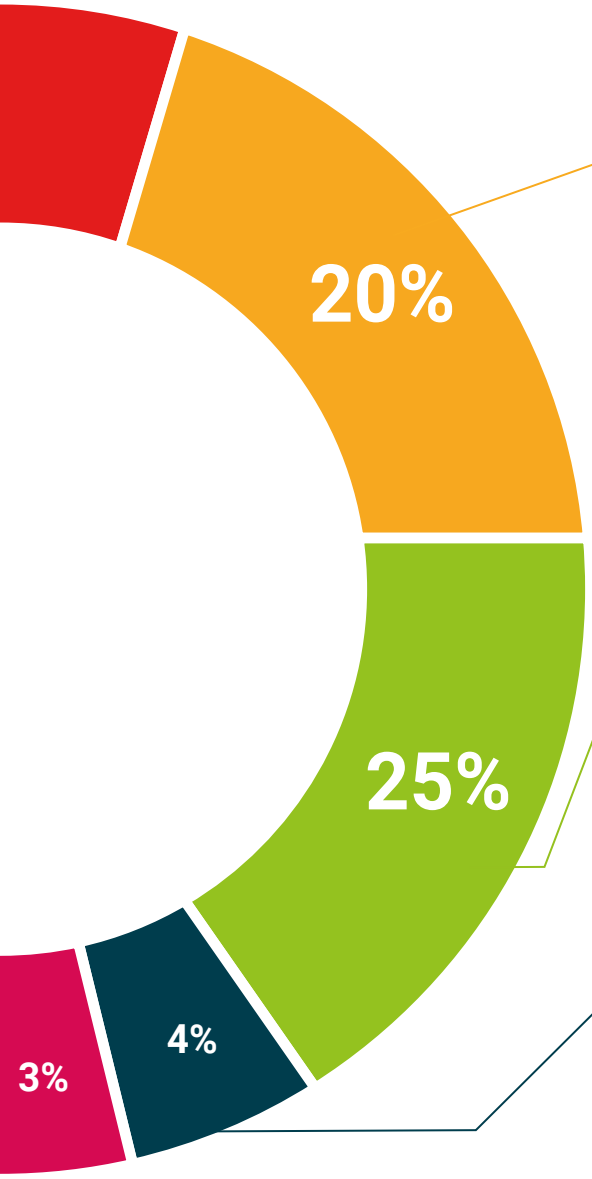
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

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 Water Engineering and Urban Waste Management guarantees you, in addition to the most rigorous and up-to-date training, 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 Water Engineering and Urban Waste Management** 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 Water Engineering and Urban Waste Management**

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 Water Engineering and Urban Waste Management

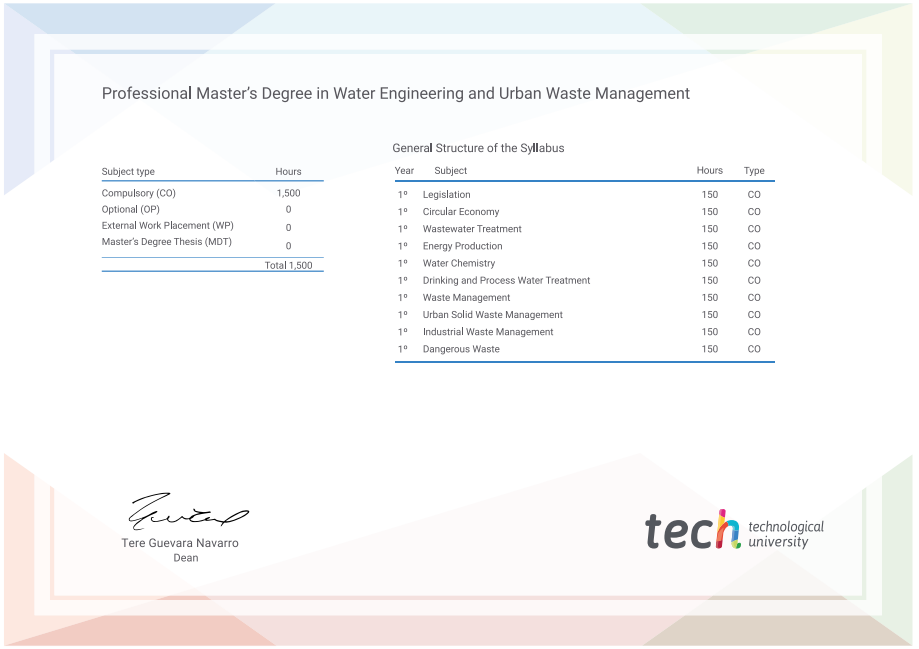
This is a program of 1,500 hours of duration equivalent to 60 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

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 Water Engineering and Urban Waste Management

Subject type	Hours
Compulsory (CO)	1,500
Optional (OP)	0
External Work Placement (WP)	0
Master's Degree Thesis (MDT)	0
	Total 1,500

General Structure of the Syllabus

Year	Subject	Hours	Type
1º	Legislation	150	CO
1º	Circular Economy	150	CO
1º	Wastewater Treatment	150	CO
1º	Energy Production	150	CO
1º	Water Chemistry	150	CO
1º	Drinking and Process Water Treatment	150	CO
1º	Waste Management	150	CO
1º	Urban Solid Waste Management	150	CO
1º	Industrial Waste Management	150	CO
1º	Dangerous Waste	150	CO

Tere Guevara Navarro
Dean

tech technological university

*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

Water Engineering and Urban Waste Management

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

Professional Master's Degree

Water Engineering and Urban Waste Management

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