

# Postgraduate Certificate Civil Railroad Infrastructure





## Postgraduate Certificate Civil Railroad Infrastructure

- » 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/civil-road-infrastructure](http://www.techtute.com/in/engineering/postgraduate-certificate/civil-road-infrastructure)

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# 01

# Introduction

For the railroad sector, it is important to have a specific civil structure that meets the necessary requirements for its correct interaction with the rolling stock. In this sense, it is of vital importance that the engineer has the necessary skills for the analysis of the train's own dynamics with the infrastructure. In this way, the Postgraduate Certificate in Civil Railroad Infrastructure will address this and other topics that will help students to know all the technical aspects of this sector, such as railway platforms, bridges, viaducts, among others. All this, from a constructive point of view and with the support of an excellent teaching team with the best experience in this area of engineering.



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*Know, from a constructive point of view, the importance of civil infrastructure in the correct operation of the railroad system"*

The railroad needs a specific civil infrastructure due to the technical requirements that are necessary for a correct interaction with the rolling stock. In this sense, the analysis of the dynamics of the train itself with the infrastructure is particularly relevant. The railroad platform, as well as the bridges, viaducts and tunnels used, although they are similar from a constructive point of view to those used in other areas, have specific particularities for case of the railroad due to this interaction.

Based on the above, the Postgraduate Certificate in Civil Railroad Infrastructure will address the technical analysis of all these elements, taking into account their characteristics, components and specificities considering such interaction. As it is to be expected, the study of the railroad track in its traditional conception, with ballast, and in slab, as well as the devices used for its operation, such as turnouts, are also covered here.

It should be noted that this program will also incorporate the analysis of the so-called infrastructure resilience. This is a discipline that has gained great importance in recent years and that studies the impact of different aspects, such as climate change, on the infrastructure itself.

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 Civil Railroad Infrastructure** is the most comprehensive 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

“ *With the graphic and practical content, this Postgraduate Certificate provides students with all the knowledge they need in their daily working day*”

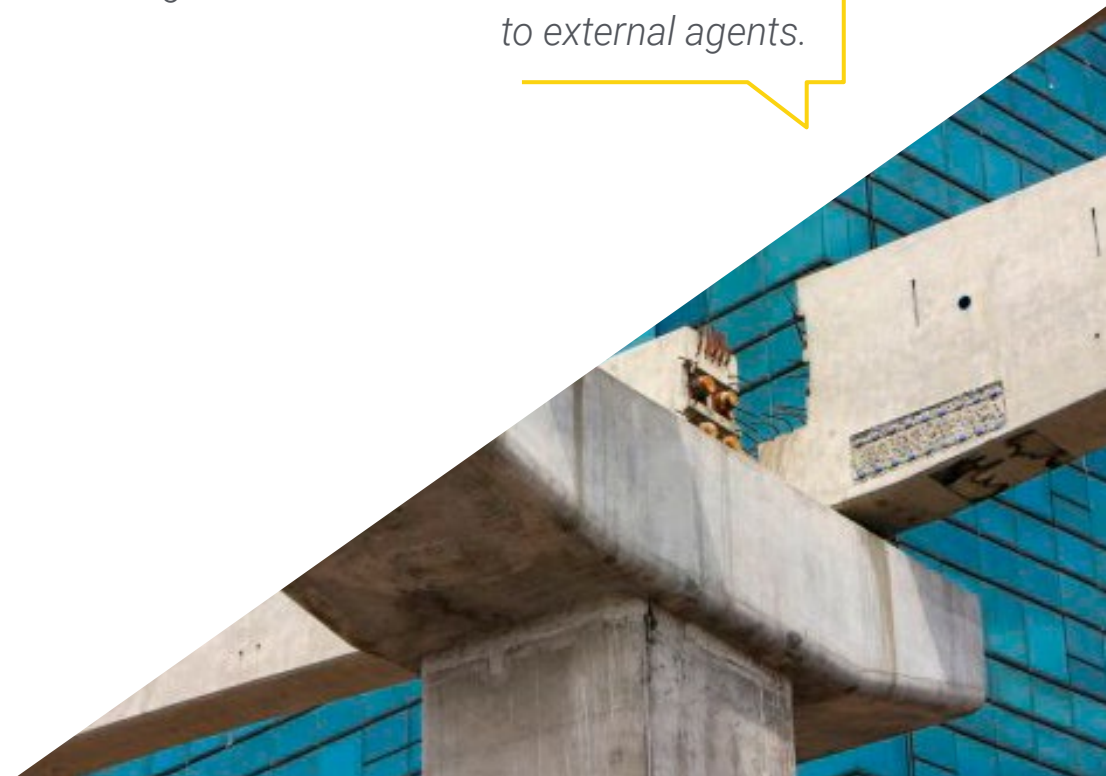
The program's teaching staff includes professionals from the sector who contribute their work experience to this training program, as well as renowned specialists from leading societies and prestigious universities.

