

# Postgraduate Certificate

## Railroads and their Engineering in the Current Context





## Postgraduate Certificate Railroads and their Engineering in the Current Context

- » Modality: **online**
- » Duration: **6 weeks**
- » Certificate: **TECH Technological University**
- » Dedication: **16h/week**
- » Schedule: **at your own pace**
- » Exams: **online**

Website: [www.techtute.com/in/engineering/postgraduate-certificate/postgraduate-certificate-railroads-engineering-current-context](http://www.techtute.com/in/engineering/postgraduate-certificate/postgraduate-certificate-railroads-engineering-current-context)

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# 01

# Introduction

Changes in the sector are causing the different companies and organizations that make up the industry to demand these new technical requirements from their professionals. Thus, in response to the needs of technological modernization of their networks and the growing orientation towards customer and citizen service in general, the administrations and railway management companies are beginning to implement all these technological changes in their strategies. This makes it essential to have specialized professionals in this area. That's why the Postgraduate Certificate in Railroads and their Engineering in the Current Context is designed so that the student is able to start specializing in the new technologies that have an impact on this growing field.





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*This Postgraduate Certificate will allow engineers to know the latest needs of technological modernization in the railroad sector”*

Throughout its history, the railroad has not changed significantly from a conceptual point of view. Even so, in terms of the organizational development over the last few years, it is necessary to analyze it in the current context. This is in addition to the new trends set in motion by the various players in the sector, which form the basis of the new sector strategies to be followed by the world's railroads.

In this way, this Postgraduate Certificate includes an in-depth analysis of the main technical and operational areas of the system, both at the level of the infrastructure, the rail vehicle and the interaction between the two, while at the same time updating knowledge from a more general approach. Its position in relation to other modes of transport is also considered in this module in order to identify its competitive advantages and factors to be improved.

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 Railroads and their Engineering in the Current Context** 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



*Boost your career with a complete program adapted to the international needs of the railroad systems"*

“*Analyze the technical interactions between infrastructure and rolling stock, as well as the existing technical criteria and conditions for the design of railroad systems”*

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.

The design of this Program focuses on Problem-Based Learning, by means of which the professional will have to try to solve the different situations of Professional Practice, which will be posed throughout the Program. For this purpose, the professional will be assisted by an innovative interactive video system created by renowned and experienced experts.

*Become a professional in the railroad sector by possessing the technical competencies in the traditional aspects of the sector.*

*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, the key aspects have been developed in a curriculum that will boost the career of engineers from a global perspective, identifying the current structures and organizations that are positioned in the railroad sector, as well the current position of this sector with respect to other modes of transport. 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.







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*Analyze the position of the railroad with respect to other modes of transportation, identifying its main advantages and areas for improvement”*



## General objectives

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- ◆ 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

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*Follow a methodology that is based on practical cases in order to achieve your professional objective in a field of engineering with global projection”*





