

Postgraduate Certificate

Production and Generation of Electricity through Hydroelectric Power Plants





Postgraduate Certificate Production and Generation of Electricity through Hydroelectric Power Plants

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

Website: www.techtute.com/us/engineering/postgraduate-certificate/production-generation-electricity-hydroelectric-power-plants

Index

01

Introduction

p. 4

02

Objectives

p. 8

03

Course Management

p. 12

04

Structure and Content

p. 18

05

Methodology

p. 22

06

Certificate

p. 30

01

Introduction

This program describes the water resources associated with hydroelectric power plants and the different uses they have for the production of electricity. Thus, the operation and how the different variables affect the design for the productivity of electricity in this type of power plants are contemplated. Likewise, it addresses the influence of the different types of dams used for the creation of water reservoirs and details in depth the existing technology in pumped-storage power plants. In turn, it includes the guidelines for working on the generation voltage, turbine speed, the associated dynamic response and the corresponding coupling to the electrical grid. Due to their enormous potential for electric power generation, the student will also have a part dedicated to mini-hydroelectric power plants.



“

You will learn how to select the turbine to be installed in a hydroelectric power plant together with the knowledge of the different techniques that currently exist in the market together with the best professionals in the sector and counting on a quality program, TECH's guarantee"

This program describes the water resources associated with this type of power plants and the different uses they have for the production of electricity. Thus, the operation and how the different variables affect the design for the productivity of electricity in this type of power plants are contemplated.

The student will learn to select the type of turbine to be installed in this type of power plants together with the knowledge of the different techniques available in the market. It will also analyze the influence of the different types of dams used for the creation of water reservoirs. In addition, the existing pumped-storage power plant technology is detailed in depth.

Due to its importance, TECH will pay special attention to the civil works equipment required for this type of infrastructure. Learning, in the same way, to discriminate the operation of the electromechanical and electrical equipment used in this type of plants, and how it affects productivity.

In addition, regulation and control is very important in this type of power plants, so we will study in depth the guidelines to work on the generation voltage, the turbine speed, the associated dynamic response and the corresponding coupling to the power grid. Finally, due to their enormous potential for electric power generation, mini-hydroelectric power plants will be addressed, so that the student will have a complete knowledge of hydroelectric power production and generation.

In addition, as it is a 100% online Postgraduate Certificate, it provides the student with the ease of being able to take 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 in line with the current times with all the guarantees to position the professional in a highly demanded area in continuous change, in line with the SDGs promoted by the UN.

This **Postgraduate Certificate in Production and Generation of Electricity Through Hydroelectric Power Plants** contains the most complete and up-to-date program on the market. The most important features of the program include:

- ◆ The development of case studies presented by experts in electrical engineering
- ◆ The deepening in Energy Resources Management
- ◆ The graphic, schematic, and eminently practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- ◆ Practical exercises where the self-assessment process can be carried out to improve learning
- ◆ 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



Thanks to this program, you will know how to identify water resources and optimize the type of water use with the professionalism required by the sector"

“

Take this TECH course and you will delve into how electricity generation technology works and what variables allow you to optimize its productivity”

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 experts.

Move up the career ladder! Controlling the operation of hydroelectric power plants with pumping techniques is a responsible function that you will learn with this Postgraduate Certificate.

You will learn in depth how to deal in detail with the technologies and techniques of mini-hydraulic plants.



02 Objectives

The Postgraduate Certificate in Production and Generation of Electric Energy through Hydraulic Power Plants is aimed at providing the student with the necessary skills regarding this energy system, with the latest updates and the most innovative aspects of the sector. In this way, we propose a specific and complete syllabus with quality content that, together with the guidance of experts, will enable the professional to achieve the following objectives.