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.

*Enhance your professional experience by knowing the complex dynamics of the train with the infrastructure and the particularities that they have.*

*Develop the necessary skills to identify the changes that occur in the infrastructure due to external agents.*



# 02 Objectives

The objective at TECH is to provide the opportunity to update the knowledge of students in a highly demanded sector which, in this case, is the railroad system. In this way, and taking into account all the key aspects that will help to boost the career of professionals, a program has been created that follows a global perspective, which allows students to analyze the dynamics of the train with the infrastructure, approaching them from a technical perspective, taking into account their characteristics, components and specifications. 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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*Grow professionally, achieving the objectives that will take your career to the next level of engineering”*



## 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



*Integrate new concepts into your daily professional practice and generate the necessary skills to analyze the managing companies of railroad infrastructure”*





## Specific Objectives

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- ◆ Capacity to control the scope of a project
- ◆ Analysis of requirements management
- ◆ In-depth knowledge of scope management
- ◆ Ability to control the schedule
- ◆ Analysis of the schedule
- ◆ In-depth knowledge to elaborate a schedule
- ◆ Capacity to know the critical route
- ◆ In-depth knowledge and analysis of a recovery plan
- ◆ In-depth knowledge and analysis of an acceleration plan

# 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 Civil Railroad Infrastructure. For this reason, we have the support of a highly qualified team with extensive experience in the sector, who 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

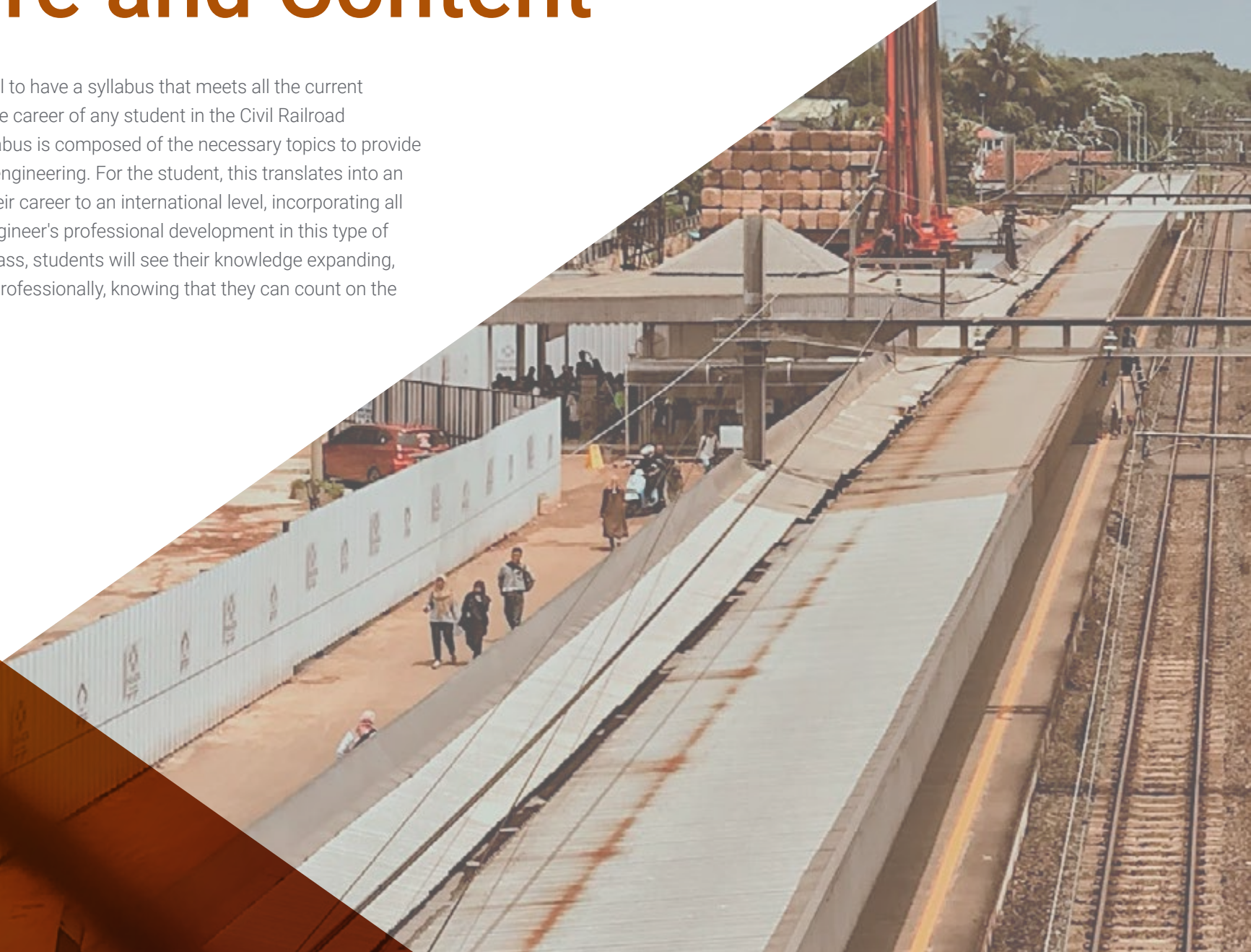
- Experience in the public railroad sector, occupying various positions in construction, operation and technological development of the Spanish high-speed and conventional railroad networks
- Head of Research, Development and Innovation projects at Administrador de Infraestructuras Ferroviarias (Adif), 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



