



# Postgraduate Diploma Road Technology

» Modality: online

» Duration: 6 weeks

» Certificate: TECH Technological University

» Dedication: 16h/week

» Schedule: at your own pace

» Exams: online

 $We b site: {\color{blue}www.techtitute.com/us/engineering/postgraduate-diploma/postgraduate-diploma-road-technology}$ 

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### tech 06 | Introduction

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.

The Postgraduate Diploma in Road Technology has been designed to enable students to address any scenario of their future work in the field of roads. The student will be able to delve into the state-of-the-art of topics such as the connected vehicle, or the autonomous vehicle and how both are going to require changes in the competencies of the road professional. In the same way, some of the main projects under the general umbrella known as "Smart Roads" will be discussed in detail. Finally, there is a unit that breaks down technologies that are already beginning to be used in other sectors but will necessarily have a specific application on the roads of the future.

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 we are all undergoing and in which the world of roads 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 Technology** will make 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 be able to make a comprehensive analysis of the most current trends in society, environment and technology: connected vehicle, autonomous vehicle and Smart Roads"

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.

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

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









## 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
- Gain in-depth knowledge of the different electromechanical and traffic installations in tunnels, their function, operation and 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
- Understand precisely how winter maintenance is organized and managed





### Objectives | 11 tech

- 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

### tech 12 | Objectives



### **Specific Objectives**

#### Module 1. Electromechanical Installations

- Analyze the differences between opencast and tunnel lighting systems
- In-depth breakdown of the operation and function of the various installations involved in tunnel operation: power supply, ventilation, pumping stations, PCI systems
- Perform effective maintenance of the facilities based on a combination of corrective and preventive maintenance, with emphasis on predictive maintenance

#### Module 2. Traffic installations

- Establish the various systems for detecting incidents in tunnels
- Know precisely which systems are involved in incident signaling, as well as the systems used to communicate with the user in the event of an incident
- Know in detail how the communication between the Control Center and the field equipment is structured and the elements involved
- Perform effective maintenance of traffic facilities based on a combination of corrective and preventive maintenance, with emphasis on predictive maintenance

#### Module 3. BIM in highways

- Gain insight into the BIM concept and distinguish it from simply deciding which commercial software to use
- Delve into the different levels of implementation
- Be prepared to address BIM implementation in both projects and pre-existing infrastructure
- Analyze the technologies that complement the BIM philosophy





### Module 4. The highway of the future

- Understand precisely how social equity measures enhance competitiveness
- Prepare for the change in direction that the roadside professional faces in the immediate future
- Further study of the changes that new technologies will force on the infrastructure or the vehicle
- Discover how to lead environmentally responsible policies through detailed knowledge of new trends



During the Postgraduate Diploma, innovative contents about Road Technology will be addressed, which will provide the student with in-depth knowledge of this sector"





### Management



### 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
- $\bullet$  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

