



## Postgraduate Diploma Road Construction and Maintenance

» Modality: online

» Duration: 6 months

» Certificate: TECH Technological University

» Dedication: 16h/week

» Schedule: at your own pace

» Exams: online

We b site: www.techtitute.com/us/engineering/postgraduate-diploma/postgraduate-diploma-road-construction-maintenance

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## tech 06 | Introduction

The Postgraduate Diploma in Road Construction and Maintenance has been designed to enable students to address any scenario of their future work in the field of roads. You will be ready to thrive in any of the areas of Road Construction and Maintenance, but you will also be ready to do so, both from a management perspective and trained to lead the Digital Transformation in your next job challenges.

Highways are an indispensable part of the transportation network, both for people and goods. These transportation routes have been indispensable since the origins of civilization, since they encourage the progress of peoples. The global pandemic caused by COVID19 has once again highlighted the importance of roads as a means of communication for supplying the population.

As main tools, the topics that make up each module have updated technical information, real case studies and of great interest. Always without losing sight of the digital transformation that everyone is going through and in which the road world is no exception.

In addition, as it is a 100% online Postgraduate Diploma, it 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 in accordance with the current times with all the guarantees to position the professional in a highly demanded area such as road construction.

This **Postgraduate Diploma in Road Construction and Maintenance** contains the most complete and up-to-date syllabus on the market. The most important features of the program include:

- Case studies presented by experts in Highway Engineering
- A deeper understanding of the management of resources for highway projects
- The graphic, schematic, and 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.
- 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



You will deepen your understanding of BIM methodology and how to apply it to each phase: design, construction, maintenance and



Detailed knowledge of the factors that affect the safety and comfort of the road, the parameters that measure it and the possible actions for its correction"

The program's teaching staff includes professionals from 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 an immersive training program designed to train in real situations.

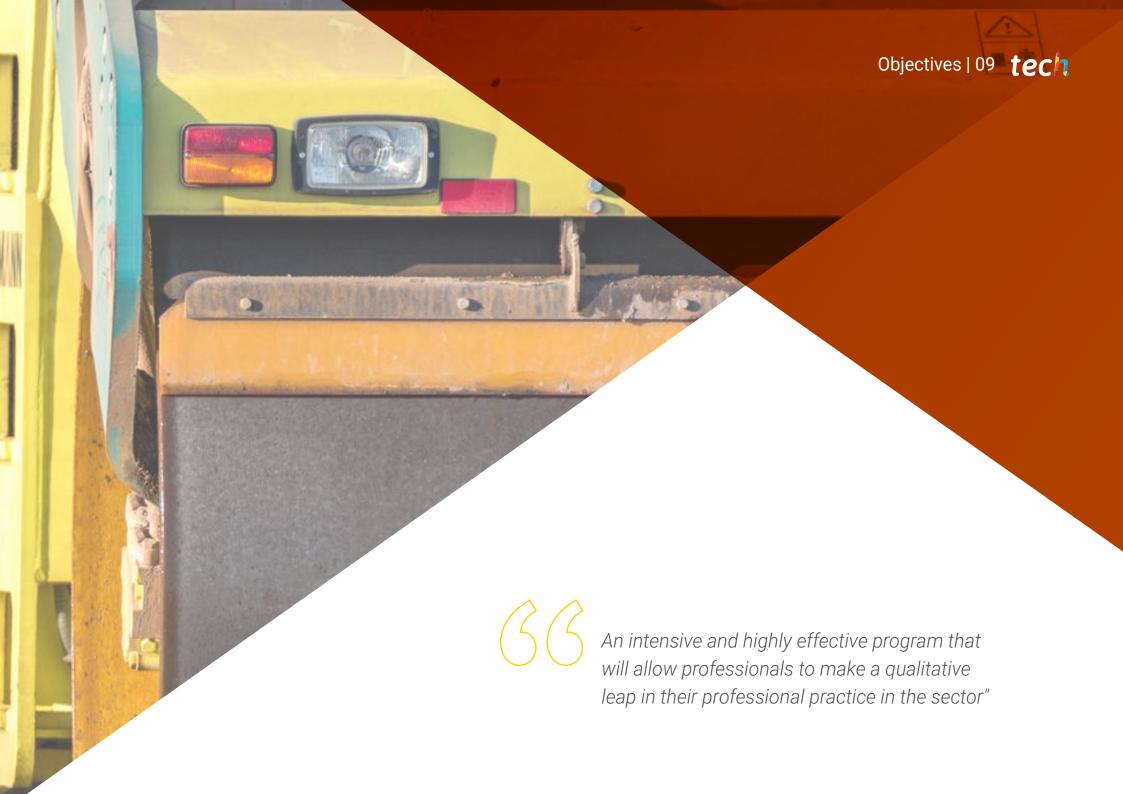
This program is designed around Problem Based Learning, whereby the professional must try to solve the different professional practice situations that arise during the academic year. For this purpose, the professional will be assisted by an innovative interactive video system created by renowned and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