# 04

## Structure and Content

For the teaching team, it is essential to have a syllabus that meets all the current requirements that will help boost the career of any student in the Civil Railroad Infrastructure sector. Thus, the syllabus is composed of the necessary topics to provide a broad perspective 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.







“From a practical methodology, students will be able to consolidate their knowledge and learn new concepts that will help them improve in their work practice”

## Module 1. Civil Infrastructure

- 1.1. Approximation of the Characteristics of the Railroad Civil Infrastructure
  - 1.1.1. Interaction of the Infrastructure With a Vehicle
  - 1.1.2. General Dynamic of the Railroad
  - 1.1.3. Parameters of the Design of the Infrastructure
- 1.2. Railroad Platform
  - 1.2.1. Constitution of the Platform
  - 1.2.2. Typology
  - 1.2.3. Railroad Bedding Layers
- 1.3. Bridges
  - 1.3.1. Typology
  - 1.3.2. Characteristics and Techniques
  - 1.3.3. Interaction With the Vehicle
- 1.4. Tunnels
  - 1.4.1. Typology
  - 1.4.2. Characteristics and Techniques
  - 1.4.3. Interaction With the Vehicle
  - 1.4.4. Particularities in the Aerodynamic Field
  - 1.4.5. Particularities in the Field of the Civil Protection and Safety
- 1.5. The Ballasted Track
  - 1.5.1. Typology
  - 1.5.2. The Running Rail
  - 1.5.3. Other Components
  - 1.5.4. The Flying-Ballast Phenomenon





- 1.6. The Ballastless Track
  - 1.6.1. Typology
  - 1.6.2. Components
  - 1.6.3. Transition of Ballastless Track to a Ballasted Track
- 1.7. Track Apparatus
  - 1.7.1. Typology
  - 1.7.2. Diversions and Crossings
  - 1.7.3. Expansion Equipment
- 1.8. Other Auxiliary Elements
  - 1.8.1. Stops and Braking Zones
  - 1.8.2. Multifunctional Barriers
  - 1.8.3. Width Changers
  - 1.8.4. Scales
- 1.9. Relationship Between Rail Services and Civil Infrastructure
  - 1.9.1. Urban Services
  - 1.9.2. Interurban Services
  - 1.9.3. High-Speed Services
- 1.10. Resilience of Infrastructure Against Extreme Events
  - 1.10.1. Meteorological Events
  - 1.10.2. Sliding
  - 1.10.3. Landslides



*With this complete Postgraduate Certificate you will be able to develop new strategies to improve Civil Railroad Infrastructures"*

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

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.