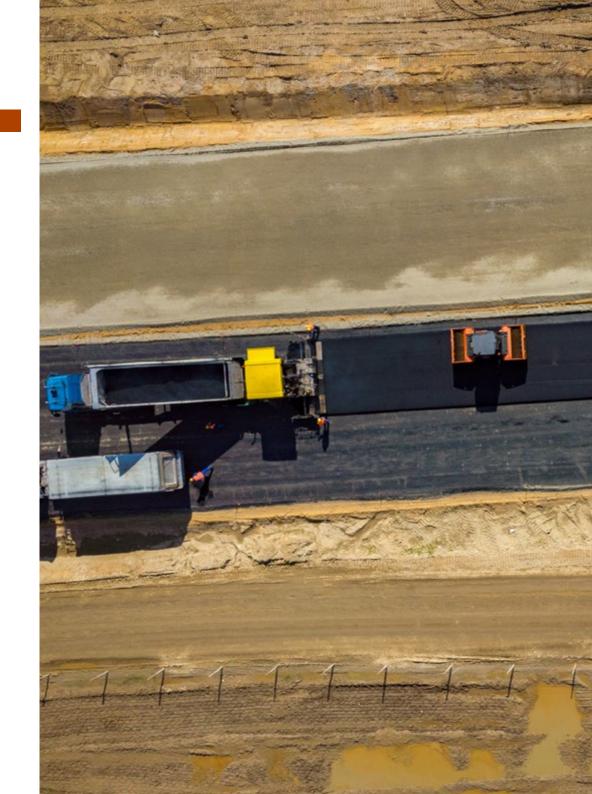


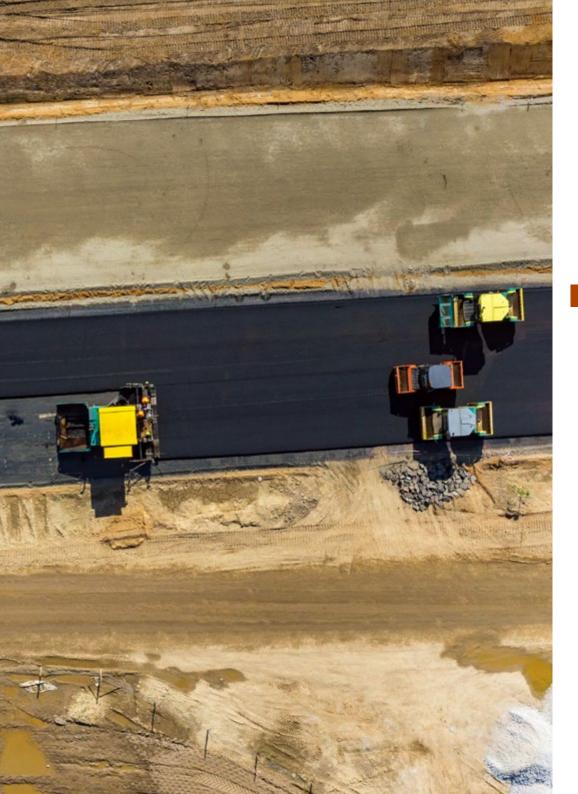


### tech 20 | Structure and Content

### Module 1. Electromechanical Installations

- 1.1. Roadside Facilities
  - 1.1.1. Fundamental Concepts
  - 1.1.2. Open Air
  - 1.1.3. In Tunnel
  - 1.1.4. Predictive Maintenance
- 1.2. Open-air Lighting
  - 1.2.1. Installation
  - 1.2.2. Preventative Maintenance
  - 1.2.3. Corrective Maintenance
- 1.3. Tunnel Lighting
  - 1.3.1. Installation
  - 1.3.2. Preventative Maintenance
  - 1.3.3. Corrective Maintenance
- 1.4. Power Supply
  - 1.4.1. Installation
  - 1.4.2. Preventative Maintenance
  - 1.4.3. Corrective Maintenance
- 1.5. Generator Sets and UPS
  - 1.5.1. Installation
  - 1.5.2. Preventative Maintenance
  - 1.5.3. Corrective Maintenance
- 1.6. Ventilation
  - 1.6.1. Installation
  - 1.6.2. Preventative Maintenance
  - 1.6.3. Corrective Maintenance
- 1.7. Pumping Stations
  - 1.7.1. Installation
  - 1.7.2. Preventative Maintenance
  - 1.7.3. Corrective Maintenance
- 1.8. PCI Systems
  - 1.8.1. Installation
  - 1.8.2. Preventative Maintenance
  - 1.8.3. Corrective Maintenance





### Structure and Content | 21 tech

- 1.9. Particulate and Gas Filtering Stations
  - 1.9.1. Installation
  - 1.9.2. Preventative Maintenance
  - 1.9.3. Corrective Maintenance
- 1.10. Other Facilities
  - 1.10.1. On the Evacuation Route
  - 1.10.2. Engines
  - 1.10.3. Transformer Station
  - 1.10.4. Corrosion Control

### Module 2. Traffic installations

- 2.1. The Fourth Technician
  - 2.1.1. Description
  - 2.1.2. Documentation
  - 2.1.3. Maintenance
- 2.2. CCT Equipment
  - 2.2.1. Control Software
  - 2.2.2. Application Integration
  - 2.2.3. Decision Support System
- 2.3. ERU/PLC
  - 2.3.1. Installation
  - 2.3.2. Preventative Maintenance
  - 2.3.3. Corrective Maintenance
- 2.4. CCTV/DAI
  - 2.4.1. Installation
  - 2.4.2. Preventative Maintenance
  - 2.4.3. Corrective Maintenance
- 2.5. SOS and Radio Communication Poles
  - 2.5.1. Installation
  - 2.5.2. Preventative Maintenance
  - 2.5.3. Corrective Maintenance

### tech 22 | Structure and Content

- 2.6. Variable Signage
  - 2.6.1. Installation
  - 2.6.2. Preventative Maintenance
  - 2.6.3. Corrective Maintenance
- 2.7. Access Equipment
  - 2.7.1. Installation
  - 2.7.2. Preventative Maintenance
  - 2.7.3. Corrective Maintenance
- 2.8. Detection of Atmospheric Conditions
  - 2.8.1. Installation
  - 2.8.2. Preventative Maintenance
  - 2.8.3. Corrective Maintenance
- 2.9. Traffic Stations
  - 2.9.1. Installation
  - 2.9.2. Preventative Maintenance
  - 2.9.3. Corrective Maintenance
- 2.10. Other Facilities
  - 2.10.1. Public Address
  - 2.10.2. Thermal Cameras
  - 2.10.3. Fire Detection