A high-level program that will allow you to gain in-depth knowledge of everything related to Road Construction and Maintenance.

As it is an online program, you can study wherever and whenever you want. You will only need an electronic device with internet access.







## tech 10 | Objectives

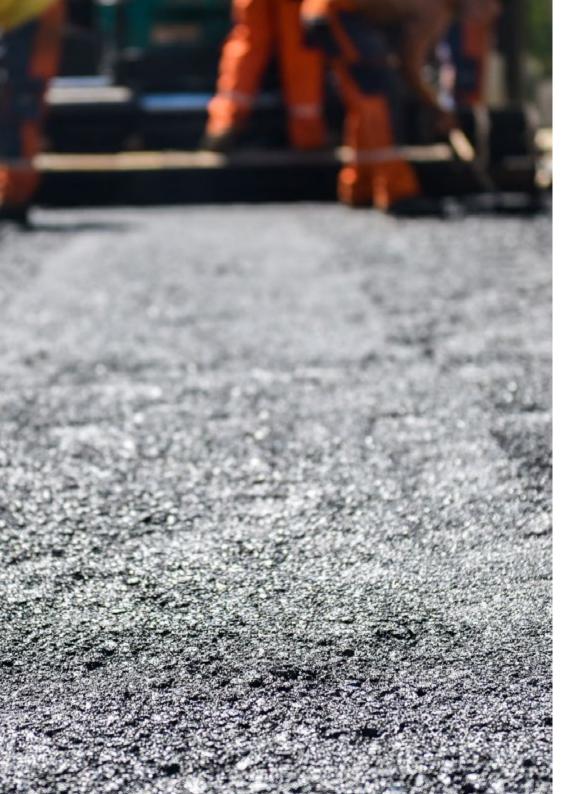


## **General Objectives**

- Master the different life phases of a highway, and the associated contracts and administrative procedures, both at national and international level
- Develop detailed knowledge of how a company is managed and the most important management systems.
- Analyze the different phases in the construction of a highway and the different types of bituminous mixes.
- Detailed knowledge of the factors that affect the safety and comfort of the road, the parameters that measure it and the possible actions for its correction.
- Gain an in-depth understanding of the different tunnel construction methods, the most frequent pathologies, and how to establish a maintenance plan.
- Analyze the singularities of each type of structure, and how to optimize its inspection and maintenance.
- Learn about the different electromechanical and traffic installations in tunnels, their function and operation, the importance of preventive and corrective maintenance.
- Analyze the assets that comprise a road, what factors should be taken into account in inspections, and what are the actions associated with each one of them
- Accurately understand the life cycle of the road and associated assets.
- In-depth breakdown of the factors that affect occupational risk prevention
- Know the fundamental aspects of the operation of a road in detail: applicable regulations, processing of files or authorizations.
- Understand how a predictive traffic model is performed and its applications.
- Mastering the fundamental factors that affect Road Safety
- $\bullet$  Understand precisely how winter maintenance is organized and managed.
- Analyze the operation of a Tunnel Control Center and how the different incidents are

managed.

