

# Postgraduate Certificate Hydroelectric Energy Systems





## Postgraduate Certificate Hydroelectric Energy Systems

- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Global University
- » Credits: 6 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtute.com/us/engineering/postgraduate-certificate/hydroelectric-energy-systems](http://www.techtute.com/us/engineering/postgraduate-certificate/hydroelectric-energy-systems)

# Index

01

Introduction

---

*p. 4*

02

Objectives

---

*p. 8*

03

Course Management

---

*p. 12*

04

Structure and Content

---

*p. 16*

05

Methodology

---

*p. 20*

06

Certificate

---

*p. 28*

# 01

# Introduction

Renewable Energies are undoubtedly on the rise and this market increasingly requires specialized professionals who know how to manage them and choose those that are best in each case. Aware of this, TECH professionals have designed this very complete program whose main objective is to provide engineers with the knowledge and trends in the latest technologies available in the field of Hydraulic Energy. Likewise, during the program, knowledge of its current use will be addressed in order to provide professionals with a global vision on the subject, which will help them to work in this field with greater guarantees of success.







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*Hydraulic Energies, although their use dates back to antiquity, are still in use and the professional to be constantly up to date"*

The renewable energy sector is in full international expansion and is increasingly demanding engineers specialized in this field. Therefore, the best professionals in the sector have designed for TECH this Postgraduate Certificate that aims to train professionals with advanced knowledge in everything that encompasses the renewable energy sector to increase their working position in today's energy market.

Therefore, this Postgraduate Certificate will provide a historical approach to the use and exploitation of Hydraulic Energy, which has been used since ancient times to exploit this energy resource and use it for different purposes. In this sense, students will be instructed in its use to produce electricity, which is based on the transformation, thanks to a hydraulic turbine, of the kinetic energy of a water current into mechanical rotational energy, and of this into electrical energy by means of a generator.

During the specialization, the topic of mini and micro hydropower plants will also be discussed, which are smaller, do not require the construction of large dams and have a much lower environmental impact than that associated with traditional hydropower, are easy and cheap to install and have greater growth possibilities. This will be of great help in understanding how to adapt the use of Hydropower according to each specific case and will provide skills to the engineering professional.

Finally, the concept of electricity generated from hydroelectric power and its high quality will be addressed, which is an irreplaceable technology, in the sense that, as its production can be adjusted in a very short time to the variations of the demand curve, it contributes greatly to the improvement in the operation and control of the electric power system.

This **Postgraduate Certificate in Hydroelectric Energy Systems** contains the most complete and up-to-date educational program on the market. The most important features of the program include.

- ◆ Practical case studies presented by experts
- ◆ 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



*A complete update that will provide you with the working capacity of a specialist in the field"*

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*Get to know the global functioning of Hydraulic Energy and bring new competences to your professional profile with this program"*

