Postgraduate Diploma

Hydrogen Facility Design

tech global university

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Postgraduate Diploma
Hydrogen Facility Design

- Modality: **online**
- Duration: **6 months**
- Certificate: **TECH Global University**
- Credits: **18 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/us/engineering/postgraduate-diploma/postgraduate-diploma-hydrogen-facility-design**

Index

01

Introduction

In the race to achieve a vehicle that significantly reduces CO2 emissions, major automotive companies have pushed the use of the hydrogen fuel cell car. This transforms the current landscape not only of transportation, but also of refueling stations, which are implementing different strategies in the design of hydrogen storage and compression, depending on the particular use and needs. In this line, it is essential that engineering professionals are aware of the latest developments in this sector, as well as the different solutions to the existing problems in the production or distribution of hydrogen. For this reason, this 100% online program is born, which offers the most advanced knowledge in Hydrogen Facility Design. In addition, with a high quality multimedia content, developed by a specialized teaching team with experience in the hydrogen industry.

With this 100% online Postgraduate Diploma you will become a specialist in Hydrogen Facility Design"

Green hydrogen is proving in recent years to be an effective alternative for reducing CO2 emissions in vehicles or industrial sectors. This has led to the promotion of projects, especially in the automotive sector, that offer a viable mobility option, which requires not only changes in vehicle design, but also in refueling stations.

In this sense, the use of hydrogen and its possibilities are much more visible to the population in this sector, although the end uses are multiple, favoring the industrial, chemical or semiconductor sectors, for example. A scenario of innovation, which requires, on the part of engineering professionals, a deep knowledge to further boost this sector. In this line, TECH offers this Postgraduate Diploma in Hydrogen Facility Design in which provides the most advanced and current knowledge in this area.

A program, where students will have access to a theoretical and practical agenda, which will lead them to delve into the use of hydrogen as a raw material in industrial processes, the many possibilities around their end uses, as well as the technical and regulatory elements required for the creation of facilities. All this with multimedia content of quality elaborated by a specialized faculty in the sector.

Graduates will also be able to reduce the long hours of memorization and study, thanks to the *Relearning* method used by TECH in all its courses. The system, based on the reiteration of content, will allow students to acquire learning in a more natural and progressive way.

Therefore, engineering professionals have an excellent opportunity to advance their careers through a 100% online university education, which they can study whenever and wherever they wish. All you need is an electronic device (computer, tablet or cell phone) with an Internet connection to access, at any time, the contents of the virtual campus. In addition, they have the freedom to distribute the teaching load according to their needs, making this university education easily compatible with the most demanding responsibilities.

This **Postgraduate Diploma in Hydrogen Facility Design** contains the most complete and up-to-date scientific program on the market. The most important features include:

- Case studies presented by engineering experts
- The graphic, schematic and practical contents of the book provide technical and practical information on those 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

Stand out in a sector that demands highly qualified engineering professionals for the development of hydrogen facility projects"

You are in front of an academic option that gives you the opportunity to access whenever you want to this course syllabus, without classes with fixed schedules. Enroll now"

