

# Postgraduate Certificate

## New Technological Materials Applied to Engineering and Construction



## Postgraduate Certificate New Technological Materials Applied to Engineering and Construction

- » Modality: **online**
- » Duration: **6 weeks**
- » Certificate: **TECH Global University**
- » Credits: **6 ECTS**
- » Schedule: **at your own pace**
- » Exams: **online**

Website: [www.techtute.com/us/engineering/postgraduate-certificate/new-technological-materials-applied-engineering-construction](http://www.techtute.com/us/engineering/postgraduate-certificate/new-technological-materials-applied-engineering-construction)

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# 01

# Introduction

Innovation is present in all aspects of daily life, from cell phones and Internet information transmissions to engineering. Understanding this process is fundamental to entering a whole field that studies how to protect new discoveries until funding is secured to help continue research into new materials that improve construction. Thus, professionals must specialize in all these skills in order to progress in their field of work. This program addresses this and other indispensable topics to boost the professional career of any civil engineer.





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*Developing new materials will advance your career as a civil engineer”*

The innovation process can be so complex that it has attracted the attention of many experts. To understand it is to enter a field that helps future engineers to develop new materials that enhance the quality of civil engineer work, be it a building, roads or bridges. In the Postgraduate Certificate in New Technological Materials Applied to Engineering and Construction, the student will learn about this process and all the requirements needed for the protection of new discoveries and to obtain the necessary funding to carry out research.

The classes throughout the course will cover the different areas of civil engineering. The first one focuses on roads and how the incorporation of waste has fostered the so called "circular economy". Students will also learn about the different ways to solve the problem of ecosystem fragmentation caused by roads built on fauna and flora. In addition, an exhaustive analysis will be made of the new materials in the railway sub infrastructure and the way to eliminate catenaries, the infrastructure that produces a high visual impact in the cities.

In the two renewable energy topics, the innovations that civil engineering has contributed to the progress of renewable energies will be reviewed in detail, including the resolution of problems in the operation of energy producing infrastructures. The last area covered is maritime engineering, where the student will be invited to analyze the latest developments in oceanographic works. It is especially interesting is to consider the natural alternative in seawalls as opposed to the usual concrete seawalls.

For this reason, we have an excellent teaching staff that offers students their extensive experience in the new technological materials applied to engineering and construction. With a 100% online Postgraduate Certificate students will be able to study 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 New Technological Materials Applied to Engineering and Construction** contains the most complete and up to date educational program on the market. The most important features of the program include:

- ◆ Gain in depth knowledge of the variables, analysis and processing methods, as well as the characterization and properties of the materials used in construction
- ◆ Determine the life cycle and the carbon footprint of the materials
- ◆ Experiment with new materials and technology related to new applications and uses
- ◆ Manage new building technologies and participate in building quality management processes
- ◆ Evaluate aspects of sustainability and environmental impact of the materials
- ◆ Analyze the concept of durability of the construction materials and their relationship with the concept of sustainability
- ◆ Identify the main causes of the alteration of construction materials



*Discover how engineers have made the most of the use of new technologies in the develop of big infrastructure works"*

“*Evaluate new technologies such as the use of drones or the internet to improve your work project proposals*”

*Learn about the areas of maritime engineering that present a sustainable and environmentally friendly proposal.*

*This course is designed for the student's development in the field of work through practical cases presented by experts in civil engineering.*

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 immersive training programmed to train in real situations.

The design of this program focuses on Problem Based Learning, which means the student must try to solve the different real life situations of that arise throughout the academic program. For this purpose, the professional will be assisted by an innovative interactive video system created by renowned and experienced experts.



# 02 Objectives

The design of this Postgraduate Certificate will allow the student to acquire new competencies and skills that are necessary to update their knowledge and skills in their profession. The knowledge presented in this program will address the analysis of the different materials used in road construction, going into a detailed analysis of the different techniques applied to construction materials and the new technologies developed. In view of the above, TECH establishes the following general and specific objectives to guarantee the satisfaction of the future graduate.





“Apply new manufacturing techniques in materials to reduce the impact on the environment”



## General Objectives

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- ◆ Perform an exhaustive analysis of the different types of construction materials
- ◆ Gain in depth knowledge of the features of different construction materials
- ◆ Implement new technologies applied to engineering materials
- ◆ Assess the waste materials
- ◆ Manage materials from a quality and production point of view
- ◆ Apply new techniques in making construction materials that are more environmentally friendly
- ◆ Raise awareness of new trends and materials applied to construction





## Specific Objectives

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- ◆ Analyze the different materials that are involved in the construction and conservation of roads
- ◆ Delve into the different parts that make up roads, drainage, roadbeds, base layers and pavement layers, as well as surface treatments
- ◆ Perform an in depth breakdown of asphalt mix manufacturing and laying procedures

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*Learn how research into new materials has helped with the construction of new roads and apply this knowledge to any infrastructure project on an international level”*

03

# Course Management

In our commitment to offer elite education for all, TECH works with renowned professionals so that the student acquires solid knowledge in the speciality of New Technological Materials Applied to Engineering and Construction. For this reason, this program has a highly qualified team with extensive experience in the sector, which will offer the best tools for students to develop their skills in each class.