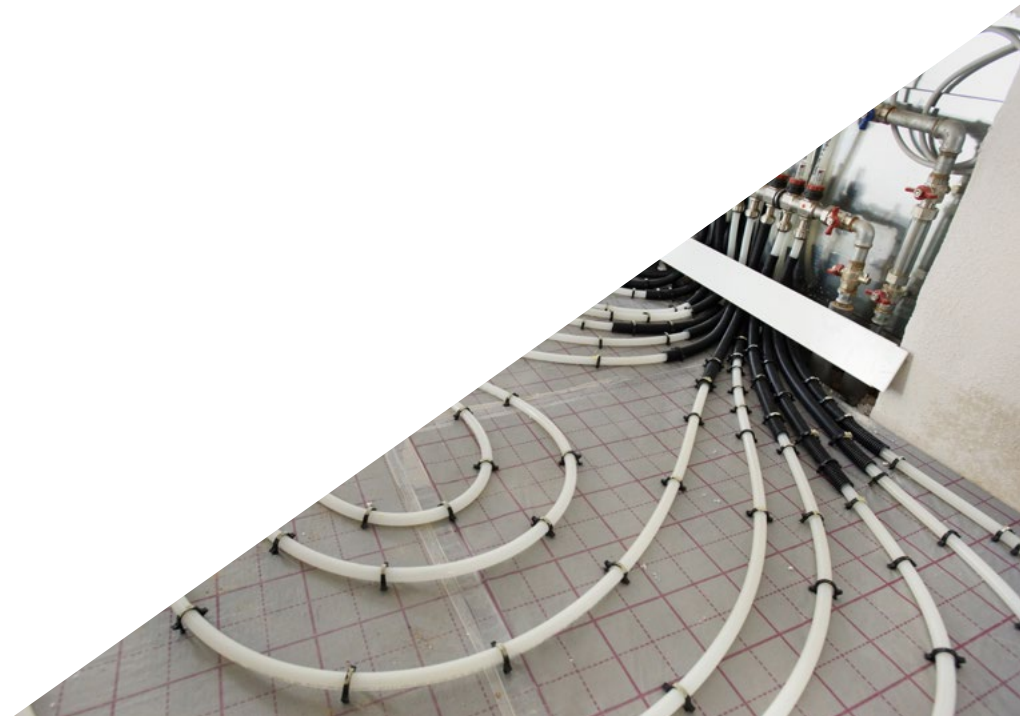
The program's teaching staff includes professionals from the sector who contribute their work experience to this training program, as well as renowned specialists from leading societies and prestigious universities.

The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide an immersive training program designed to train in real situations.

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

*You will have innovative didactic materials and resources that will facilitate the learning process and the retention of the contents learned for a longer period of time*

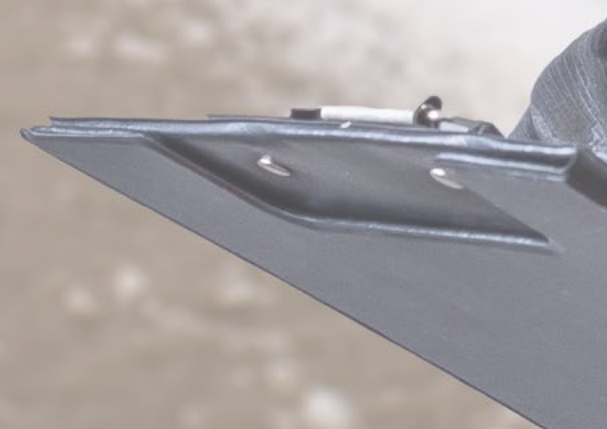
*A 100% online program that will allow you to combine your studies with the rest of your daily activities*



# 02

# Objectives

TECH has designed this Postgraduate Certificate with the aim of training engineering professionals to be able to design, implement and work on Renewable Energy projects, knowing in depth everything related to this industry and the aspects of sustainability and climate change in the international arena that directly affect it. To this end, specific aspects of energy systems that stand out for their enormous importance in today's business landscape will be addressed, and for which large corporations are increasingly demanding competent engineers with solid specialized training.





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*With this program, TECH has only one goal: to help you grow in your profession and become a prestigious engineer"*



## General Objectives

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- ◆ Conduct an exhaustive analysis of current legislation and the energy system, from electricity generation to the consumption phase, as well as the fundamental production factor in the economic system and the functioning of the different energy markets
- ◆ Identify the different phases required for the feasibility and implementation of a Renewable Energy project and its commissioning
- ◆ Analyze in depth the different technologies and manufacturers available to create renewable energy exploitation systems, and distinguish and critically select those qualities based on costs and their actual application
- ◆ Identify the operation and maintenance tasks required for the correct operation of Renewable Energy installations
- ◆ Size facilities for the application of all energy sources of lesser implementation such as mini-hydro, geothermal, tidal and clean vectors
- ◆ Manage and analyze relevant bibliography on a topic related to one or some of the fields of Renewable Energies, published both nationally and internationally
- ◆ Adequately interpret society's expectations on the environment and climate change, and engage in technical discussions and critical opinions on energy aspects of sustainable development, as skills that Renewable Energy professionals should have
- ◆ Integrate knowledge and face the complexity of formulating reasoned judgments in the field applicable to a company in the Renewable Energy sector
- ◆ Master the different existing solutions or methodologies for the same problem or phenomenon related to Renewable Energies and develop a critical spirit knowing the practical limitations