### Module 3. BIM in highways

- 3.1. Origins of Information
  - 3.1.1. Project Documentation
  - 3.1.2. Network Inventory
  - 3.1.3. CMMS
  - 3.1.4. ITS
- 3.2. BIM at the conceptual level
  - 3.2.1. Applicable Regulations
  - 3.2.2. Description of BIM Methodology
  - 3.2.3. BIM Advantages

- 3.3. Implementation of the BIM Methodology in an In-Service Infrastructure
  - 3.3.1. Coding Assets
  - 3.3.2. Documentation Coding
  - 3.3.3. Attribute Dictionary
  - 3.3.4. IFCs
- 3.4. The BIM Model in Maintenance and Operation
  - 3.4.1. Integration of the Different Platforms
  - 3.4.2. The Importance of Document Management
  - 3.4.3. Knowledge of the State of the Infrastructure
- 3.5. BIM Experiences in other Infrastructures
  - 3.5.1. BIM in Railroads
  - 3.5.2. BIM in Building
  - 3.5.3. BIM in Industry
- 3.6. Software BIM
  - 3.6.1. Plan
  - 3.6.2. Open BIM
  - 3.6.3. Modeling
- 3.7. BIM Management
  - 3.7.1. ISO 19650
  - 3.7.2. BIM manager
  - 3.7.3. The Role of the BIM
- 8.8. Digital Twin
  - 3.8.1. Description
  - 3.8.2. Operation
  - 3.8.3. Advantages
- 3.9. Other Skills to be Developed by the Roadside Professional
  - 3.9.1. Databases
  - 3.9.2. Python Programming
  - 3.9.3. Big Data
- 3.10. New Technologies
  - 3.10.1. 3D Printing
  - 3.10.2. Virtual Reality, Augmented Reality
  - 3.10.3. Point Cloud