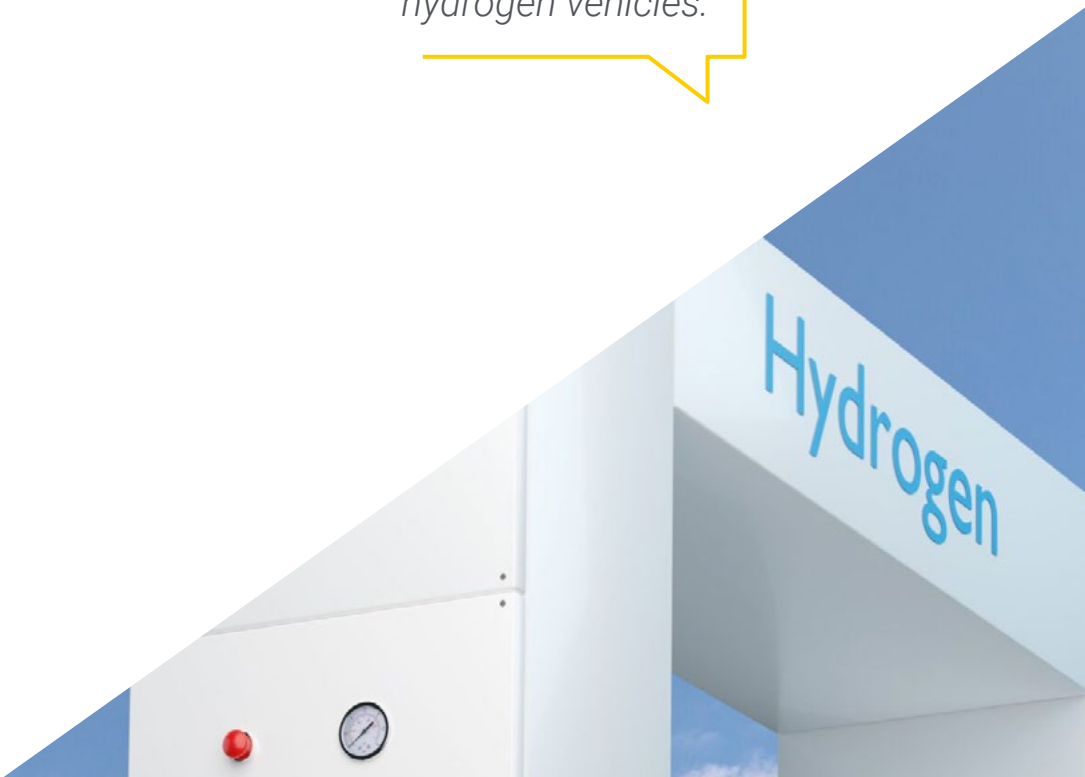
This program will enable you to learn about the main issues involved in the replacement of natural gas by hydrogen.

The multimedia capsules will lead you to a more dynamic understanding of the types of refueling stations for hydrogen vehicles.

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

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

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



02

Objectives

This Postgraduate Diploma has been designed to provide engineering professionals with the most advanced knowledge in Hydrogen Facility Design. Therefore, at the end of the 450 teaching hours, students will be able to develop and promote projects, master the existing regulations for hydrogen vehicle refueling stations or know the current state of deployment of hydrogen refueling stations. The case studies facilitated by the teaching team will be very useful in achieving these goals.

You will be able to successfully develop projects that improve the current storage, transport and distribution of hydrogen"

General Objectives

- In-depth analysis of the technical-economic analysis of large-scale hydrogen logistics
- Determine the relationship between hydrogen and its use in refineries and its use in steel mills
- Raise students' awareness of the need for natural gas substitution
- Master the concepts of safety and associated regulations
- Specialize students in modeling the operation of a hydrogen refueling station

This university course will give you an insight into the safety and regulations applicable to refueling stations for hydrogen vehicles"

Specific Objectives

Module 1. Hydrogen Storage, Transportation and Distribution

- Develop the different possibilities for hydrogen storage, transportation and distribution
- Determine the different ways of transporting, storing and distributing hydrogen
- Analyze the possibilities and limitations of hydrogen export
- In-depth analysis of the technical-economic analysis of large-scale hydrogen logistics

Module 2. Hydrogen End-Uses

- Train students in e-Fuels production processes
- Specialize students in hydrogen integration in fuel cell vehicles
- Analyze the idiosyncrasies of the hydrogen-industry relationship
- Examine the Haber-Bosch process and methanol production in depth
- Determine the relationship between hydrogen and its use in refineries and its use in steel mills
- Raise students' awareness of the need for natural gas substitution

Module 3. Hydrogen Vehicle Refueling Stations

- Establish the different typologies of hydrogen refueling stations
- Establish the design parameters
- Compile storage strategies at different pressure levels
- Analyze dispensing and its associated problems
- Master the concepts of safety and associated regulations
- Specialize the student in modeling the operation of a hydrogen refueling station

03

Structure and Content

TECH uses the *Relearning* system in all its program, with which students can progress in a much more natural way, even reducing the hours of study. Therefore, through this system, the graduates will acquire advanced learning about the forms of storage, transport and distribution of hydrogen, the final uses and the design of hydrogen facilities in different industries. All this, in addition, through multimedia teaching resources that can be easily accessed 24 hours a day, from any electronic device with an Internet connection.