## Relearning Methodology

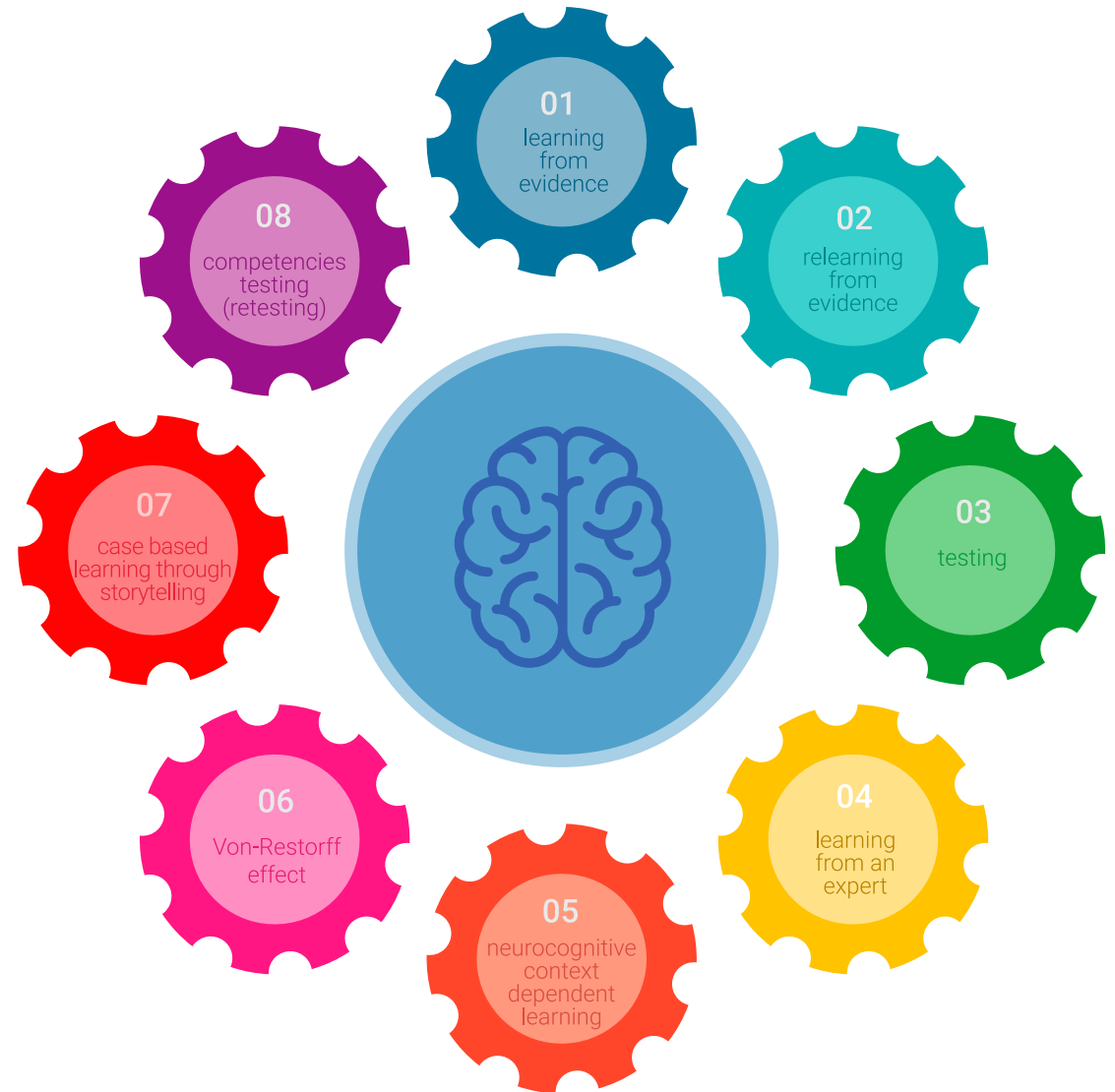
TECH is the first university in the world to combine Harvard University case studies with a 100% online learning system based on repetition, which combines 8 different didactic elements in each lesson.

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.