## Specific Objectives

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- ◆ Make an in-depth analysis of hydrology and the management of water resources related to hydropower
- ◆ Implementing environmental management mechanisms in the field of hydroelectric energy
- ◆ Identify and select the necessary equipment for different types of hydroelectric developments
- ◆ Design, dimension and operate of hydroelectric power plants
- ◆ Master the elements that make up hydroelectric works and facilities, both in technical and environmental aspects, as well as those connected to operation and maintenance



*A program design based on practical cases that will teach you how to act in real situations in the daily practice of your profession"*

# 03

# Course Management

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





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

## International Guest Director

Varun Sivaram, Ph.D. is a **physicist, bestselling author** and leading **clean energy technology** expert with a career spanning the corporate, public and academic sectors. In fact, he has served as **Director of Strategy and Innovation at Orsted**, one of the world's leading renewable energy companies with the largest offshore wind power portfolio.

In addition, Dr. Sivaram has served in the U.S. Biden-Harris administration, as Director General for Clean Energy and Innovation, as well as Senior Advisor to Secretary John Kerry, the Special Presidential Climate Envoy to the White House. In this capacity, he was the creator of the First Movers Coalition, a key initiative to foster clean energy innovation globally.

In the academic field, he has directed the Energy and Climate Program at the Council on Foreign Relations. And his influence in the formulation of government policies to support innovation has been remarkable, having advised leaders such as the mayor of Los Angeles and the governor of New York. He has also been recognized as a Young Global Leader by the World Economic Forum.

In addition, Dr. Varun Sivaram has published several influential books, including "Taming the Sun: Innovations to Harness Solar Energy and Power the Planet" and "Energizing America: A Roadmap to Launch a National Energy Innovation Mission", both of which have received accolades from prominent leaders such as Bill Gates. In fact, his contribution to the clean energy field has been recognized internationally, being included in the TIME 100 Next list and incorporated by Forbes in its Forbes 30 Under 30 list in Law and Policy, among other major accolades.



## Dr. Sivaram, Varun

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- Director of Strategy and Innovation at Ørsted, United States
- Managing Director, Clean Energy and Innovation // Senior Advisor to Secretary John Kerry, U.S. Special Presidential Climate Envoy at The White House
- Chief Technology Officer at ReNew Power
- Strategic Advisor for Energy and Finance on Reforming the Energy Vision at the New York Governor's Office
- Ph.D. in Condensed Matter Physics from Oxford University
- B.S. in Engineering Physics and International Relations from Stanford University.
- Awards: Forbes 30 Under 30, awarded by Forbes magazine  
Grist Top 50 Leaders in Sustainability, awarded by Grist magazine  
MIT TR Top 35 Innovators, awarded by MIT Tech Review Magazine  
TIME 100 Next Most Influential People in the World, awarded by TIME Magazine
- Young Global Leader, awarded by the World Economic Forum
- Member of: Atlantic Council ,Breakthrough Institute , Aventurine Partners



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

## Guest Director



### Mr. De la Cruz Torres, José

- ◊ Degree in Physics and Industrial Electronics Engineering, University of Seville
- ◊ Master's Degree in Operations Management by EADA Business School Barcelona
- ◊ Master's Degree in Industrial Maintenance Engineering, University of Huelva, Spain
- ◊ Railway Engineering, UNED
- ◊ South head of the appraisal, assessment and valuation of technologies and processes of Renewable Energy generation facilities at RTS International Loss Adjusters