- Know in detail the structure of the Operation Manual and the actors involved in tunnel operation.
- Break down the conditions for defining the minimum conditions under which a tunnel can be operated, and how to establish the associated methodology for fault resolution
- In-depth understanding of BIM methodology and how to apply it to each phase: design, construction and maintenance and operation.
- Make a comprehensive analysis of the most current trends in terms of society, environment and technology: connected vehicle, autonomous vehicle, Smart Roads.
- Have a firm grasp on the possibilities that some technologies are offering. In this way, combined with the student's experience, it can be the perfect alliance when designing the actual application or improving existing processes.





## Module 1. Layout, Grading and Execution of Pavements.

- Acquire in-depth knowledge in the design and layout of roads, understanding the importance of the different phases and stages for the realization of the same.
- Acquire the necessary knowledge regarding the different operations related to earth moving. Developing the different existing types, with a practical approach, which allows to know their costs, yields, etc., depending on the different terrains and typology of the works to be executed.
- Know, in detail, from a current and practical point of view, the constituent elements of bituminous pavements.
- Develop, in a comprehensive manner, the different types of existing pavements, with special emphasis on which situations to use each one of them. All this from an objective point of view based on experience, without forgetting to strengthen the knowledge from the point of view of the design of each of the different types of pavement.
- Able to accurately understand the day-to-day operation of a bituminous mix
  manufacturing facility. From the dosing and quality marking of the different mixtures, to
  the study of manufacturing costs and their maintenance
- Deepen in the day-to-day work of laying bituminous mixes, identifying the essential aspects and the most common difficulties in transport, paving and compacting operations.

## tech 12 | Objectives

#### Module 2. Tunnels and road works

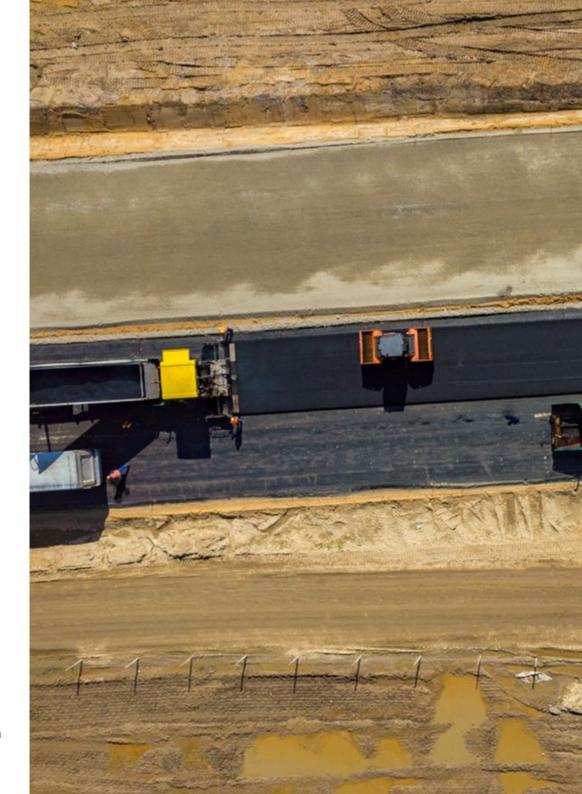
- Analyze the different tunnel construction systems and identify the most common pathologies depending on the construction system used.
- Master the inspection methods, deepen in data collection through destructive and nondestructive techniques, and know how to perform condition assessment.
- Make a comprehensive analysis of the different types of tunnel structural maintenance: ordinary, extraordinary, renovations, rehabilitations and reinforcements and how each is managed
- Understand the parameters that accurately measure the safety, comfort, capacity and durability of a pavement.
- In-depth knowledge of pavement monitoring and inspection systems.
- Discuss the actions that can be taken to correct the various parameters of pavements in detail