A study plan with a theoretical-practical focus on hydrogen installations, which will lead you to improve your professional career"

Module 1. Hydrogen Storage, Transportation and Distribution

1.1. Hydrogen Storage, Transportation, and Distribution Forms
- 1.1.1. Hydrogen Gas
- 1.1.2. Liquid Hydrogen
- 1.1.3. Hydrogen Storage in Solid State

1.2. Hydrogen Compression
- 1.2.1. Hydrogen Compression. Necessity
- 1.2.2. Problems Associated with the Compression of Hydrogen
- 1.2.3. Equipment

1.3. Gaseous State Storage
- 1.3.1. Problems Associated with Hydrogen Storage
- 1.3.2. Types of Storage Tanks
- 1.3.3. Storage Tank Capacities

1.4. Transportation and Distribution in Gaseous State
- 1.4.1. Transportation and Distribution in Gaseous State
- 1.4.2. Distribution by Road
- 1.4.3. Use of the Distribution Network

1.5. Hydrogen Storage, Transportation and Distribution as Liquid
- 1.5.1. Process and Conditions
- 1.5.2. Equipment
- 1.5.3. Current State

1.6. Storage, Transportation and Distribution as Methanol
- 1.6.1. Process and Conditions
- 1.6.2. Equipment
- 1.6.3. Current State

1.7. Storage, Transportation and Distribution as Green Ammonia
- 1.7.1. Process and Conditions
- 1.7.2. Equipment
- 1.7.3. Current State

1.8. Storage, Transportation and Distribution as LOHC (Liquid Organic Hydrogen)
- 1.8.1. Process and Conditions
- 1.8.2. Equipment
- 1.8.3. Current State

1.9. Hydrogen Export
- 1.9.1. Hydrogen Export. Necessity
- 1.9.2. Green Hydrogen Production Capabilities
- 1.9.3. Transport Technical Comparison

1.10. Comparative Technical-Economic Analysis of Alternatives for Large Scale Logistics
- 1.10.1. Cost of Hydrogen Export
- 1.10.2. Comparison between Different Means of Transportation
- 1.10.3. The Reality of Large-Scale Logistics

Module 2. Hydrogen End-Uses

2.1. Industrial Uses of Hydrogen
- 2.1.1. Hydrogen in Industries
- 2.1.2. Origin of Hydrogen Used in Industry. Environmental Impact
- 2.1.3. Industrial Uses in the Industry

2.2. Industries and Hydrogen e-Fuels Production
- 2.2.1. e-Fuel Versus Traditional Fuels
- 2.2.2. Classification of e-Fuels
- 2.2.3. Current Status of e-Fuels

2.3. Production of Ammonia: Haber-Bosch Process
- 2.3.1. Nitrogen in Figures
- 2.3.2. Haber-Bosch Process. Process and Equipment
- 2.3.3. Environmental Impact

2.4. Hydrogen in Refineries
- 2.4.1. Hydrogen in Refineries. Necessity
- 2.4.2. Hydrogen Used Today. Environmental Impact and Cost
- 2.4.3. Short- and Long-Term Alternatives

2.5. Hydrogen in Steel Mills
- 2.5.1. Hydrogen in Steel Mills. Necessity
- 2.5.2. Hydrogen Used Today. Environmental Impact and Cost
- 2.5.3. Short- and Long-Term Alternatives

2.6. Natural Gas Substitution: Blending
- 2.6.1. Mixing Properties
- 2.6.2. Problems and Required Improvements
- 2.6.3. Opportunities

2.7. Injection of Hydrogen into the Natural Gas Grid
- 2.7.1. Methodology
- 2.7.2. Current Capabilities
- 2.7.3. Problems