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*The teaching staff will provide you with all the knowledge they have gained from their experience in engineering to help you become an expert in new construction materials”*

## Management



### Dr. Miñano Belmonte, Isabel de la Paz

- ◆ Contracted Doctor for the Advanced Construction Science and Technology Group of the Polytechnic University of Cartagena
- ◆ Technical Architect from the Polytechnic University of Cartagena
- ◆ Construction Engineer from the Camilo José Cela University
- ◆ PhD from the Polytechnic University of Cartagena
- ◆ Master's Degree in Construction (Major in Technology) from the Polytechnic University of Valencia
- ◆ Speaker at various national and international conferences and congresses
- ◆ Author of the books "*Manual de cálculo de hormigón armado. Teoría y ejemplos prácticos*" (Reinforced concrete calculation manual. Theory and practical examples) and "*Problemas resueltos de hormigón armado (HA)*" (Solved problems of reinforced concrete), as well as author of specific chapters in other books
- ◆ Co-author of various scientific high impact publications on construction materials



### Dr. Benito Saorin, Francisco Javier

- ◆ Technical Architect in Optional Direction and Coordination Functions Of SS
- ◆ Municipal Technician in the Ricote-Murcia Town Hall
- ◆ Work experience in an Architecture Office
- ◆ Construction Engineer
- ◆ Construction Engineer from the Camilo José Cela University
- ◆ PhD from the Polytechnic University of Valencia
- ◆ Master's Degree in Construction (Major in Technology) from the Polytechnic University of Valencia
- ◆ Vast experience in R&D&I with more than 10 years experience on site
- ◆ Reviewer of journals indexed in JCR
- ◆ Articles in international congresses and high impact indexed journals on the different areas of construction materials



### **Dr. Rodríguez López, Carlos Luis**

- ◆ Head of the Materials Department at the Construction Technology Center of the Region of Murcia
- ◆ Coordinator of the sustainable construction and climate change area in CTCON
- ◆ Technician in the projects department of PM Arquitectura y Gestión SL
- ◆ PhD in Construction Engineering in Construction Materials and Sustainable Construction
- ◆ Construction Engineer from Polytechnic University of Cartagena
- ◆ PhD from the University of Alicante
- ◆ Master's Degree in Engineering of Materials, Water and Land: Sustainable Construction from the University of Alicante
- ◆ Extensive experience in R&D&I
- ◆ Articles in international congresses and high impact indexed journals on the different areas of construction materials
- ◆ Specialist in the development of new materials, products for construction and in the analysis of pathologies in construction

## Professors

### Mr. del Pozo Martín, Jorge

- ◆ Technical and economic evaluator and project auditor at the Spanish Ministry of Science and Innovation
- ◆ Civil Engineer
- ◆ Diploma in Business Administration from UNED In his professional work experience, he worked in the private sector in Arthur Andersen, Pacadar, Dragados and Bovis Lend Lease
- ◆ Master's Degree in Research in Civil Engineering from the University of Cantabria

### Dr. Muñoz Sánchez, María Belén

- ◆ Consultant in Innovation and Sustainability of Construction Materials
- ◆ Reseracher in polymers at POLYMAT
- ◆ Dr. Engineer of Sustainable Processes and Materials from the University of the Basque Country
- ◆ Chemical Engineer from the University of Extremadura
- ◆ Master's Degree in Research, with a major in Chemistry from the University of Extremadura
- ◆ Extensive experience in R&D&I in materials, including waste valorization to create innovative construction materials
- ◆ Co-author of scientific article published in international journals
- ◆ Speaker at international congresses related to renewable energies and the environmental sector





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*This academic itinerary is exclusive to TECH and you will be able to develop it at your own pace thanks to its 100% online Relearning methodology”*

04

# Structure and Content

This syllabus has been designed to meet the essential requirements that will help the student to learn about the new technological materials that have been developed for the engineering and construction area. In addition, thanks to the proposals of the teaching team, it has the necessary structure to offer a broad perspective in this field. All of this will help students delve into the science of new materials and their use in the construction of roads and railroads.