## Codirector



### Lillo Moreno, Javier

- ◊ Telecommunications Engineer, University of Seville
- ◊ Master's Degree in Project Management and Master's Degree in Big Data & Business Analytics, School of Industrial Organization (EOI)
- ◊ With an extensive professional career in the Renewable Energy sector of more than 15 years
- ◊ Has managed the O&M areas of several companies with high visibility in the sector





## Professors

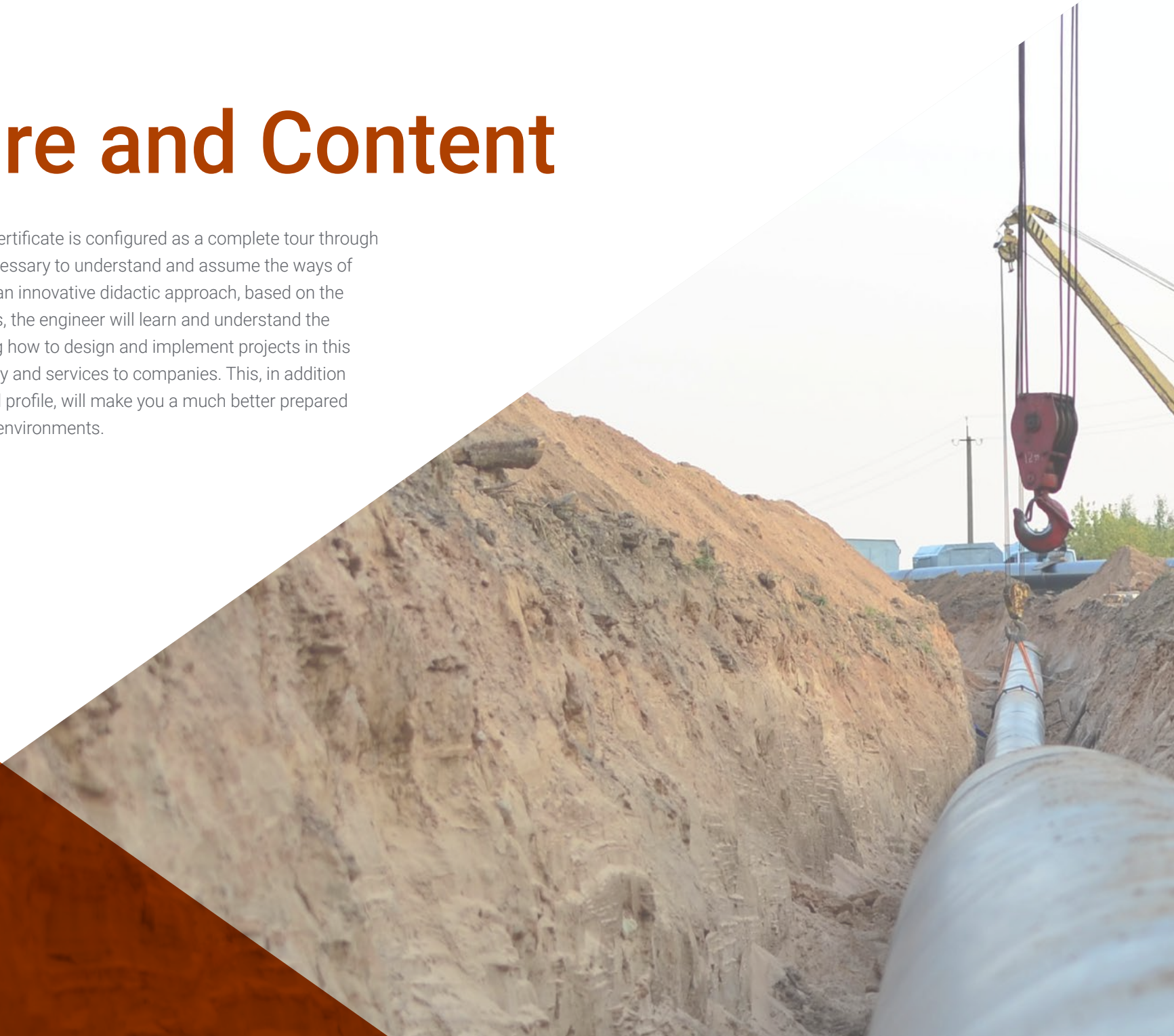
### Álvarez Morón, Gregorio

- ◆ Agronomist Engineer specializing in Rural Engineering
- ◆ Lecturer in collaboration with WATS Ingeniería, a Spanish company specialized in water, agronomy, energy and environmental engineering
- ◆ With more than 15 years of experience in public and private companies