“

You will know how to break down the different typologies and functionality of dams for the accumulation of water resources like a real expert"



General Objectives

- ◆ Interpret the investments and feasibility of power generation plants
- ◆ Discover the potential business opportunities offered by electricity generation infrastructures
- ◆ Delve into the latest trends, technologies and techniques in electric power generation
- ◆ Identify the components necessary for the correct functionality and operation of the facilities that make up the power generation plants
- ◆ Establish preventive maintenance plans that ensure and guarantee the proper operation of the power plants, taking into account human and material resources, the environment and the most rigorous quality standards
- ◆ Successfully manage maintenance plans for power generation plants
- ◆ Analyze the different productivity techniques existing in power generation plants, taking into account the particular characteristics of each facility
- ◆ Select the most appropriate contracting model according to the characteristics of the power plant to be built





Specific Objectives

- ◆ Identify water resources and optimize the type of water resource use
- ◆ Delve into the functioning of the power generation technique and which variables allow to optimize its productivity
- ◆ Selecting the most suitable generation turbine according to the current state of technology
- ◆ Breakdown of the different typologies and functionality of dams for the accumulation of water resources
- ◆ Control the operation of hydroelectric power plants using pumping techniques
- ◆ Analyze the civil works equipment necessary to undertake this type of project
- ◆ Regulating and controlling the production of electrical energy in this type of power plant
- ◆ Deal in detail with the technologies and techniques of mini-hydraulic plants

“

With this program you will successfully analyze the civil works equipment necessary to undertake projects related to hydroelectric power plants”

03

Course Management

TECH University, in its maxim of offering an elite education for all, has renowned teachers, professionals in the sector so that the student acquires a solid knowledge in the production and generation of electricity through hydroelectric power plants today. Therefore, this program has a highly qualified professional with extensive experience in the industry, whose trajectory has positioned them as great executives within the sector. In this way, it will offer the best tools to the student in the development of their skills during the course, with the guarantees required to specialize in a sector in full update and innovation, so it will reflect on the different energy production technologies with accuracy and precision to apply it in the transition to a quality and sustainable industry.



“

Boost your career with the best in the hydropower industry. Make it possible thanks to this TECH Program”

International Guest Director

Adrien Couton is a prominent **international leader in sustainability**, known for his optimistic approach towards transitions to zero net emissions. As such, with extensive **consulting** and **executive management** experience in **strategy and sustainability**, he has established himself as a truly creative problem solver and strategist focused on building high-performing organizations and teams that contribute to keeping **global warming** below 1.5°C.

As such, he has served as Vice President of Sustainability Solutions at ENGIE Impact, where he has helped large public and private entities plan and execute their transitions to **sustainability** and **zero carbon**. Notably, he has also led strategic partnerships and the commercial deployment of digital and advisory solutions to help clients achieve these goals. He has also been **Director of Firefly, Paris**, an independent **sustainability** consultancy.

Adrien Couton's career has also developed at the convergence of **private sector** initiatives and **sustainability**. Indeed, he has worked as **Engagement Manager** at **McKinsey & Company**, supporting European utilities, and as **Partner** and **Sustainability Practice Director** at **Dalberg**, a consulting firm focused on **emerging markets**. He has also been **Managing Director** of **India's largest decentralized water systems operator, Naandi Danone JV**, and has held the position of **Private Equity Analyst** at **BNP Paribas**.

To this must be added his time as **Global Portfolio Manager** at **Acumen Fund, New York**, where he has developed two investment portfolios (**Water and Agriculture**) in a pioneering social impact investment fund, applying a VC approach to **sustainability**. In this regard, Adrien Couton has proven to be a dynamic, creative and innovative leader, committed to the fight against **climate change**.



Mr. Couton, Adrien

- ♦ Vice President of Sustainability Solutions at ENGIE Impact, San Francisco, United States
- ♦ Director at Firefly, Paris
- ♦ Partner and Head of Sustainability Practice at Dalberg, India
- ♦ Executive Director at Naandi Danone JV, India
- ♦ Global Portfolio Manager, Water and Agriculture Portfolios at Acumen Fund, New York
- ♦ Engagement Manager at McKinsey & Company, Paris
- ♦ Consultant at The World Bank, India
- ♦ Private Equity Analyst at BNP Paribas, Paris
- ♦ Master's Degree in Public Administration at Harvard University, Harvard University
- ♦ Master's Degree in Political Science, Sorbonne University, Paris
- ♦ Master's Degree in Business Administration, Ecole d'Etudes Supérieures de Commerce (HECH) Paris

“

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

Management



Mr. Palomino Bustos, Raúl

- ◆ Director at the Institute for Technical Training and Innovation
- ◆ International Consultant in Engineering, Construction and Maintenance of Energy Production Plants for the company RENOVETEC
- ◆ Technological/training expert recognized and accredited by the State Public Employment Service
- ◆ Industrial Engineer, University of Carlos III in Madrid
- ◆ Industrial Technical Engineer by the EUITI of Toledo
- ◆ Master's Degree in Occupational Risk Prevention from the Francisco de Vitoria University
- ◆ Master's Degree in Quality and Environment by the Spanish Quality Association