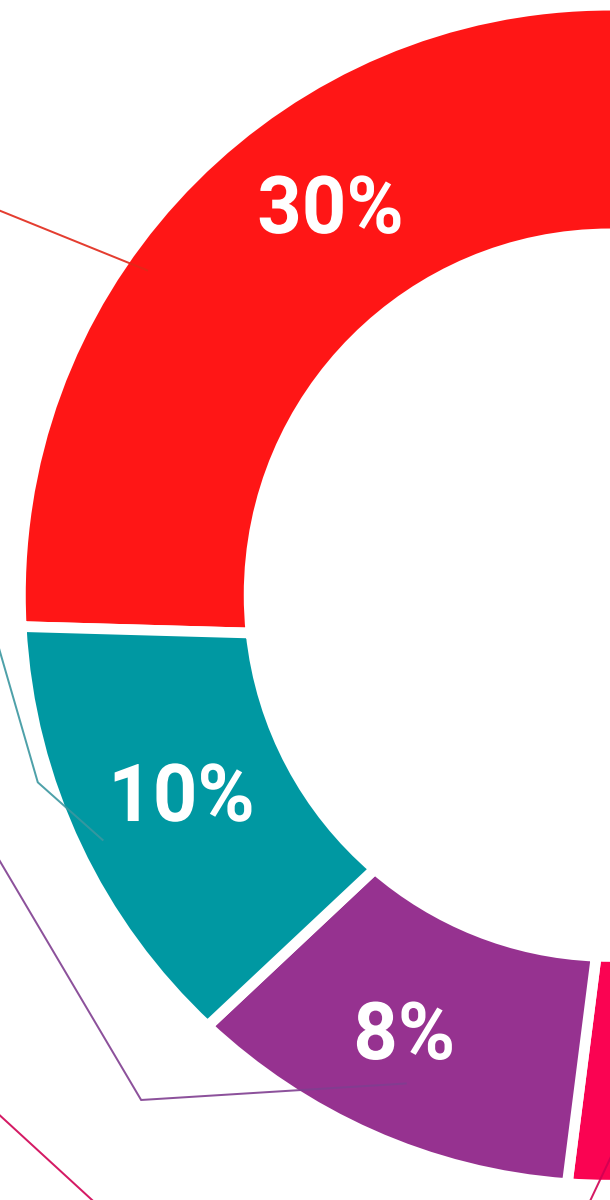
#### Practising Skills and Abilities

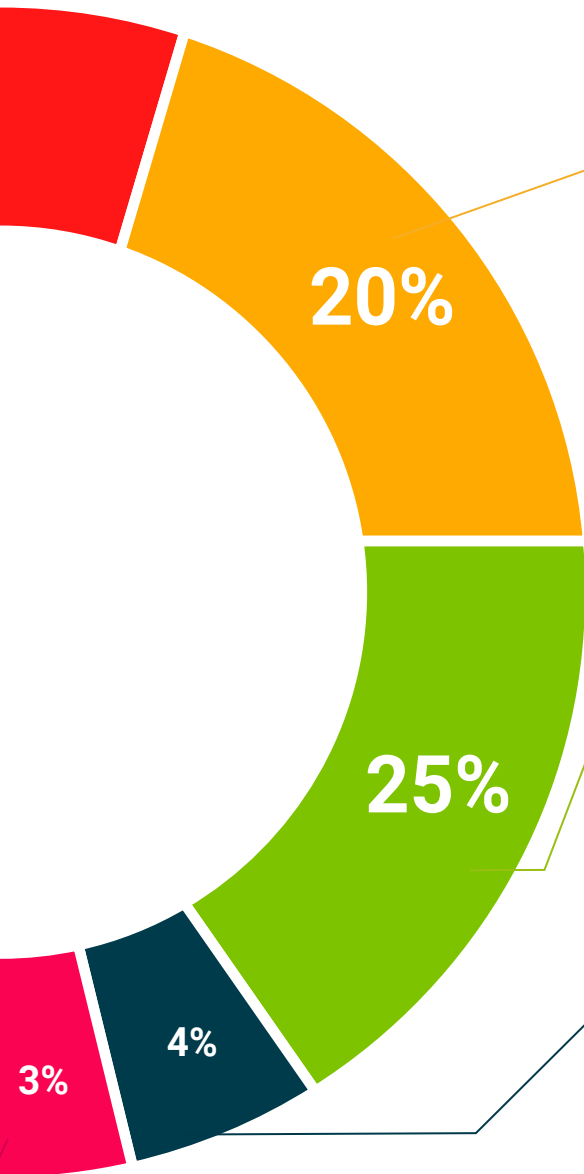
They will carry out activities to develop specific competencies and skills in each thematic area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization we live in.



#### 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 Civil Railroad Infrastructure guarantees , in addition to the most accurate and up-to-date training, access to a Postgraduate Certificate issued by TECH Technological University.



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

This **Postgraduate Certificate in Civil Railroad Infrastructure** 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 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 Civil Railroad Infrastructure**

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.

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



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