# 04

## Structure and Content

The syllabus of the Postgraduate Certificate is configured as a complete tour through each and every one of the skills necessary to understand and assume the ways of working in this field. Thus, through an innovative didactic approach, based on the practical application of the contents, the engineer will learn and understand the functioning of wind energy, knowing how to design and implement projects in this sense, providing high levels of safety and services to companies. This, in addition to adding value to your professional profile, will make you a much better prepared professional to work in a variety of environments.



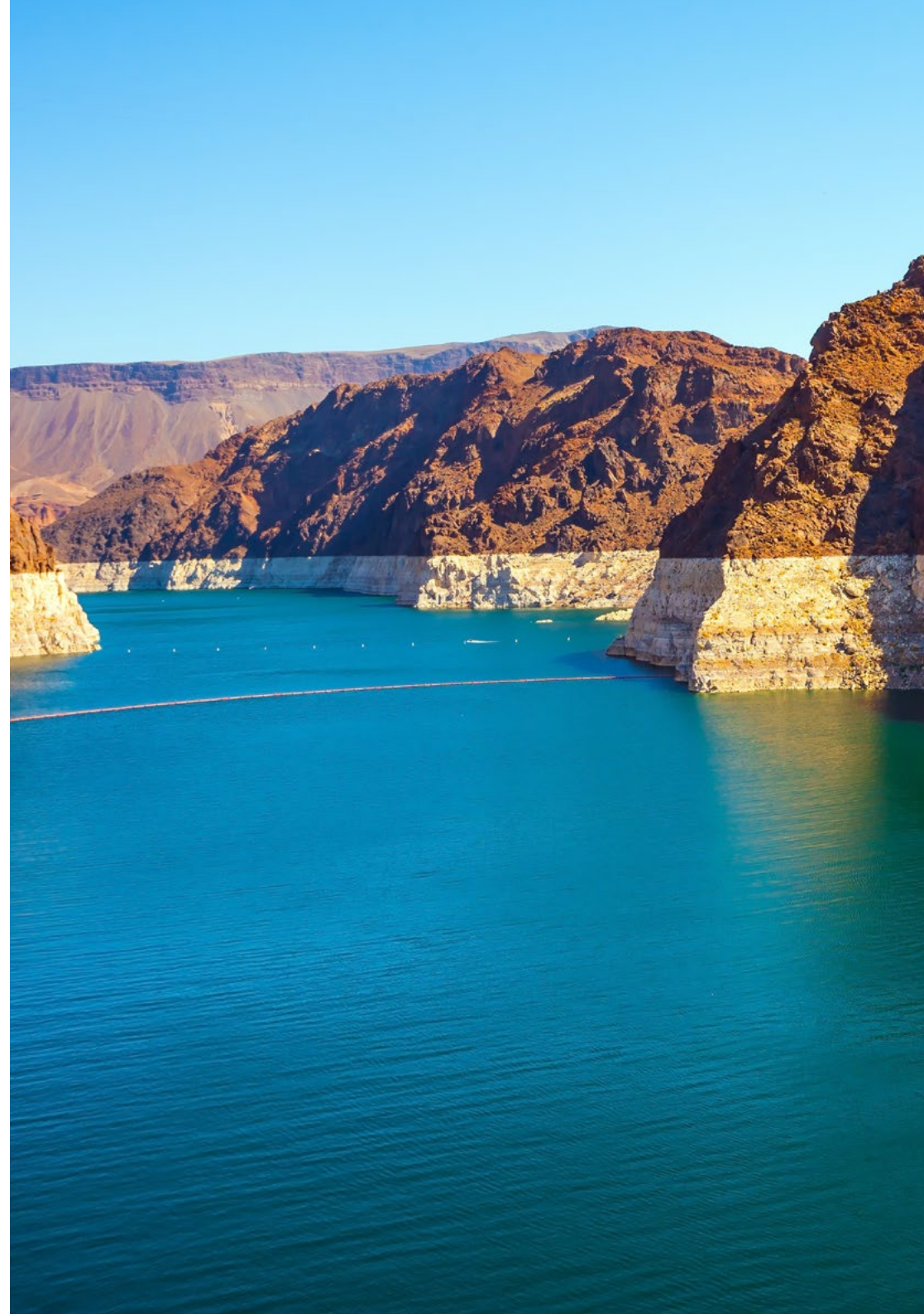


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*A comprehensive syllabus focused on acquiring knowledge and converting it into real skills, created to propel you to excellence”*

## Module 1. Hydroelectric Energy Systems

- 1.1. Water, a Natural Resource. Hydroelectric Energy
  - 1.1.1. Water on Earth. Flows and Uses of Water
  - 1.1.2. Water Cycle
  - 1.1.3. Early Uses of Hydroelectric Energy
- 1.2. From Hydroelectric Energy to Hydropower
  - 1.2.1. Origin of Hydroelectric Utilization
  - 1.2.2. Hydroelectric Power Plant
  - 1.2.3. Current Utilization
- 1.3. Types of Hydroelectric Power Plants by Capacity
  - 1.3.1. Large Hydroelectric Power Plant
  - 1.3.2. Mini and Micro Hydroelectric Power Plants
  - 1.3.3. Conditions and Future Perspectives
- 1.4. Types of Hydroelectric Power Plants by Layout
  - 1.4.1. Run-of-River Power Plant
  - 1.4.2. Flowing Power Plant
  - 1.4.3. Conduction Power Plant
  - 1.4.4. Pumped Storage Hydroelectric Power Plant
- 1.5. Hydraulic Elements of a Power Plant
  - 1.5.1. Intake and Water Intake Structure
  - 1.5.2. Forced Conduction Connection
  - 1.5.3. Discharge Conduction
- 1.6. Electromechanical Elements of a Power Plant
  - 1.6.1. Turbine, Generator, Transformer, and Electrical Line
  - 1.6.2. Regulation, Control, and Protection
  - 1.6.3. Automation and Telecontrol
- 1.7. The Key Element: The Hydroelectric Turbine