2.8. Hydrogen in Mobility: Fuel Cell Vehicles
- 2.8.1. Context and Necessity
- 2.8.2. Equipment and Schemes
- 2.8.3. Current State

2.9. Co-generation and Production of Electricity with Fuel Cells
- 2.9.1. Fuel Cell Production
- 2.9.2. Discharge to the Grid
- 2.9.3. Microgrids

2.10. Others Hydrogen End-Uses: Chemical, Semiconductor, Glass Industry
- 2.10.1. Chemical Industry
- 2.10.2. Semiconductor Industry
- 2.10.3. Glass Industry

Module 3. Hydrogen Refueling Stations

3.1. Hydrogen Refueling Corridors and Networks
- 3.1.1. Hydrogen Refueling Networks. Current State
- 3.1.2. Global Hydrogen Vehicle Refueling Station Deployment Targets
- 3.1.3. Cross-Border Hydrogen Refueling Corridors

3.2. Hydrogen Plant Types, Modes of Operation and Dispensing Categories
- 3.2.1. Hydrogen Refueling Station Types
- 3.2.2. Operating Modes of the Hydrogen Refueling Stations
- 3.2.3. Dispensing Categories According to Standards

3.3. Design Parameters
- 3.3.1. Hydrogen Refueling Station. Components
- 3.3.2. Design Parameters according to Hydrogen Storage Type
- 3.3.3. Design Parameters according to the Station's Target Use

3.4. Storage and Pressure Levels
- 3.4.1. Storage of Hydrogen Gas at Hydrogen Refueling Stations
- 3.4.2. Gas Storage Pressure Levels
- 3.4.3. Liquid Hydrogen Storage in Hydrogen Refueling Stations

3.5. Compression Stages
- 3.5.1. Hydrogen Compression. Necessity
- 3.5.2. Compression Technologies
- 3.5.3. Optimization

3.6. Dispensing and Precooling
- 3.6.1. Precooling according to Regulations and Vehicle Type. Necessity
- 3.6.2. Hydrogen Dispensing Cascade
- 3.6.3. Thermal Phenomena of Dispensing

3.7. Mechanical Integration
- 3.7.1. Refueling Stations with On-Site Hydrogen Production
- 3.7.2. Refueling Stations without Hydrogen Production
- 3.7.3. Modularization

3.8. Applicable Regulations
- 3.8.1. Safety Regulations
- 3.8.2. Hydrogen Quality Standards, Certificates
- 3.8.3. Civil Regulations

3.9. Preliminary Design of a Hydrogen Plant
- 3.9.1. Presentation of the Case Study
- 3.9.2. Development of the Case Study
- 3.9.3. Resolution

3.10. Cost Analysis
- 3.10.1. Capital and Operating Costs
- 3.10.2. Technical Characterization of a Hydrogen Refueling Station Operation
- 3.10.3. Technical-Economic Modeling

