



# Postgraduate Certificate Railroad Control, Command and Signaling (CCS)

» Modality: online

» Duration: 6 weeks

» Certificate: TECH Technological University

» Dedication: 16h/week

» Schedule: at your own pace

» Exams: online

 $We b site: {\color{blue}www.techtitute.com/in/engineering/postgraduate-certificate/railroad-control-command-signaling-ccs} \\$ 

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# tech 06 | Introduction

In all industrial sectors it is important to have a signaling system that is optimally designed. Although in some cases this may be a fully automated process, it still requires engineers and highly trained personnel to know them and maintain their proper functioning. In this way, this Postgraduate Certificate seeks to delve into these aspects and components of the techniques of Railroad Control, Command and Signaling, maintaining an up to date vision.

It is important to mention the in-depth study of the ERTMS and CBTC systems as the main references of modern signaling worldwide, which have become true standards in almost all metropolitan, urban and interurban rail networks.

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 Control, Command and Signaling (CCS)** 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





Through practical cases and theoretical lessons, students will refine their knowledge in this area of the vitally important 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.

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.

Count on the experience of experts in the Railroad System and boost your career to the next level with an international projection.

Know the current structures and organizations governing the railroad system.







# tech 10 | Objectives

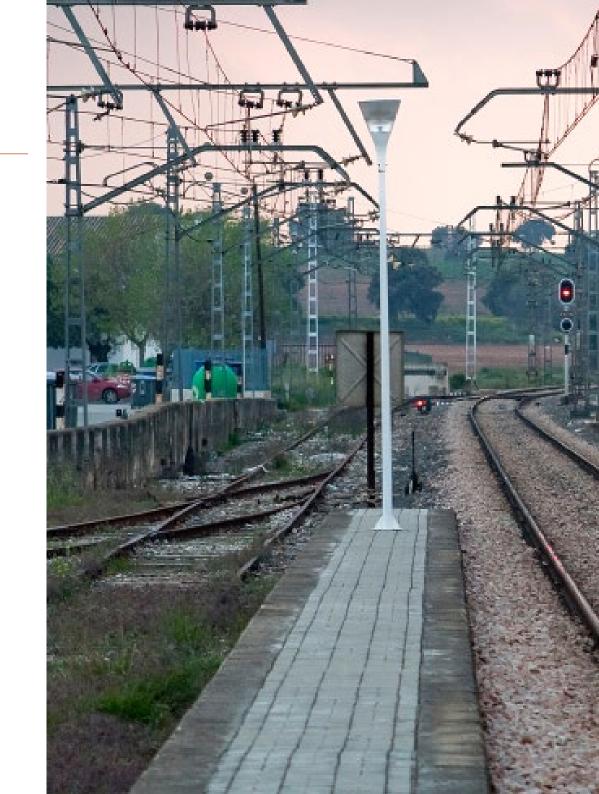


# **General Objectives**

- 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"

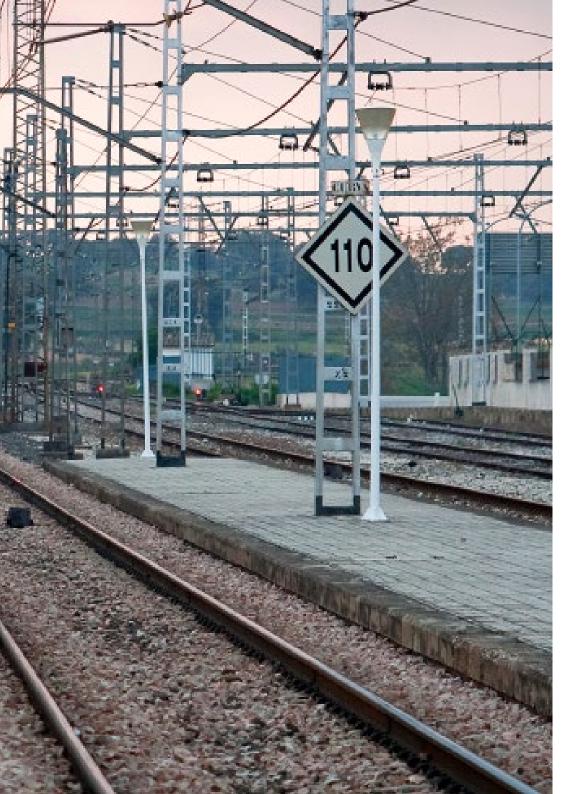




# **Specific Objectives**

#### Module 1. Control, Command and Signaling (CCS)

- Explain in a clear and structured way the main technical aspects of the installations associated with railroad control, command and signaling
- Specify the technical characteristics of the different components that make up the CCS system
- Provide an in-depth breakdown of the specific characteristics of ERTMS and CBTC signaling systems, as the newest standardized systems in the current context
- Specify in detail the technical characteristics of the CCS installations according to the different railroad systems
- Analyze the characteristics that the engineering project associated with CCS installations must have
- Direct the student in the practical application of the content presented







