

# Postgraduate Certificate Railroad Rolling Stock





## Postgraduate Certificate Railroad Rolling Stock

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

Website: [www.techtitude.com/engineering/postgraduate-certificate/railroad-rolling-stock](http://www.techtitude.com/engineering/postgraduate-certificate/railroad-rolling-stock)

# 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

Many years ago, the need to transport large loads over long distances arose, leading humans to build a machine with this traction capacity: the train. As a product of the industrial revolution, what we know today as railroad was born, having a remarkable evolution, not only in transporting huge loads, but also to take people to other cities or destinations. For railroad engineers, it is essential to know the technology related to this means of transport and the different subsystems that it is composed of. Thus, this and other important points are analyzed in the Postgraduate Certificate on Railroad Rolling Stock, following the guidelines of an experienced teaching staff.



“

*Benefit from an experienced teaching staff to enhance your professional career in the railroad engineering sector with a focus on Rolling Stock”*

The evolution that rail transport has undergone since its beginnings with steam has been marked by the development and improvement of combustion engines and electric motors. This has allowed the development of new locomotives with greater capacity and power. For this reason, the Postgraduate Certificate in Railroad Rolling Stock specifically addresses the engineering and technology related to this sector. The program will guide students to achieve the above objective. Providing up-to-date knowledge of all these new aspects and technological trends of the railroad, allowing them to have greater professional skills in the field of railroads.

In this way, the different subsystems that make up this type of vehicle will be analyzed, such as the body, the cab, the doors, the interior design, the electrical circuits, the traction chain, the braking system and the signaling, communications and control and diagnosis systems. It also includes some specific topics oriented to the technical classification of Railroad Rolling Stock and the specific maintenance of all of them. Reference will also be made not only to electric traction, but also to diesel, diesel-electric and hybrid traction. Finally, a specific topic has been dedicated to the dynamics of the vehicle itself, which is complementary to the dynamic part also considered in the civil infrastructure module.

The experience of the teaching staff in the field of railroads, in different areas and approaches such as administration, industry and the engineering company, has made it possible to develop this practical and complete content oriented to the new challenges and needs of the sector. Unlike other programs in the market, the approach is international and not only oriented to one type of country and/or system.

A 100% online Postgraduate Certificate that provides the student with the ease of being able to study it comfortably, wherever and whenever they want. All you need is a device with internet access to take your career one step further. A modality according to the current times with all the guarantees to position the engineer in a highly demanded sector.

This **Postgraduate Certificate in Railroad Rolling Stock** contains the most complete and up-to-date educational program on the market. The most important features of the program include:

- ♦ Improve professional skills in the field of railroad systems.
- ♦ Update and focus the student's company's strategies in these terms.
- ♦ Demand new requirements in the technology acquisition processes.
- ♦ Add value to the technical projects to be developed by student's companies and organizations.
- ♦ 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 self-assessment can be used to improve learning.
- ♦ 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.



*Analyze the many subsystems that make up the railroad vehicles, knowing the latest technological trends in this sector"*



“

*Become a better professional by enhancing your work experience by following case studies supported by the experience of the teaching staff"*