04

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

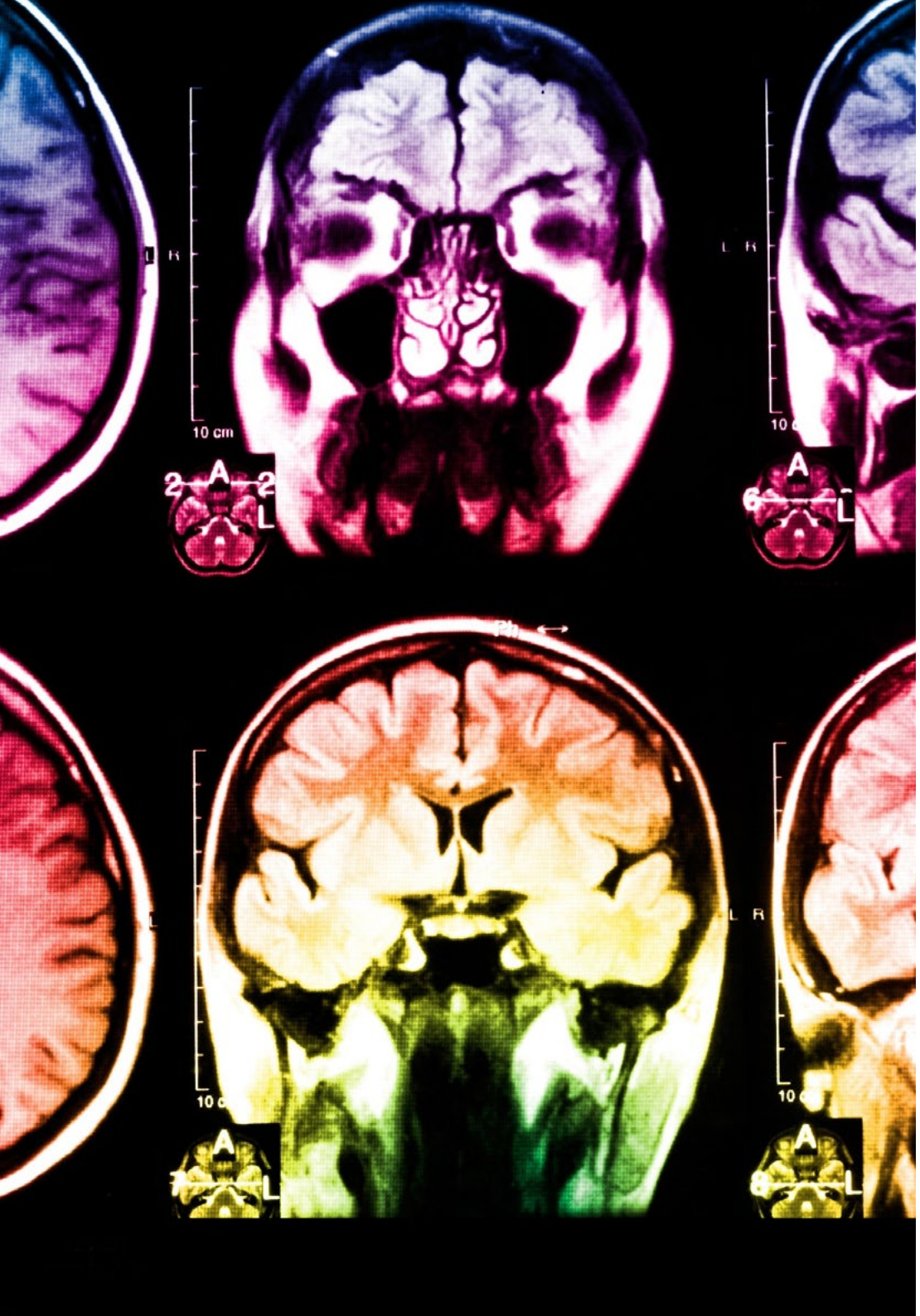
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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.

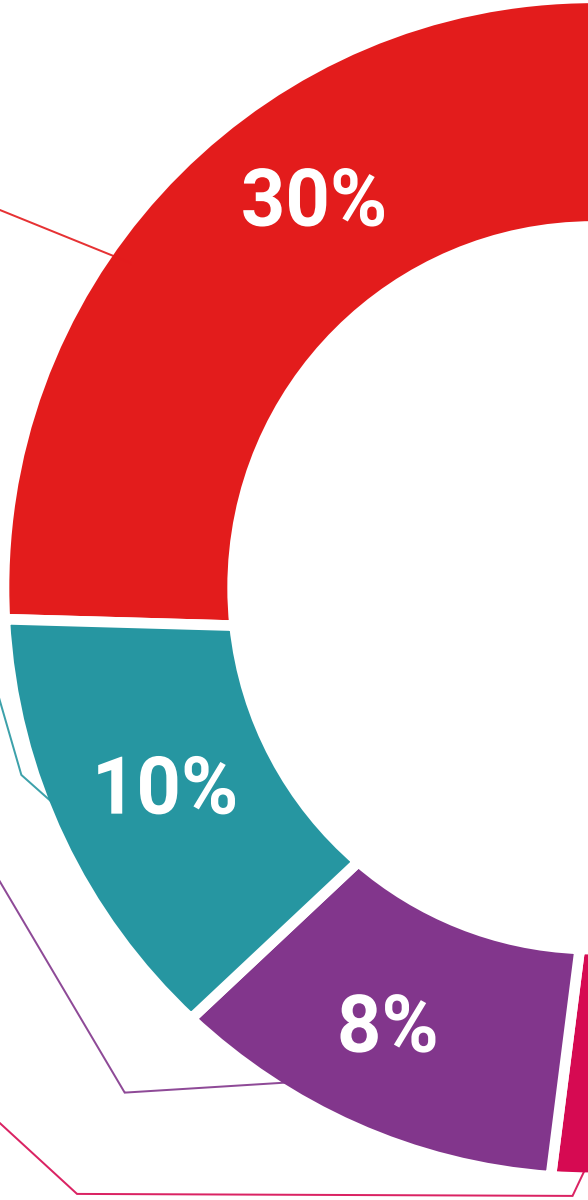
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