04

Structure and Content

The structure of the contents of this program has been designed by engineering professionals focused on the production and generation of electricity through hydroelectric power plants, so that they have poured their knowledge and experience into a complete and updated syllabus, oriented towards the use of water resources in the most sustainable way possible. The syllabus includes the most updated information on the market, with all the knowledge that the student who wants to go deeper into this type of energy must master. Therefore, this curriculum is essential to move towards a quality, more sustainable industry, which will enable the professional to be competent in their day-to-day work in this sector.





“

You will learn about the latest trends in hydroelectric power plants, betting on an industry that takes advantage of water resources aimed at sustainability”

Module 1. Hydraulic Power Plants

- 1.1. Water Resources
 - 1.1.1. Fundamentals
 - 1.1.2. Use per Dam
 - 1.1.3. Use by Derivation
 - 1.1.4. Mixed Use
- 1.2. Operation
 - 1.2.1. Installed Power
 - 1.2.2. Produced Energy
 - 1.2.3. Height of the Waterfall
 - 1.2.4. Flow Rate
 - 1.2.5. Components
- 1.3. Turbines
 - 1.3.1. Pelton
 - 1.3.2. Francis
 - 1.3.3. Kaplan
 - 1.3.4. Michell-Banky
 - 1.3.5. Turbine Selection
- 1.4. Dams
 - 1.4.1. Fundamental Principles
 - 1.4.2. Typology
 - 1.4.3. Composition and Operation
 - 1.4.4. Drainage
- 1.5. Pumping Power Plants
 - 1.5.1. Operation
 - 1.5.2. Technology
 - 1.5.3. Advantages and Disadvantages
 - 1.5.4. Pumped Storage Plants





- 1.6. Civil Works Equipment
 - 1.6.1. Water Retention and Storage
 - 1.6.2. Controlled Flow Evacuation
 - 1.6.3. Elements of Water Conduction
 - 1.6.4. Water Hammer
 - 1.6.5. Equilibrium Chimney
 - 1.6.6. Turbine Chamber
- 1.7. Electromechanical Equipment
 - 1.7.1. Gratings and Grille Cleaners
 - 1.7.2. Opening and Closing of the Water Passage
 - 1.7.3. Hydraulic Equipment
- 1.8. Electrical Equipment
 - 1.8.1. Generator
 - 1.8.2. Opening and Closing of the Water Passage
 - 1.8.3. Asynchronous Start-up
 - 1.8.4. Starting by Auxiliary Machine
 - 1.8.5. Variable Frequency Starting
- 1.9. Regulation and Control
 - 1.9.1. Generation Voltage
 - 1.9.2. Speed of the Turbine
 - 1.9.3. Dynamic Response
 - 1.9.4. Network Coupling
- 1.10. Minihydraulics
 - 1.10.1. Water Intake
 - 1.10.2. Cleaning of Solids
 - 1.10.3. Conduction
 - 1.10.4. Pressure Chambers
 - 1.10.5. Pressure Pipes
 - 1.10.6. Machinery
 - 1.10.7. Suction Pipe
 - 1.10.8. Output Channel

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.





“

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.



06

Certificate

The Postgraduate Certificate in Production and Generation of Electricity Through Hydroelectric Power Plants guarantees you, in addition to the most rigorous and up-to-date training, access to a Postgraduate Certificate issued by TECH Technological University.





“

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

This **Postgraduate Certificate in Production and Generation of Electricity through Hydroelectric Power Plants** contains the most complete and up-to-date program on the market

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

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

Title: **Postgraduate Certificate in Production and Generation of Electricity through Hydroelectric Power Plants**

Official N° of hours: **150 h.**



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

future

health confidence people

education information tutors

guarantee accreditation teaching

institutions technology learning

community commitment

tech technological
university

personalized service innovation

knowledge present
online tra
velopment languages

classroom

Postgraduate Certificate
Production and Generation
of Electricity through
Hydroelectric Power Plants

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

Postgraduate Certificate

Production and Generation of Electricity through Hydroelectric Power Plants