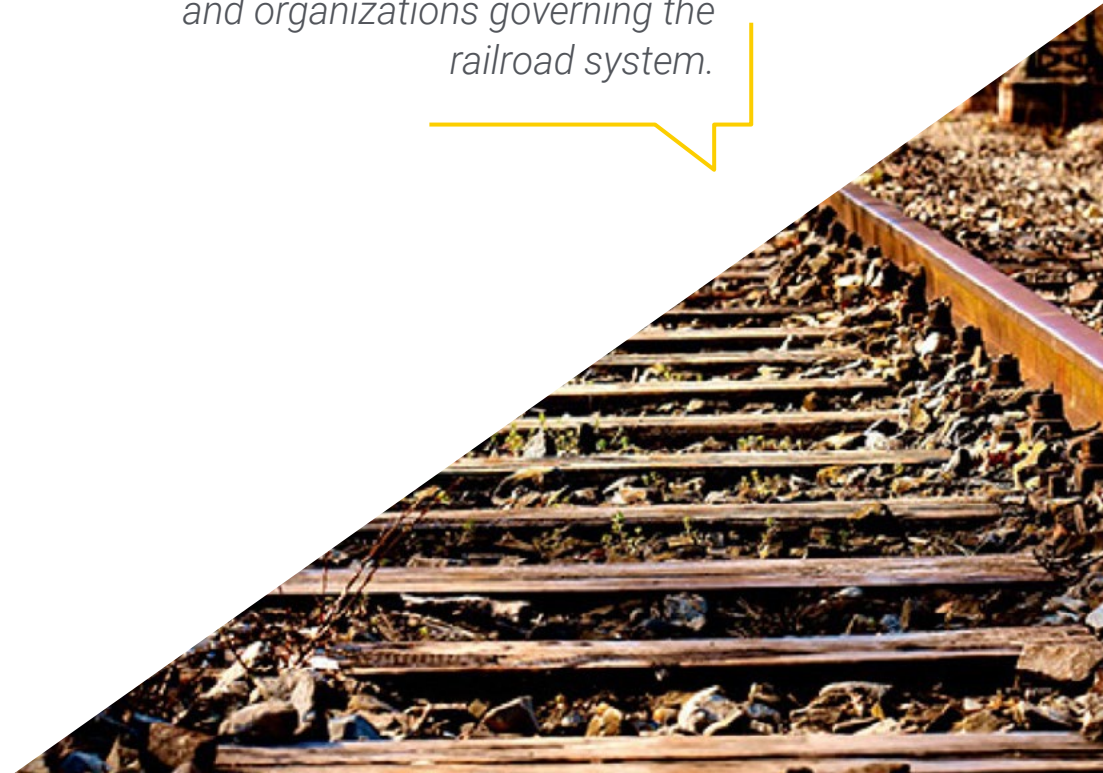
The program's teaching staff includes professionals from the sector who contribute their work experience to this training program, as well as renowned specialists from leading societies and prestigious universities.

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 immersive training programmed 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.

*Learn everything you need to know about Railroad Rolling Stock in a simulated environment that encourages participation in real cases.*

*Know the current structures and organizations governing the railroad system.*



# 02 Objectives

The design of this Postgraduate Certificate allows the student to update their knowledge in a highly demanded sector in the field of engineering. In this way, and taking into account all the key aspects that will boost the career of the professionals, a global perspective is followed, which an in-depth identification of the main technical aspects of railroad vehicles, explaining them in a clear and structured way. As a result, students will develop their skills while aiming to achieve this eminently technological objective, gaining up-to-date knowledge of current trends in railroad systems. In view of the above, TECH establishes the following general and specific objectives to guarantee the satisfaction of the future graduate.





“

*Advance your skills by specifying all the technical characteristics of railway rolling stock and take your career into the international market"*



## General Objectives

---

- ♦ Gain in-depth knowledge of the different technical concepts of the railroad in its different fields
- ♦ Know the technological advances that the railroad sector is experiencing mainly due to the new digital revolution, but without forgetting the traditional approaches on which this mode of transport is based
- ♦ Understand the changes in the industry that have triggered the demand for new technical requirements
- ♦ Implement strategies based on the technological changes that have arisen in the sector
- ♦ Gain up-to-date knowledge in all aspects and trends of railroads



*Achieve your goals following a syllabus that perfectly complies with the professional demands of today"*





## Specific Objectives

---

### Module 1. Rolling Stock

- ◆ Perform an in-depth study of the main technical aspects of rail vehicles
- ◆ Explain in a clear and structured way the technical characteristics of the different components that make up the railroad rolling stock
- ◆ Specify the technical characteristics of the railroad dynamic from the Rolling Stock point of view
- ◆ Analyze the aspects governing the maintenance of railroad vehicles
- ◆ Direct the student in the practical application of the content presented

03

# Course Management

In our commitment to offer education for all, TECH works with renowned professionals in order for the student to acquire solid knowledge in this Postgraduate Certificate in Railroad Rolling Stock. For this reason, we have the support of a highly qualified team with extensive experience in the sector, which will offer the best tools to help students to develop their skills during the program. In this way, students have the guarantees they need to specialize at an international level in a booming sector that will catapult them to professional success.