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*Carry out an exhaustive analysis of new materials and their application in roads and railroads in order to improve the visual impact of cities”*

## Module 1. New Materials and Innovations in Engineering and Construction

### 1.1. Innovation

1.1.1. Innovation. Incentives. New Products and Diffusion

1.1.2. Innovation Protection

1.1.3. Innovation Financing

### 1.2. Roads I

1.2.1. Circular Economy with New Materials

1.2.2. Self Repairing Roads

1.2.3. Decontaminating Roads

### 1.3. Roads II

1.3.1. Energy Production on Roads

1.3.2. Wildlife Passes. Ecosystem Fragmentation

1.3.3. IoT and Digitalization in Roads

### 1.4. Roads III

1.4.1. Safe Roads

1.4.2. Anti Noise Roads and "Noisy" Roads

1.4.3. Anti Heat Island Roads in Cities

### 1.5. Railroads

1.5.1. New Alternative Materials to Ballast

1.5.2. Ballast Flight

1.5.3. Elimination of Catenaries on Tramways

### 1.6. Underground and Tunnel Works

1.6.1. Excavation and Gunning

1.6.2. RMR (*Rock Mass Rating*)

1.6.3. Tunnel Boring Machines





- 1.7. Renewable Energy I
  - 1.7.1. Solar Photovoltaic
  - 1.7.2. Solar Thermal
  - 1.7.3. Wind
- 1.8. Renewable Energy II
  - 1.8. 1. Maritime
  - 1.8.2. Hydroelectric
  - 1.8.3. Geothermal
- 1.9. Maritime Works
  - 1.9.1. New Materials and Shapes in Seawalls
  - 1.9.2. Natural Alternative to Artificial Works
  - 1.9.3. Prediction of Ocean Weather
- 1.10. Incorporation of Innovation from Other Construction Sectors
  - 1.10.1. LIDAR (*Laser Imaging Detection and Ranging*)
  - 1.10.2. Drones
  - 1.10.3. *Internet of Things* (IoT)

“Apply new technologies such as drones and lasers in the construction sector and develop an infrastructure project that is at the forefront of the modern trends in construction”

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.

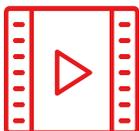
*Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.*

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.



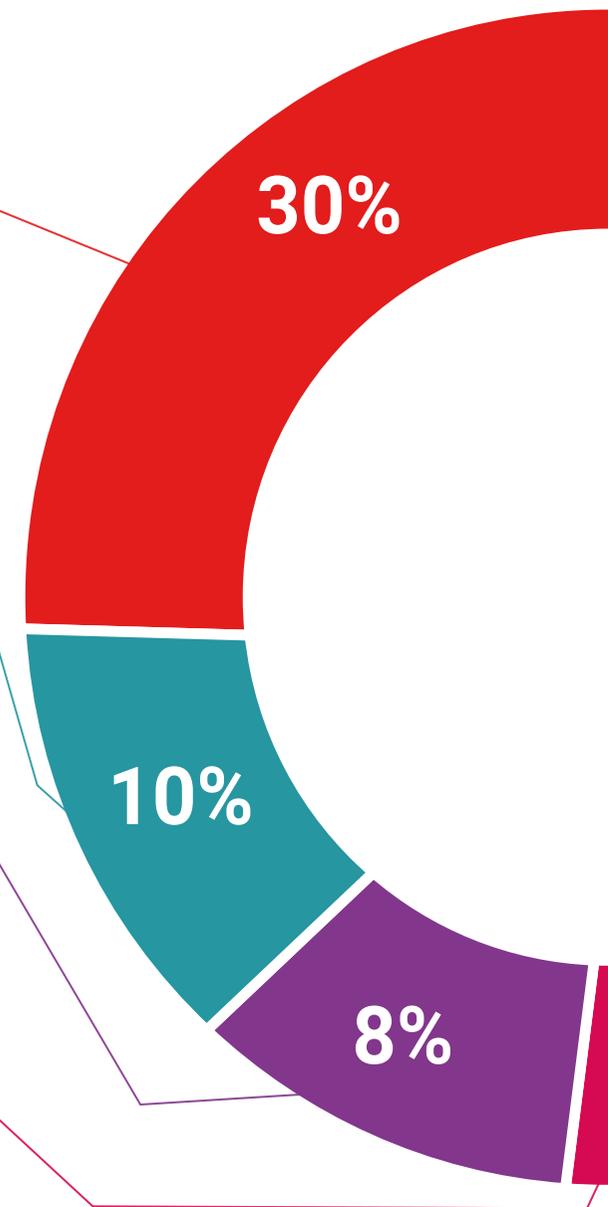
#### Practising Skills and Abilities

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 New Technological Materials Applied to Engineering and Construction guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Global University.



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

This program will allow you to obtain your **Postgraduate Certificate in New Technological Materials Applied to Engineering and Construction** endorsed by **TECH Global University**, the world's largest online university.

**TECH Global University** is an official European University publicly recognized by the Government of Andorra ([official bulletin](#)). Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Certificate in New Technological Materials Applied to Engineering and Construction**

ECTS: 6

Official N° of Hours: **150 h.**



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



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