## Specific Objectives

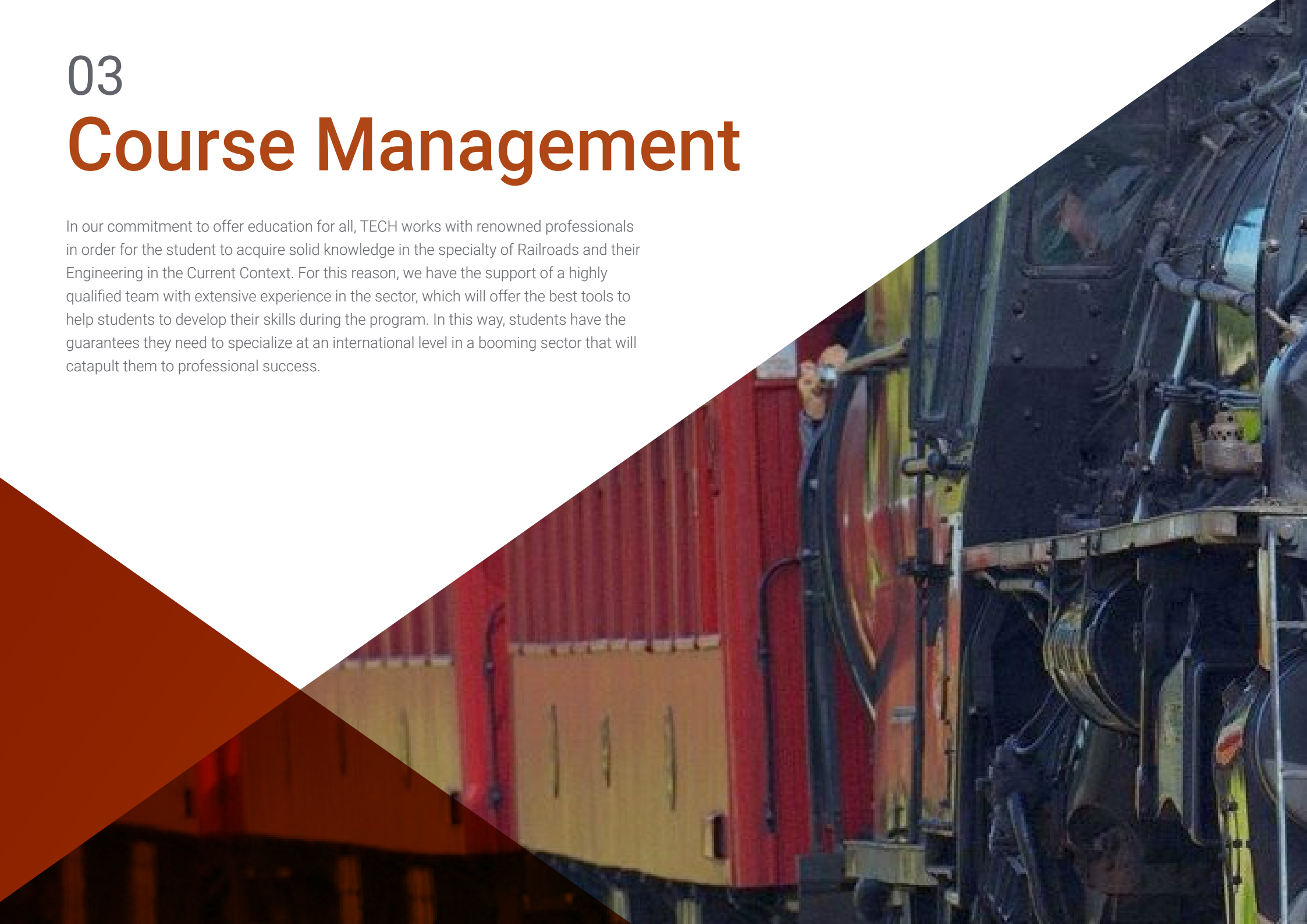
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- ◆ Analyze the position of the railroad with respect to other modes of transportation, identifying its main advantages and areas for improvement
- ◆ Gain in-depth knowledge of the current structures and organizations on which the railroad sector is based (regulators, railroad managers, industry, institutions, groups, etc.)
- ◆ Analyze the different regulations and norms on which the railroad sector is currently based
- ◆ Discuss in detail the main technological trends that the sector is currently experiencing
- ◆ Gain in-depth knowledge of the characteristics of the different railroad operating systems, the main technical areas in the infrastructure and rolling stock
- ◆ Establish the technical interactions between infrastructure and rolling stock, as well as the existing technical criteria and conditions for the design of railroad systems
- ◆ Explain different worldwide references in terms of railroad networks, infrastructures and technical projects with high impact on the sector

# 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 the specialty of Railroads and their Engineering in the Current Context. 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.





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*TECH offers quality education thanks to the support of excellent and experiences teaching staff”*

## 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. Martínez Lledó, Mariano

- ◆ 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)
- ◆ PhD in Spanish Philology, specialized in applied linguistics (Doctoral thesis: The specialized language of railroads) and a Master's Degree Degree in International Strategic Management. Several specialization courses in technological surveillance and competitive intelligence
- ◆ Internal trainer in the area of railroad R&D&i (Integral Training Program for Technicians)
- ◆ International trainer in the area of operation, traffic control and railroad innovation (Morocco, Mexico, France)
- ◆ Professor in the Master's Degree in International Strategic Management offered by Adif, Indra and the Polytechnic University of Madrid
- ◆ Speaker at several congresses and seminars with papers on terminology and linguistics applied to railroads



# 04

## Structure and Content

The following syllabus meets the essential requirements in the area of railroad engineering. 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.







“Analyze the position of the railroad with respect to other modes of transportation, identifying its main advantages and areas for improvement”