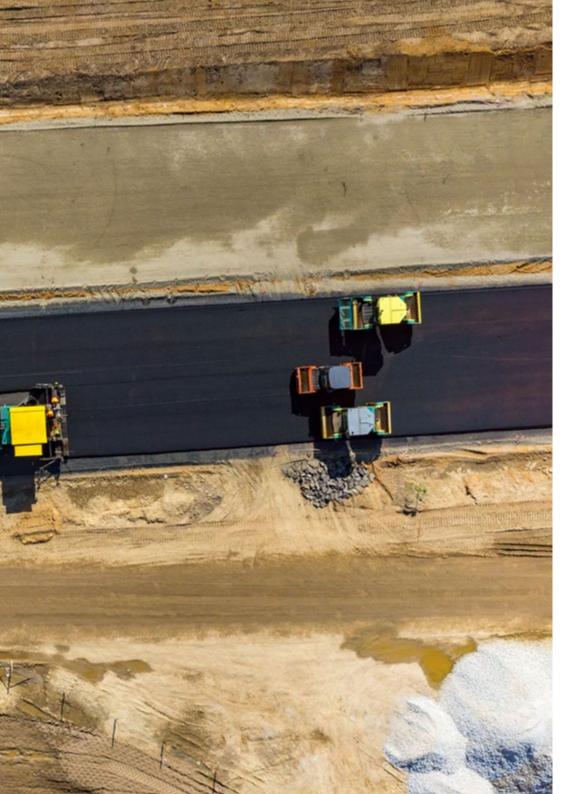
## Module 3. Structures and masonry

- Analyze how the life cycle of structures is managed through structure management systems.
- Understand, in detail, the different types of structural inspection, which players are involved, what methods are used and how the severity index is assessed
- Establish the different types of structural maintenance and how they are managed
- Gain an in-depth understanding of some of the unique maintenance operations.

## Module 4. Other highway elements

- Gain in-depth knowledge of the existing signaling, beaconing and containment elements on the road, the existing typologies and how their inspection and maintenance is carried out.
- Break down the different enclosure elements and their components, and how they are inspected and maintained.
- Analyze the elements involved in road drainage, and how their inspection and maintenance is carried out.
- Discuss, in detail, the different slope protection systems, and how to check their condition and their maintenance







During the Postgraduate Diploma, innovative contents about road construction and maintenance will be addressed, which will provide the student with in-depth knowledge of this sector"





## Manage-



## Mr. Barbero Miguel, Héctor

- Head of Safety, Operations and Maintenance at Empresa Mantenimiento y Explotación M30, (API Conservación, Dragados-IRIDIUM and Ferrovial Servicios)
- Somport Bi-national Tunnel Operations Manager
- Head of COEX in one of the Areas of the Provincial Council of Bizkaia
- COEX technician in Salamanca for the maintenance of the roads of the Junta de Castilla y León.
- Civil Engineer, Alfonso X el Sabio University.
- Technical Engineer in Public Works from the University of Salamanca.
- Professional Certificate in Spanish in Digital Transformation by MIT. Partner of EJE&CON
- He has held various positions in the road maintenance sector under the jurisdiction of the different Administrations.