“

*Learn through the experience of an excellent teaching staff everything you need to update your knowledge in Railroad Telecommunications"*



## Management



### Mr. Martínez Acevedo, José Conrado

- ♦ Experience in the public railroad sector, occupying various positions in construction, operation and technological development of the Spanish high-speed and conventional railroad networks
- ♦ Head of Research, Development and Innovation projects at Administrador de Infraestructuras Ferroviarias (Adif), a state-owned company attached to the Spanish Ministry of Transport, Mobility and Urban Agenda (MITMA)
- ♦ Coordinator of more than 90 technology projects and initiatives in all areas of the railroad
- ♦ Industrial Engineer and Master's Degree in Specialization in Railroad Technologies and in Construction and Maintenance of Railroad Infrastructures
- ♦ Professor in the Master's Degree courses on railroads at the Pontificia de Comillas University (ICAI) and the University of Cantabria
- ♦ Member of the IEEE (Institute of Electrical and Electronics Engineers) and member of the Editorial Committee of Electrification Magazine at the same institution (magazine specialized in transportation electrification)
- ♦ Member of the AENOR group CTN 166 "Research, Technological Development and Innovation Activities (R&D&I)"
- ♦ Adif representative in the MITMA R&D&I and EGNSS (Galileo) working groups
- ♦ Speaker at more than 40 congresses and seminars



## Professors

### Mr. Morales Arquero, Ramón

- ♦ MBA in Business Administration from the National Distance Education University
- ♦ Industrial Engineer from the Polytechnic University of Madrid
- ♦ Expert in Railway Technology, National Distance Education University





# 04

## Structure and Content

The following content complies with the current requirements which are essential for those wanting to specialize in the area of Railroad Rolling Stock. In addition, it has the support of an experienced teaching team, resulting in a curriculum with all the necessary information to provide a broad overview of this area in engineering. For the student, this translates into an excellent opportunity to catapult their career to an international level, incorporating all the fields of work involved in the engineer's professional development in this type of work environment. From the first class, students will see their knowledge expanding, which will enable them to develop professionally, knowing that they can count on the support of a team of experts.