# tech 14 | Course Management

# 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. Fernández Sánchez, Angel

- Control, Command and Signaling Technician at Administrador de Infraestructuras
   Ferroviarias (Adif), a state owned company attached to the Spanish Ministry of
   Transport, Mobility and Urban Agenda (MITMA)
- Director of Control, Command and Signaling Projects, including: suppression of telephone blockades, installation of automatic banalized blockades, standardization and modernization of blockades and modernization of interlocks and interlockings, and effects on the CCS subsystem derived from infrastructure projects
- Responsible for the analysis and study of blocking systems based on alternative technologies in Adif's Conventional Network. Case Study, Caceres-Valencia de Alcántara
- Industrial Engineer and Master's Degree in Engineering and Land Transportation Management







# tech 18 | Structure and Content

# Module 1. Control, Command and Signaling (CCS)

- 1.1. CCS and the Railroad
  - 1.1.1. Evolution
  - 1.1.2. Railroad Safety
  - 1.1.3. The Importance of RAMS
  - 1.1.4. Railroad Interoperability
  - 1.1.5. Components of the CCS Subsystem
- 1.2. The Interlocking
  - 1.2.1. Evolution
  - 1.2.2. Principles of Use
  - 1.2.3. Types
  - 1.2.4. Other Elements
  - 1.2.5. Program of Use
  - 1.2.6. Future Developments
- 1.3. The Blockade
  - 1.3.1. Evolution
  - 1.3.2. Types
  - 1.3.3. The Capacity of the Transport and the Blockade
  - 1.3.4. Design Criteria
  - 1.3.5. Communication of the Blockade
  - 1.3.6. Specific Applications
- 1.4. Detection of the Train
  - 1.4.1. Track Circuits
  - 1.4.2. Axle Counters
  - 1.4.3. Design Criteria
  - 1.4.4. Other Technology
- 1.5. Elements of the Field
  - 1.5.1. Track Apparatus
  - 1.5.2. Signals
  - 1.5.3. Level Crossing Protection Systems
  - 1.5.4. Detectors to Support the Operation





# Structure and Content | 19 tech

1	6.	Train	Protection	Syctome
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- 1.6.1. Evolution
- 1.6.2. Types
- 1.6.3. Onboard Systems
- 1.6.4. ATP
- 1.6.5. ATO
- 1.6.6. Design Criteria
- 1.6.7. Future Developments

# 1.7. The ERTMS System

- 1.7.1. Evolution
- 1.7.2. Regulations
- 1.7.3. Architecture and Components
- 1.7.4. Levels
- 1.7.5. Modes of Operation
- 1.7.6. Design Criteria

#### 1.8. The CBTC System

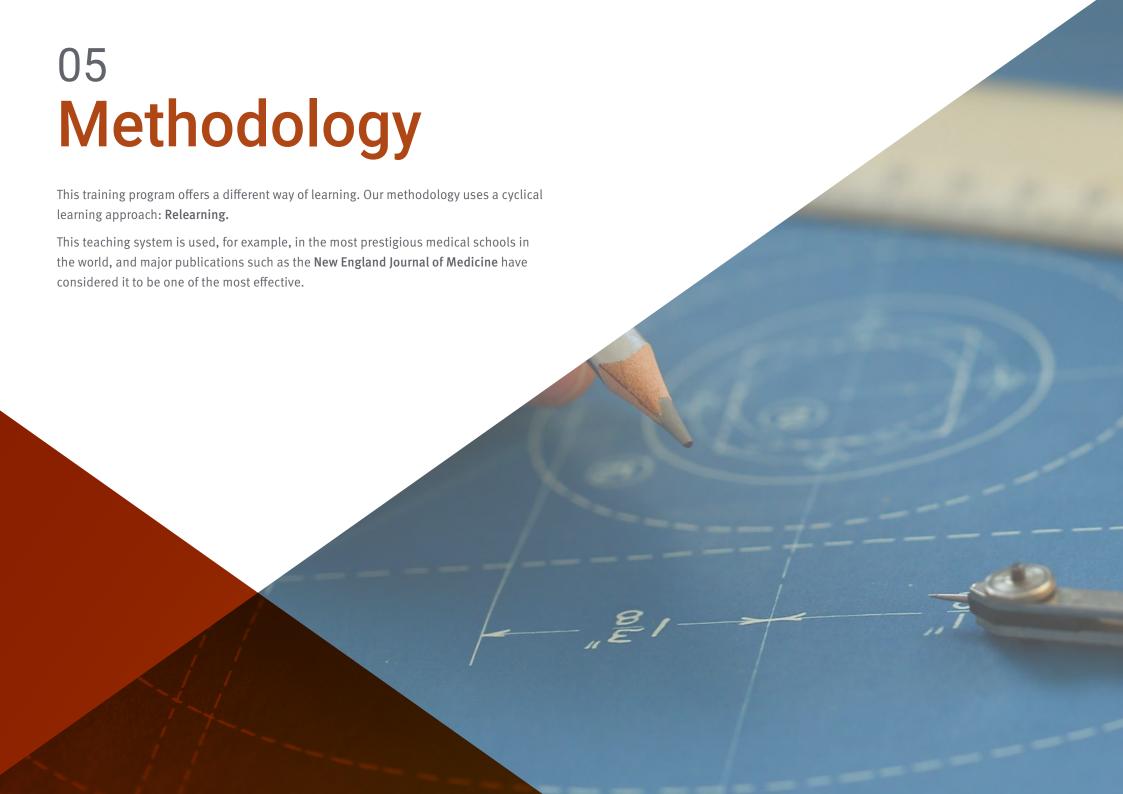
- 1.8.1. Evolution
- 1.8.2. Regulations
- 1.8.3. Architecture and Components
- 1.8.4. Modes of Operation
- 1.8.5. Design Criteria