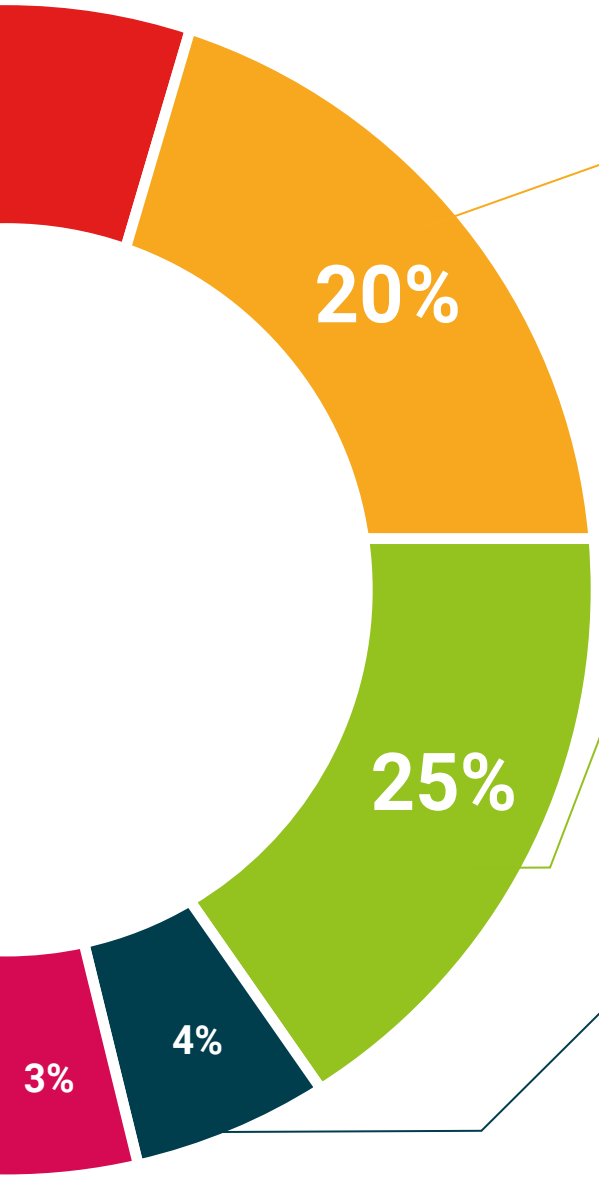
Practising Skills and Abilities

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.

05

Certificate

The Postgraduate Diploma in Hydrogen Facility Design guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Global University.

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 an **Postgraduate Diploma in Hydrogen Facility Design** 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 Diploma in Hydrogen Facility Design**

Modality: **online**

Duration: **6 months**

Accreditation: **18 ECTS**


tech global university

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

Postgraduate Diploma in Hydrogen Facility Design

This is a program of 450 hours of duration equivalent to 18 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
Dean

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

*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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Postgraduate Diploma

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