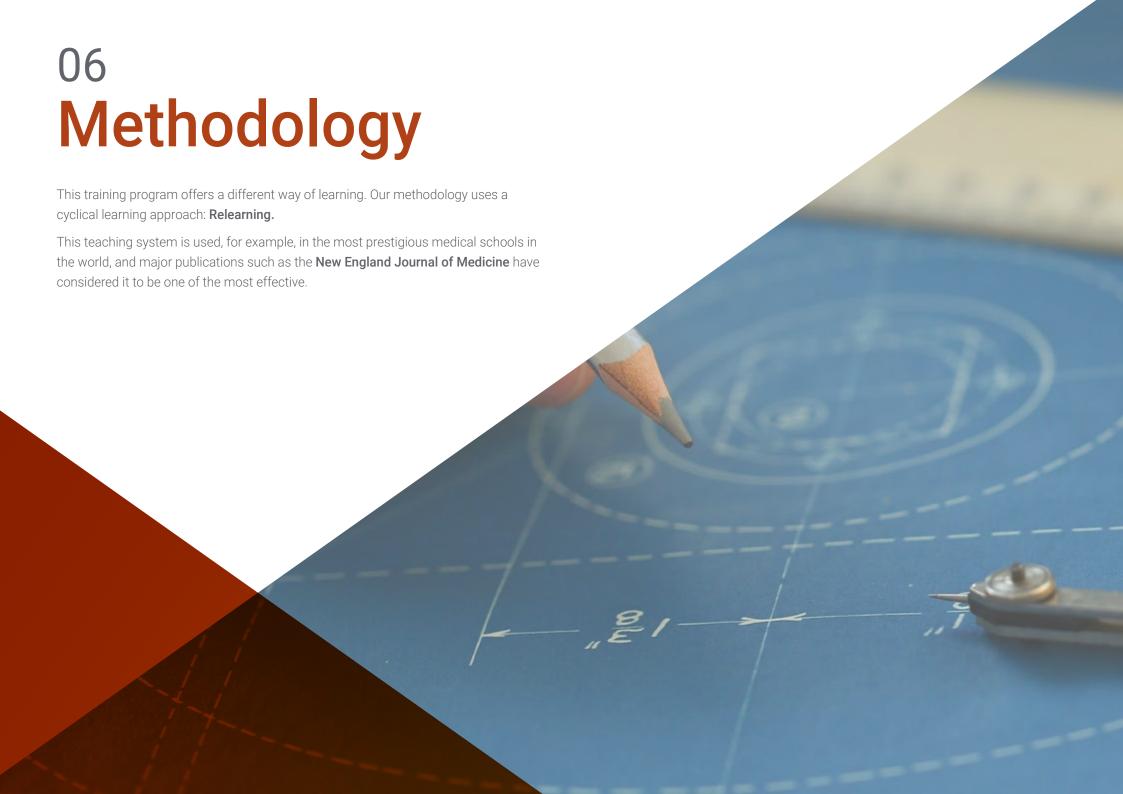
### Module 4. The highway of the future

- 4.1. Social Equity
  - 4.1.1. Equality Policies
  - 4.1.2. Transparency
  - 4.1.3. Remote work Possibilities
- 4.2. Environment
  - 4.2.1. Circular Economy
  - 4.2.2. Energy Autonomy of the Road
  - 4.2.3. Energy Use of the Subsoil
  - 4.2.4. New Projects under Development
- 4.3. Present Continuous
  - 4.3.1. RSC
  - 4.3.2. Administration Liability
  - 4.3.3. The Road in Pandemic
- 4.4. From Passive to Active Information
  - 4.4.1. The Hyperconnected User
  - 4.4.2. Cross Information with Other Modes of Transportation
  - 4.4.3. RRSS
- 4.5. Operation
  - 4.5.1. Variable Speed Management
  - 4.5.2. Pay-Per-Use
  - 4.5.3. Dynamic Electric Recharging
- 4.6. 5G Networks
  - 4.6.1. Network Description
  - 4.6.2. Network Deployment
  - 4.6.3. Utilities
- 4.7. The Connected Vehicle
  - 4.7.1. Road Vehicle
  - 4.7.2. Vehicle Road
  - 4.7.3. Vehicle Vehicle

- 4.8. Autonomous Vehicle
  - 4.8.1. Fundamental Principles
  - 4.8.2. How Does It Affect the Road?
  - 4.8.3. Services Required
- 4.9. Smart Roads
  - 4.9.1. Solar Roads
  - 4.9.2. Roads that Decarbonize
  - 4.9.3. Road and Solar Energy
  - 4.9.4. Asphalt of the Future
- 4.10. Applications at your Fingertips
  - 4.10.1. Artificial Intelligence: Image Recognition
  - 4.10.2. Drones on the Road: From Surveillance to Inspection
  - 4.10.3. Robotics in the Service of Occupational Safety



This TECH Postgraduate Diploma in Road Technology will make you stand out professionally, propelling your career path towards industry excellence"





### 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.



At TECH, you will experience a way of learning that is shaking 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.

### 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 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 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 confidence in future difficult decisions.



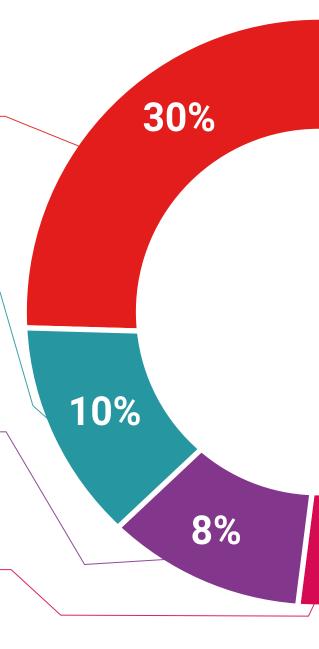
#### **Practising Skills and Abilities**

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.





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.

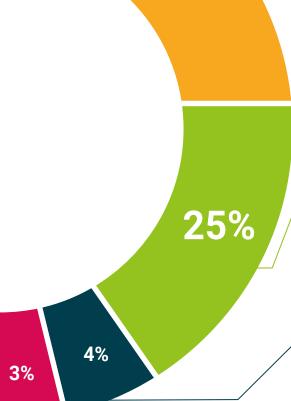


This exclusive multimedia content presentation training Exclusive system was awarded by Microsoft as a "European Success Story".

### **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 Technology** 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 Diploma** 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 from career evaluation committees.

Title: Postgraduate Diploma in Road Technology Official N° of Hours: 600 h.



#### **POSTGRADUATE DIPLOMA**

in

#### Road Technology

This is a qualification awarded by this University, equivalent to 600 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH is a Private Institution of Higher Education recognized by the Ministry of Public Education as of June 28, 2018.

ne 17, 2020

Tere Guevara Navarro

e TECH Code: AFWORD23S techtitute.com/certif

<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 Technology

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- » Dedication: 16h/week
- » Schedule: at your own pace
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