  - 1.7.1. Operation
  - 1.7.2. Types
  - 1.7.3. Selection Criteria







- 1.8. Utilization Calculation and Sizing
  - 1.8.1. Available Power: Flow and Head
  - 1.8.2. Electrical Power
  - 1.8.3. Efficiency. Production
- 1.9. Administrative and Environmental Aspects
  - 1.9.1. Benefits and Drawbacks
  - 1.9.2. Administrative Procedures. Concessions
  - 1.9.3. Environmental Impact
- 1.10. Design and Project of a Mini Hydroelectric Power Plant
  - 1.10.1. Mini Hydroelectric Power Plant Design
  - 1.10.2. Cost Analysis
  - 1.10.3. Economic Feasibility Analysis



*A unique learning opportunity that will catapult your career to the next level  
Don't let it slip away"*

05

# 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.





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*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.

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*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.*



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

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.





06

# Certificate

The Postgraduate Certificate in Hydroelectric Energy Systems guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Global University.





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*Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork”*

This program will allow you to obtain your **Postgraduate Certificate in Hydroelectric Energy Systems** 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: **Postgraduate Certificate in Hydroelectric Energy Systems**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**



\*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.



future  
health confidence people  
education information tutors  
guarantee accreditation teaching  
institutions technology learning  
community commitment  
personalized service innovation  
knowledge present quality  
development language  
virtual classroom



## Postgraduate Certificate Hydroelectric Energy Systems

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