## **Professors**

### Ms. Suárez Moreno, Sonia

- Production Manager at Empresa Mantenimiento y Explotación M30, S.A. (API Conservación, Dragados-IRIDIUM and Ferrovial Servicios)
- EJE&CON's "Talent without Gender" award for the company's talent development and communication policies.
- Member of the Conservation Committee of the Technical Road Association (ATC)
- Civil Engineer from the European University of Madrid.
- Public Works Engineer, Universidad Politécnica de Madrid.
- Senior Technician in Occupational Risk Prevention. Occupational Safety and Ergonomics and Applied Psychosociology

## Mr. Fernández Díaz, Álvaro

- Area delegate at trabajos Bituminosos SLU
- Civil Engineering at the E.T.S.I. de Caminos, C. y P. of the Polytechnic University of Madrid.
- Course on occupational risk prevention for managers of construction companies. Taught by the Construction Labor Foundation.
- Motivation, teamwork and leadership course. Delivered by Fluxá Training and Development

#### Ms. Hernández Rodríguez, Lara

- Specialist in international railway tenders. In the International Contracting Department of OHL Construction. Barcelona
- Production Manager at Nuevos Accesos Ampliación Sur. Phase 1A. Port of Barcelona
- Production Manager. Work on the abutments of the Barranco de Pallaresos viaduct on the Madrid-French border high-speed railway line.
- Degree in Civil Engineering from the Polytechnic University of Madrid. Madrid
- Expert in Port and Coastal Engineering from the University of Las Palmas de Gran Canaria.

#### Mr. Navascués Rojo, Maximiliano

- Works Group Leader at the multinational company DRAGADOS
- Civil Engineer by the Polytechnic University of Madrid and Master in Tunnels and Underground Works by the Spanish Association of Tunnels and Underground Works.
- Master's Degree in E-business and E-Commerce from the Comillas Pontificia University ICAI-ÍCADE
- Executive-MBA from Business School
- PMP (Project Management Professional) certificate by the Project Management Institute.

#### Dr. García García, Antonio

• Staff Engineer Network Intelligence & Automation en COMMSCOPE/ARRIS

- Member of the EMEA Network Intelligence & Automation Solution group within the Professional Services business unit.
- He has developed his professional career in different companies in the communications sector at European level such as ONO, Netgear, Telenet, Telindus or Vodafone.
- Computer Systems Technical Engineer Pontifical University of Salamanca

## Mr. Ferrán Íñigo, Eduardo

- Opening and management of business centers in Madrid, under a franchise system.
- Creation from scratch of a company that installs electric vehicle recharging points. Pioneer brand in the market with more than 4 years of life and wide implantation in Madrid and national presence.
- Degree in Business Administration from the University of Salamanca.
- Master's Degree in Business Administration





## tech 20 | Structure and Content

## Module 1. Layout, Grading and Execution of Pavements.

- 1.1. Road Planning and Design
  - 1.1.1. Development and Evolution of Materials
  - 1.1.2. Preliminary Study and Preliminary Design
  - 1.1.3. The Project
- 1.2. The Layout
  - 1.2.1. Plan Layout
  - 1.2.2. Elevation Plotting
  - 1.2.3. Cross Section
  - 1.2.4. Drainages
- 1.3. Earth Moving, Excavation and Blasting
  - 1.3.1. Earthwork
  - 1.3.2. Excavations
  - 1.3.3. Ripping and Blasting
  - 1.3.4. Singular Actions
- 1.4. Pavement Sizing
  - 1.4.1. Esplanade
  - 1.4.2. Road Surface Sections
  - 1.4.3. Analytical Calculation
- 1.5. Constituent Elements of Bituminous Pavements
  - 1.5.1. Aggregates
  - 1.5.2. Bitumens and Binders
  - 1.5.3. Filler
  - 1.5.4. Additives
- 1.6. Hot Mix Asphalt
  - 1.6.1. Conventional Bituminous Mixes
  - 1.6.2. Discontinuous Bituminous Mixtures
  - 1.6.3. Bituminous Mixes type SMA
- 1.7. Management of an Asphalt Plant
  - 1.7.1. Plant Organization
  - 1.7.2. Dosing of Mixtures: Working Formulas
  - 1.7.3. Quality Control: CE Marking
  - 1.7.4. Site maintenance