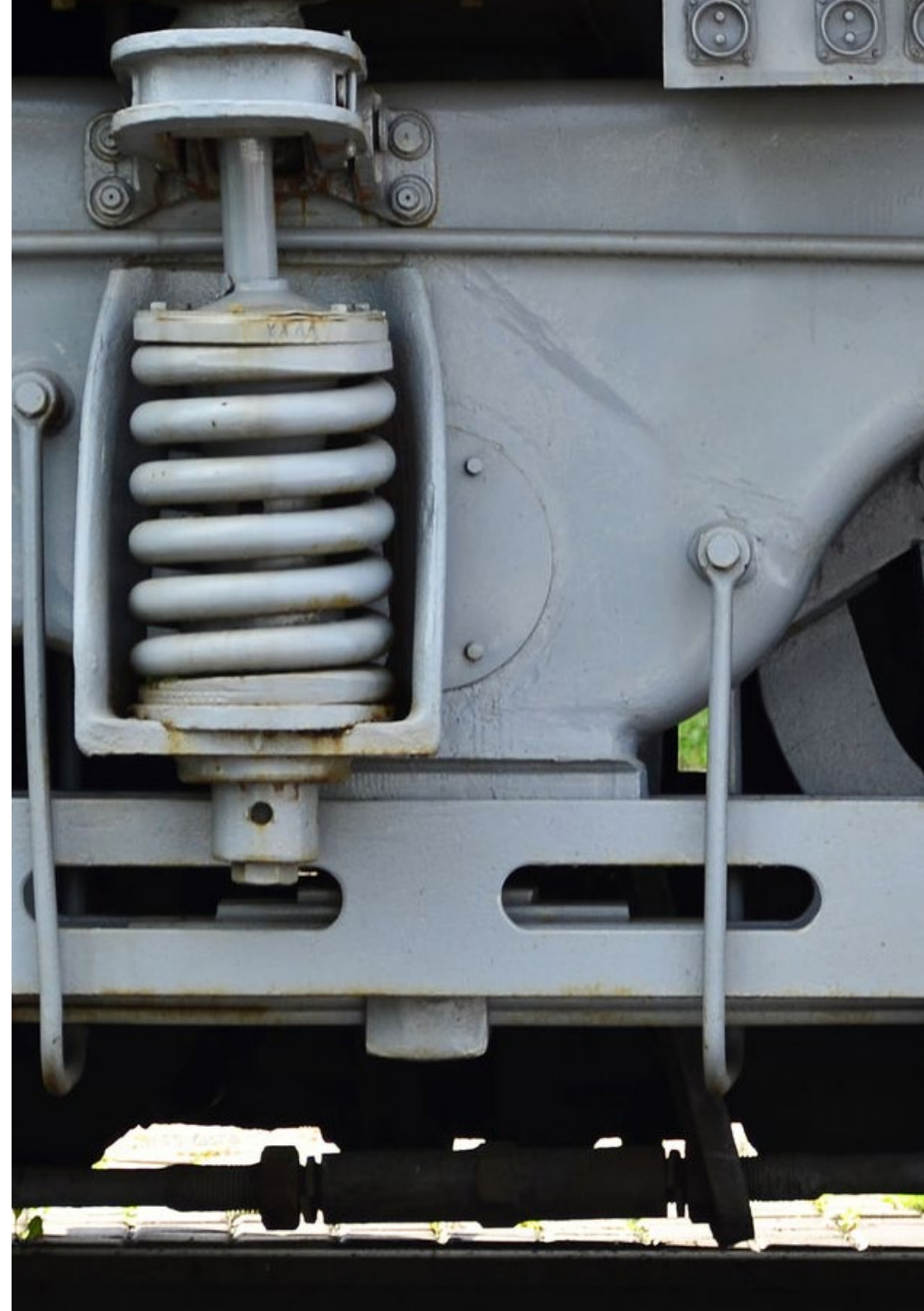


“

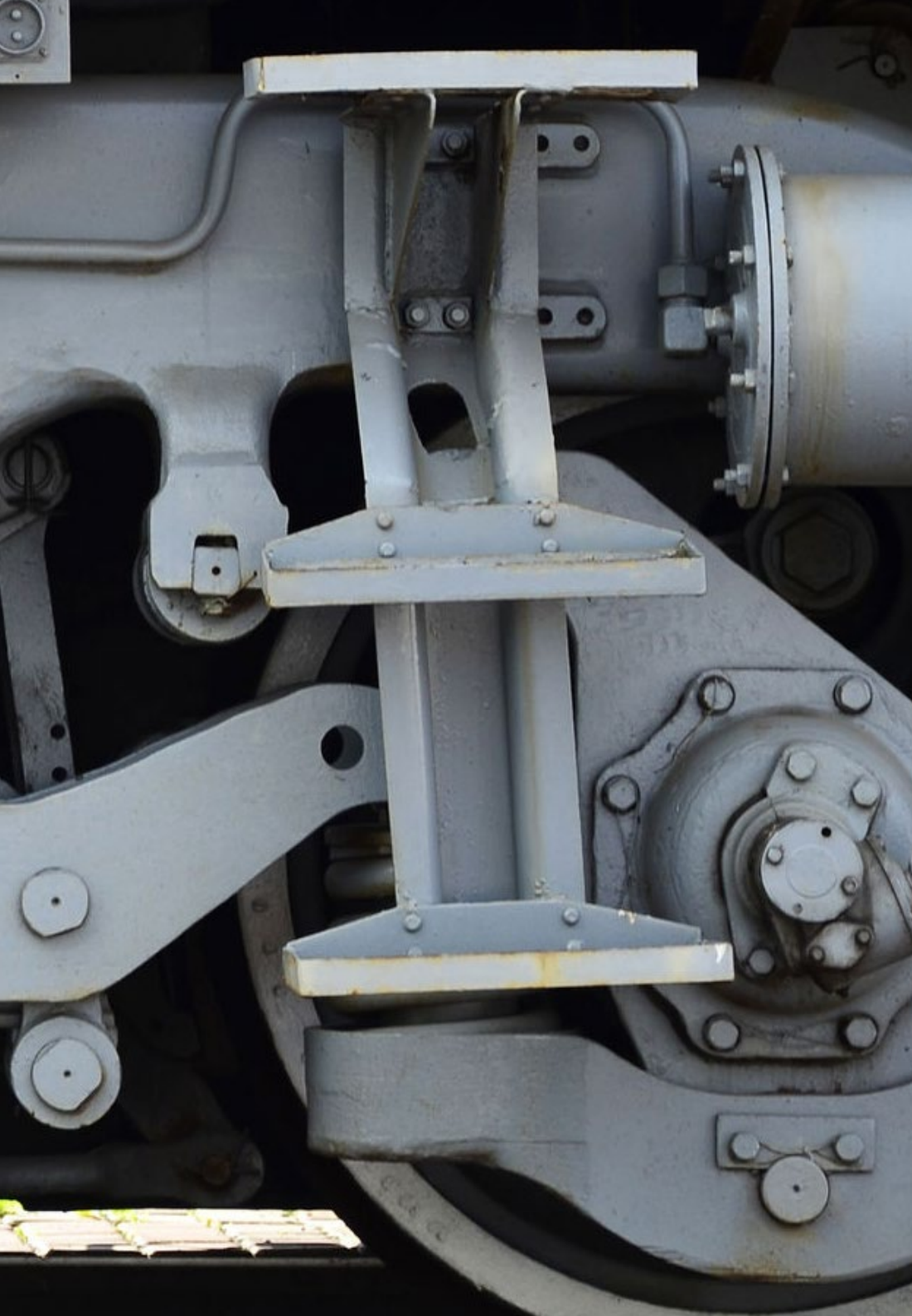
*Stand out in a growing sector with international projection and form part of the improvements being made in the Railroad System”*

## Module 1. Rolling Stock

- 1.1. Railroad Vehicles
  - 1.1.1. Evolution
  - 1.1.2. Classification
  - 1.1.3. Functional Parts
  - 1.1.4. Regulations and Approval Processes
- 1.2. Wheel-Track Interaction
  - 1.2.1. Mounted Wheels and Axles
  - 1.2.2. Bogies and Stands
  - 1.2.3. Wheel Guidance
  - 1.2.4. Tilting
  - 1.2.5. Variable Width Systems
- 1.3. Dynamic Railroad
  - 1.3.1. Movement Equations
  - 1.3.2. Traction Curves
  - 1.3.3. Adherence
  - 1.3.4. Suspension
  - 1.3.5. Aerodynamics in High Speed Trains
- 1.4. Body, Cabin, Doors, WC and Interior Design
  - 1.4.1. Body
  - 1.4.2. Driver's Cab
  - 1.4.3. Doors, WC and Interior Design
- 1.5. HV and LV electrical circuits
  - 1.5.1. Pantograph
  - 1.5.2. HV Switchgear and Transformer
  - 1.5.3. HV Circuits Architecture
  - 1.5.4. Auxiliary Services Converter and Batteries
  - 1.5.5. LV Circuits Architecture
- 1.6. Electrical Traction
  - 1.6.1. Traction Chain
  - 1.6.2. Electric Traction Motors
  - 1.6.3. Static Converters
  - 1.6.4. HV Filter