## Module 1. The Railroad and Its Engineering in the Current Context

- 1.1. The Railroad in Transport
  - 1.1.1. Its Position and Competency With Other Modes of Transport
  - 1.1.2. Sectorial Analysis
  - 1.1.3. Financing
  - 1.1.4. Specialty Railroad Language and Terminology
- 1.2. Organization
  - 1.2.1. Regulatory Organizations and Supervisors
  - 1.2.2. Industry
  - 1.2.3. Administrators of Infrastructure
  - 1.2.4. Railroad Transport Companies
  - 1.2.5. Institutions and Associations
- 1.3. Regulation, Legislation and Guidelines
  - 1.3.1. Legal Framework and Regulation
  - 1.3.2. The Liberalization of Rail Transport
  - 1.3.3. Technical Regulations
- 1.4. New Trends and Strategies
  - 1.4.1. Interoperability of Different Technological Systems
  - 1.4.2. Towards Digitalization: Railroad 4.0
  - 1.4.3. A New Service Model for Society
- 1.5. Description of Railroad Services
  - 1.5.1. Urban Services
  - 1.5.2. Mid- and Long-Distance Services
  - 1.5.3. High-Speed Services
  - 1.5.4. Freight Services
- 1.6. Classification and Main Infrastructure Systems
  - 1.6.1. Electric Traction Energy
  - 1.6.2. Control, Command and Signaling
  - 1.6.3. Telecommunications
  - 1.6.4. Civil Infrastructure





- 1.7. Classification and Main Rolling Stock Systems
  - 1.7.1. Main Types
  - 1.7.2. Traction
  - 1.7.3. Braking
  - 1.7.4. Control, Command and Signaling
  - 1.7.5. Rolling
- 1.8. Interaction Between Vehicle and Infrastructure
  - 1.8.1. Different Interactions
  - 1.8.2. Technical Compatibility of the Vehicle With the Infrastructure
  - 1.8.3. The Problem of the Width of the Track and Its Main Solutions
- 1.9. Criteria and Technical Conditions of the Railroad
  - 1.9.1. Maximum Speed
  - 1.9.2. Typology of the Rolling Stock
  - 1.9.3. The Capacity of the Transport
  - 1.9.4. Interrelation Between the Different Subsystems
- 1.10. Cases of Global References
  - 1.10.1. Rail Networks and Services
  - 1.10.2. Infrastructures in Construction and in Service
  - 1.10.3. Technological Projects



*Know all the relevant aspects of railroad engineering by analyzing the different cases of global references”*

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.





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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"*

## At TECH we use the Case Method

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.

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*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.



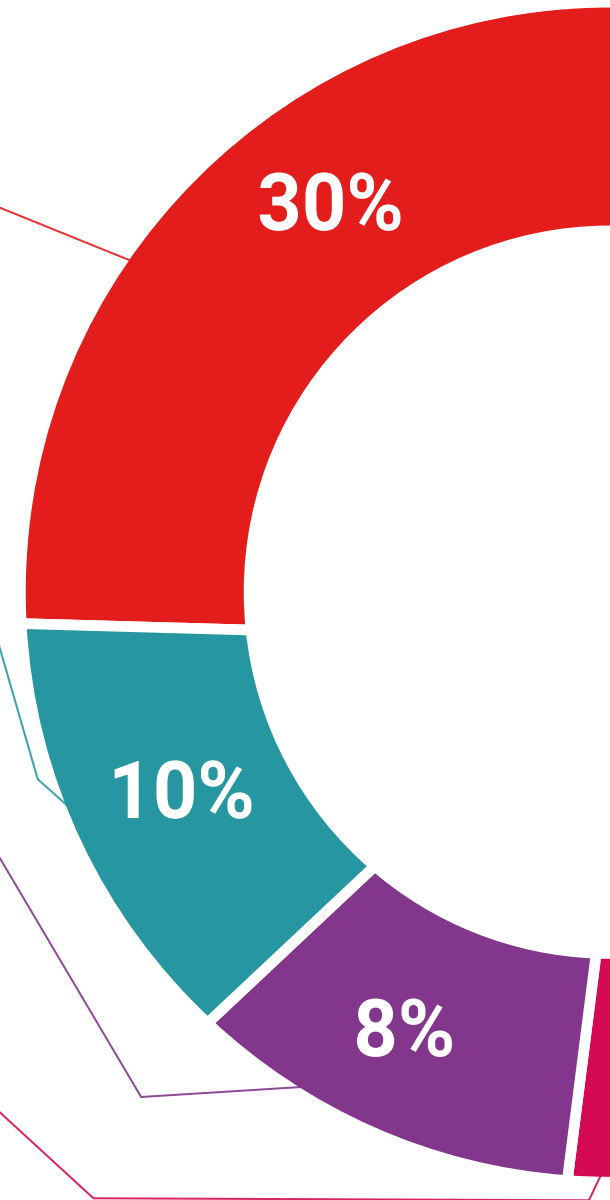
#### Practising Skills and Abilities

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 Railroads and their Engineering in the Current Context guarantees you, in addition to the most rigorous and updated training, access to a Postgraduate Certificate issued by TECH Technological University.



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

This **Postgraduate Certificate in Railroads and their Engineering in the Current Context** contains the most complete and updated program on the market.

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

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

Title: **Postgraduate Certificate in Railroads and their Engineering in the Current Context**

Official N° of hours: **150 h.**



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



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