- 1.8. Cold Asphalt Mixtures
  - 181 Bituminous Slurries
  - 1.8.2. Gravel Irrigation
  - 1.8.3. Cold Agglomerate
  - 1.8.4. Complementary Techniques: Crack Sealing, etc.
- 1.9. Rigid Sidewalks
  - 1.9.1. Design
  - 1.9.2. On-site Installation
  - 1.9.3. Maintenance of Rigid Pavements
- 1.10. On-site Installation
  - 1.10.1. Transportation and Paving
  - 1.10.2. Compaction
  - 1.10.3. Good Practices

#### Module 2. Tunnels and road works

- 2.1. Recycling and In-Situ Stabilization of Pavements with Cement and/or Lime
  - 2.1.1. Stabilized in Situ with lime
  - 2.1.2. Stabilized in Situ with Cement
  - 2.1.3. In-situ Recycling of Concrete Pavements
- 2.2. Recycling of Bituminous Mixtures
  - 2.2.1. Recycling Machinery
  - 2.2.2. In-situ Cold Recycling with Bituminous Emulsion Coatings
  - 2.2.3. Recycling at Plant (RAP)
- 2.3. Pavement Monitoring
  - 2.3.1 Deterioration Assessment
  - 2.3.2. Surface Regularity
  - 2.3.3. Pavement Adhesion
  - 234 Deflections
- 2.4. Maintenance Operations on Pavements
  - 2.4.1. Repair of Damage
  - 2.4.2. Surface Rejuvenation and Renewal of the Wearing Course
  - 2.4.3. CRT Correction
  - 2.4.4. IRI Correction
  - 2.4.5. Pavement Rehabilitation

- 2.5. Singular Actions
  - 2.5.1. Asphalt Operation in Urban Areas
  - 2.5.2. Actions on High-Capacity Roads
  - 2.5.3. Use of Geogrids and/or Geocomposites
- 2.6. Tunnels. Regulations
  - 2.6.1. Construction
  - 2.6.2. Operation
  - 2.6.3. International
- 2.7. Tunnel Typology
  - 2.7.1. Open Air
  - 2.7.2. In Mine
  - 2.7.3. With Tunnel Boring Machine
- 2.8. General Characteristics of the Tunnel
  - 2.8.1. Excavation and Support
  - 2.8.2. Waterproofing and Coating
  - 2.8.3. Tunnel Drainage
  - 2.8.4. International Singularities
- 2.9. Tunnel Inventory and Inspection
  - 2.9.1. Inventory
  - 2.9.2. Laser Scanners
  - 2.9.3. Thermography
  - 2.9.4. Georadar
  - 2 9 5 Passive Seismic
  - 2.9.6. Refraction Seismic
  - 2.9.7. Pits
  - 2.9.8. Drilling and Coring
  - 2.9.9. Coating Coring
  - 2.9.10. Condition Assessment
- 2.10. Tunnel Maintenance
  - 2.10.1. Ordinary Maintenance
  - 2.10.2. Extraordinary Maintenance
  - 2.10.3. Renovation Operations
  - 2.10.4. Rehabilitation
  - 2.10.5. Reinforcements

## Module 3. Structures and masonry

- 3.1. Evolution of Structures
  - 3.1.1. Roman Engineering
  - 3.1.2. Evolution of Materials
  - 3.1.3. Evolution of Structural Design
- 3.2. Passage Works
  - 3.2.1. Pontoon
  - 3.2.2. Bridge
  - 3.2.3. Singular Works for the Preservation of Wildlife
- 3.3. Other Structures
  - 3.3.1. Walls and Retaining Elements
  - 3.3.2. Footbridges
  - 3.3.3. Porticos and Banners
- 3.4. Small Masonry and Drainage Works
  - 3.4.1. Spouts
  - 3.4.2. Culverts
  - 3.4.3. Sewers
  - 3.4.4. Drainage Elements in Structures
- 3.5. Bridge Management System
  - 3.5.1. Inventory
  - 3.5.2. Systematization of Structure Management
  - 3.5.3. Severity Rates
  - 3.5.4. Planning of Actions
- 3.6. Inspection of Structures
  - 3.6.1. Routine Inspections
  - 3.6.2. General Major Inspections
  - 3.6.3. Detailed Major Inspections
  - 3.6.4. Special Inspections
- 3.7. Structural Maintenance
  - 3.7.1. Ordinary Maintenance
  - 3.7.2. Renovation Operations
  - 3.7.3. Rehabilitation
  - 374 Reinforcements