- 1.7. Diesel Traction, Diesel-Electric Traction and Hybrid Traction
  - 1.7.1. Diesel Traction
  - 1.7.2. Diesel-Electric Traction
  - 1.7.3. Hybrid Traction
- 1.8. Braking System
  - 1.8.1. Automatic Braking Service
  - 1.8.2. Electric Brake
  - 1.8.3. Parking Brake
  - 1.8.4. Auxiliary Brake
- 1.9. Signaling Systems, Communications Systems and Command and Diagnostics Systems
  - 1.9.1. ATP- ERTMS/ ETCS System
  - 1.9.2. Train-Ground Communication Systems - GSM-R
  - 1.9.3. Command and Diagnosis Systems - TCN Network
- 1.10. Maintenance of Railroad Vehicles
  - 1.10.1. Installations for the Maintenance of Railroad Vehicles
  - 1.10.2. Maintenance Interventions
  - 1.10.3. Entities in Charge of Maintenance

“Gain in-depth knowledge of the different systems which make up a train and become an expert engineer in the sector of railroad systems”

# 05 Methodology

This training program offers 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"*

Our program offers a revolutionary method of skills and knowledge development. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

“

*At TECH, you will experience a way of learning that is shaking the foundations of traditional universities around the world"*



*We are the first online university to combine Harvard Business School case studies with a 100% online learning system based on repetition.*



### A learning method that is different and innovative

This intensive Engineering program at TECH Technological University prepares you to face all the challenges in this field, both nationally and internationally. We are committed to promoting your personal and professional growth, the best way to strive for success, that is why at TECH Technological University you will use Harvard case studies, with which we have a strategic agreement that allows us, to offer you material from the best university in the world.

“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 by 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.

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

## Relearning Methodology

TECH is the first university in the world to combine Harvard University case studies with a 100% online learning system based on repetition, which combines 8 different didactic elements in each lesson.

We enhance Harvard case studies 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 university 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.