#### 1.9. Relationship Between Rail Services and CCS

- 1.9.1. Urban Services
- 1.9.2. Interurban Services
- 1.9.3. High Speed Services

#### 1.10. Engineering Project

- 1.10.1. Regulations
- 9----
- 1.10.2. Index of the Project
- 1.10.3. Planning, Executing and Putting It Into Practice





# tech 22 | Methodology

#### At TECH we use the Case Method

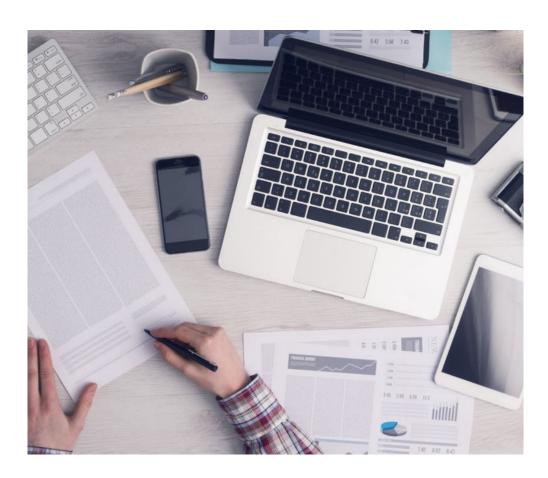
Our program offers a revolutionary method of skills and knowledge development. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.



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.



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

# 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.

# tech 24 | Methodology

# **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.



# Methodology | 25 tech

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.



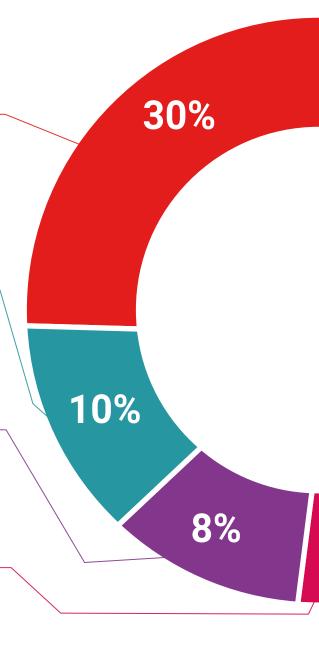
#### **Practising Skills and Abilities**

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.

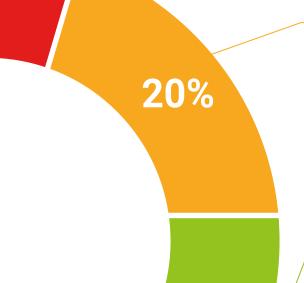


## **Additional Reading**

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.



# Methodology | 27 tech



25%

#### **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.



4%





# tech 30 | Certificate

This **Postgraduate Certificate in Railroad Control, Command and Signaling (CCS)** contains the most complete and up to date program on the market.

After the student has passed the evaluations, 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 program, and meets the requirements commonly demanded by labour exchanges, competitive examinations, and professional career evaluation committees.

Title: Postgraduate Certificate in Railroad Control, Command and Signaling (CCS)
Official N° of hours: 150 h.



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