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- 3.8. Singular Maintenance Actions
  - 3.8.1. Expansion Joints
  - 3.8.2. Support
  - 3.8.3. Concrete Walls
  - 3.8.4. Adequacy of Containment Systems
- 3.9. Singular Structures
  - 3.9.1. By Design
  - 3.9.2. For its Light
  - 3.9.3. For its Materials
- 3.10. The Value of Structures
  - 3.10.1. Asset Management
  - 3.10.2. Collapse. Unavailability Costs
  - 3.10.3. Equity Value

## **Module 4.** Other highway elements

- 4.1. Vertical Signage
  - 4.1.1. Types of Vertical Signage
  - 4.1.2. Inspections
  - 4.1.3. Performance
- 4.2. Horizontal Signage
  - 4.2.1. Types of Road Markings
  - 4.2.2. Auscultation
  - 4.2.3. Performance
- 4.3. Beacons, Traffic Islets and Curbs
  - 4.3.1. Types of Beacons
  - 4.3.2. Inspections
  - 4.3.3. Performance
- 4.4. Containment Systems
  - 4.4.1. Types of Containment Systems
  - 4.4.2. Inspections
  - 4.4.3. Performance
- 4.5. Enclosures
  - 4.5.1. Components.
  - 4.5.2. Inventory and Inspection
  - 4.5.3. Maintenance