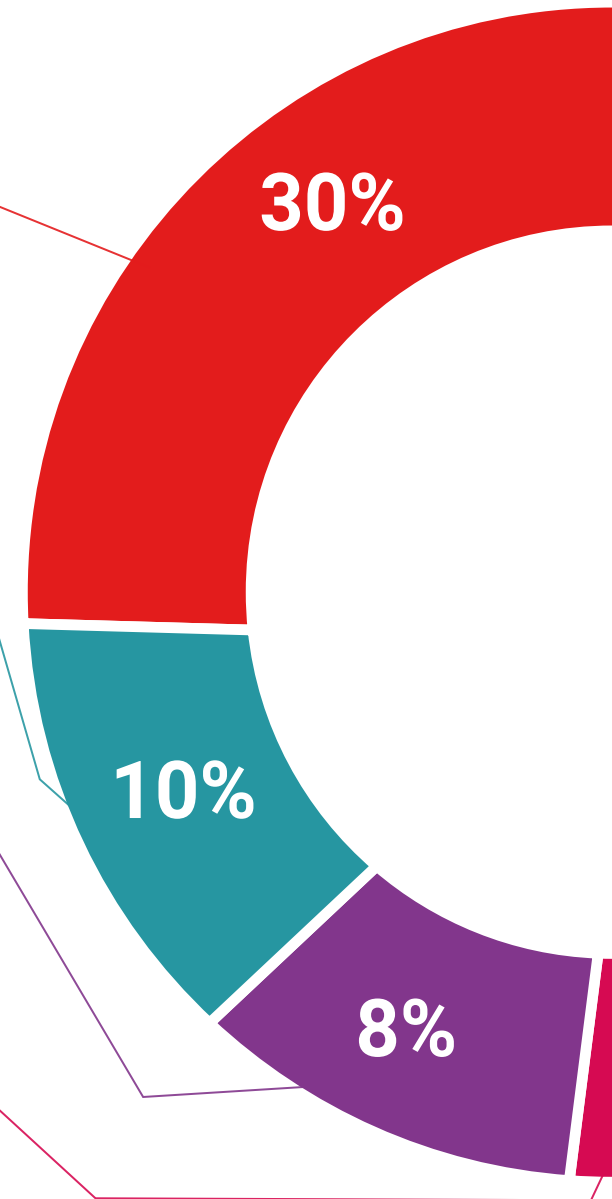
#### Practising Skills and Abilities

They will carry out activities to develop specific competencies and skills in each thematic area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization we live in.

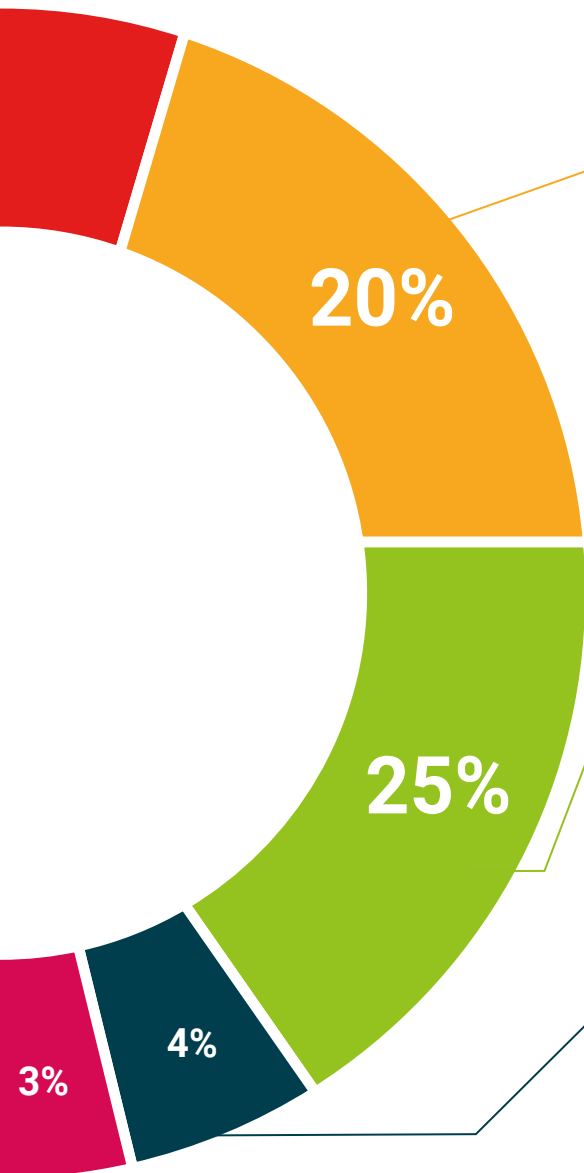


#### Additional Reading

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**

They will complete a selection of the best case studies in the field used at Harvard. Cases that are presented, analyzed, and supervised by the best senior management 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 multimedia content presentation training Exclusive system 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 your goals.



# 06 Certificate

The Postgraduate Certificate in Railroad Rolling Stock guarantees, in addition to the most rigorous and up-to-date training, access to a Postgraduate Certificate issued by TECH Global University.



“

*Successfully complete this training program  
and receive your university certificate  
without travel or laborious paperwork"*

This private qualification will allow you to obtain an **Postgraduate Certificate in Railroad Rolling Stock** 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** private qualification, 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 Railroad Rolling Stock**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**





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



## Postgraduate Certificate Railroad Rolling Stock

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

# Postgraduate Certificate

## Material Railroad Rolling Stock