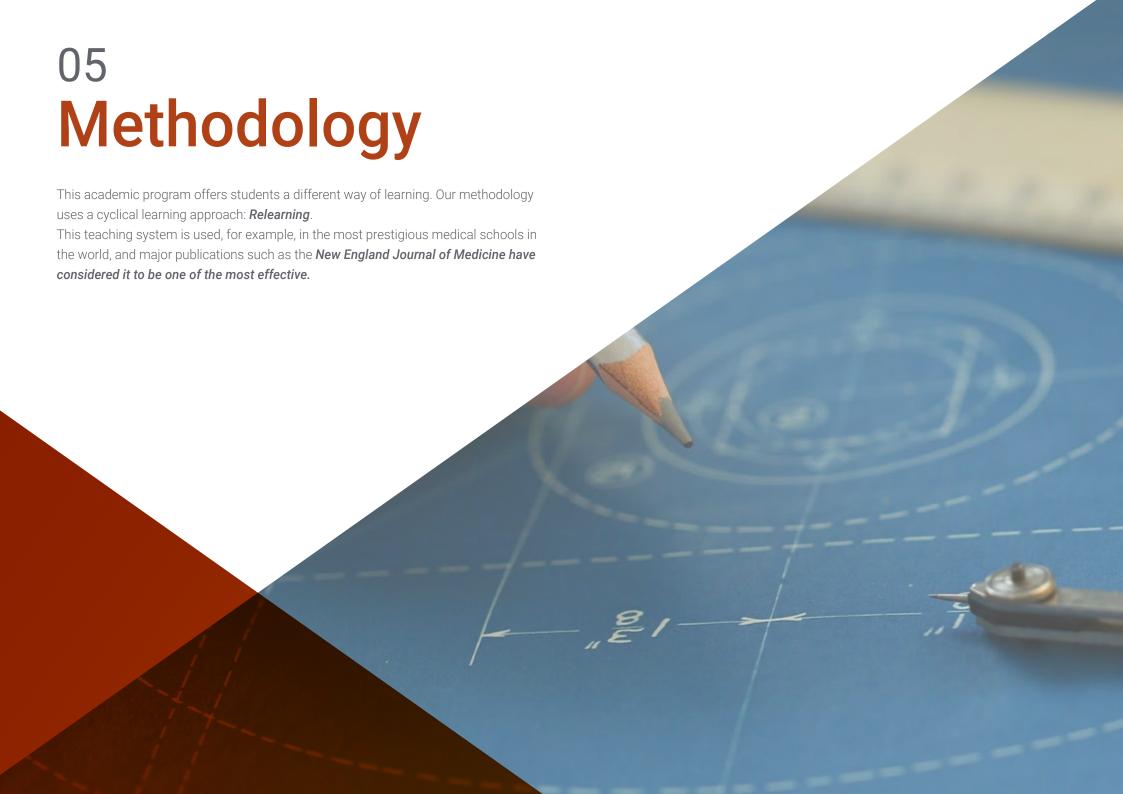


## Structure and Content | 23 tech

- 4.6. Drainages
  - 4.6.1. Drainage Elements
  - 4.6.2. Inventory and Inspection
  - 4.6.3. Maintenance
- 4.7. Slopes and Vegetation
  - 4.7.1. Slope Protection Systems
  - 4.7.2. Inventory and Inspection
  - 4.7.3. Maintenance
- 4.8. Level Crossings
  - 4.8.1. Road-FFCC
  - 4.8.2. Road-Airport
  - 4.8.3. Road-Bike Lane
- 4.9. RRLL Prevention
  - 4.9.1. Industry Idiosyncrasy
  - 4.9.2. Good Practices
  - 4.9.3. The Importance of Training
  - 4.9.4. Technology at the Service of Sustainability
- 4.10. The Lifecycle
  - 4.10.1. Construction and Start-Up
  - 4.10.2. Maintenance and Operation
  - 4.10.3. End of Useful Life



This TECH Postgraduate Diploma in Road Construction and Maintenance will make you stand out professionally, boosting your career path towards excellence in the sector"





## tech 26 | 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.





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

## Methodology | 27 tech



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 innova-

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 28 | 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 | 29 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



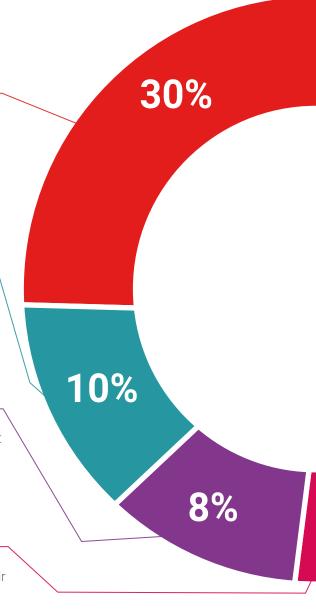
#### **Practising Skills and Abilities**

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.





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.

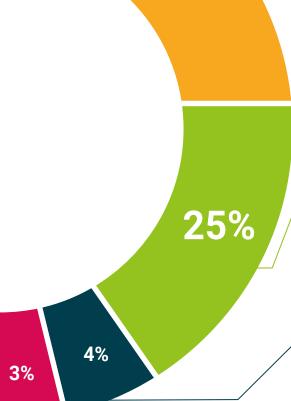


This exclusive multimedia content presentation training Exclusive system was awarded by Microsoft as a "European Success Story".

## **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.





20%





## tech 34 | Certificate

This **Postgraduate Diploma in Road Construction and Maintenance** contains the most complete and up-to-date program on the market today.

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

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

Title: **Postgraduate Diploma in Road Construction and Maintenance**Official N° of Hours: **600 hours**.



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

technological university Postgraduate Diploma Road Construction and

# Maintenance

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