

# Postgraduate Certificate Industrialization and Earthquake-Resistant Construction





## Postgraduate Certificate Industrialization and Earthquake-Resistant Construction

Modality: **online**

Duration: **6 weeks**

Certificate: **TECH Technological University**

Official N° of Hours: **150 h.**

Website: [www.techtitute.com/engineering/postgraduate-certificate/postgraduate-certificate-industrialization-earthquake-resistant-construction](http://www.techtitute.com/engineering/postgraduate-certificate/postgraduate-certificate-industrialization-earthquake-resistant-construction)

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# 01

# Introduction

The best prevention against any natural event is to prepare before it happens. This has been the main premise in the design of a earthquake-resistant construction, that is, a building that can survive a major earthquake. This has become a requirement in many constructions on an international level, becoming standardized to guarantee the safety of the structures. Thus, it is essential for today's professionals to specialize in this area in order to apply the knowledge acquired in their work projects. During this program which focuses on Industrialization and Earthquake-Resistant Construction, this and other points of interest for future graduates will be addressed.







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*Analyze and assess advanced techniques for characterization of construction systems to make them more resistant to natural events”*

The world has faced numerous natural disasters, often fatal, which have led to the creation of a collective awareness of them. Thus, the idea was born for earth-quake resistant buildings that are built according to the conditions of the areas in which they will be located. This has been possible due to countless research, techniques and tests on materials that absorb destructive earthquake waves.

The Postgraduate Certificate in Industrialization and Earthquake-Resistant Construction will show the progress and application of structural models for a project of concrete structures in buildings at risk of being exposed to earthquakes. Likewise, the student will be able to evaluate and interpret the regulations on actions, materials, components and concretes in the seismic field. Furthermore, we will cover the distinction and application of the criteria for the adequate design of the reinforcement of concrete structures exposed to seismic activity.

In addition, the solutions provided when building a timber construction, a skyscraper or a prefabricated construction will be analyzed; differentiating and assessing the different elements and innovations involved. The BIM methodology will also be discussed in detail in this process that has revolutionized the engineering field.

For this reason, we have an excellent teaching staff that offers students their extensive experience in the construction of this type of building. 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 Industrialization and Earthquake-Resistant 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 quality management processes in construction
- ◆ 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



*Apply the latest systems and technology for the rehabilitation of a construction project and the maintenance of old buildings”*

“

*Study this Postgraduate Certificate  
100% online at a time to suit you no  
matter where you are”*

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.

*Analyze and understand the structural  
characteristics that influence the  
behavior of buildings.*

*Boost your career to an international  
level by studying a program that  
is focused on a highly-demanded  
professional field.*





# 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 gained from this program will allow students to gain in-depth knowledge of the progress and application of structural models for a construction project in a area of seismic actuctuvty, carrying out the prior evaluations and regulations. In view of the above, TECH establishes the following general and specific objectives to guarantee the satisfaction of the future graduate:





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*Carry out an evaluation of the bearing capacity of structures and determine the level of damage caused by seismic activity”*



## 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 and evaluate advanced techniques for the characterization of building systems
- ◆ Apply innovative systems and technologies for new construction, renovation and maintenance in the phases of project execution, commissioning and service life of a building
- ◆ Analyze and understand how the characteristics of structures influence their behavior
- ◆ Gain in-depth knowledge of the fundamentals of the behavior of reinforced concrete structures and the ability to conceive, design, build and maintain this type of structures

“

*Apply the criteria for the adequate design of the reinforcement of concrete structures exposed to seismic activity”*



# 03

# Course Management

In accordance with its maxim of offering an elite education for all, TECH counts on renowned professionals in order for the student to acquire solid knowledge in the industrialization and construction of earth-quake resistant buildings. For this reason, this Postgraduate Certificate has a highly qualified team with extensive experience in the sector, who will offer the best possible resources to help students develop their skills throughout the course. In this way, students have the guarantees they need to specialise at an international level in a booming sector that will catapult them to professional success.







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*Complete your professional profile with the help of a team of highly-trained experts in an internationally-demanded sector”*

## 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.







**Dr. Parra Costa, Carlos J**

- ◆ Head Professor in the Department of Architecture and Construction Technology from the Polytechnic University of Cartagena
- ◆ Regular contributor to research presentations and thesis tribunals.
- ◆ Head Researcher of the Advanced Construction Science and Technology Group (CTAC)
- ◆ PhD in Architecture from the Polytechnic University of Valencia
- ◆ Postgraduate Diploma in the Finite Element Method (2001-2003)
- ◆ Articles in conferences and journals, including more than 40 articles submitted to conferences and 22 articles published in indexed journals.
- ◆ Reviewer of journals indexed in JCR. Director of more than 50 Bachelor's Degree Final Projects and Master's Thesis' of research and technological application. H-index of 9 with more than 415 citations
- ◆ Two research periods and one period in Knowledge Transfer and Innovation, recognized by the National Commission for the Evaluation of Research Activity (CNAI).

# 04

# Structure and Content

The syllabus has been designed to meet the essential requirements that help students learn about construction materials that have been developed following the latest technological and environmental trends. 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 to evaluate the bearing capacity of structures and determine the level of damage that can be caused by seismic activity. From the first class, students will see their knowledge broadened, allowing them to learn through practical and theoretical content.





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*Apply the criteria for the adequate design of the reinforcement of concrete structures that can suffer damage due to seismic activity”*

## Module 1. Industrialization and Earthquake-Resistant Construction

- 1.1. Industrialization: Prefabricated Construction
  - 1.1.1. The Beginnings of Industrialization in Construction
  - 1.1.2. Prefabricated Structural Systems
  - 1.1.3. Prefabricated Constructive Systems
- 1.2. Prestressed Concrete
  - 1.2.1. Voltage Losses
  - 1.2.2. Serviceability Limit States
  - 1.2.3. Ultimate Limit States
  - 1.2.4. Precast Systems: Prestressed Slabs and Beams with Prestressed Reinforcement
- 1.3. Quality in Horizontal Building Structures
  - 1.3.1. Unidirectional Joist Floor Slabs
  - 1.3.2. Unidirectional Hollow-Core Slab Floors
  - 1.3.3. Unidirectional Ribbed Sheet Metal Floor Slabs
  - 1.3.4. Waffle Slabs
  - 1.3.5. Solid Slabs
- 1.4. Structural Systems in Tall Buildings
  - 1.4.1. Review of Skyscrapers
  - 1.4.2. Wind in High-Rise Buildings
  - 1.4.3. Materials
  - 1.4.4. Structural Diagrams
- 1.5. Dynamic Behavior of Building Structures Exposed to Earthquakes
  - 1.5.1. One Degree of Freedom Systems
  - 1.5.2. Systems with Several Degrees of Freedom
  - 1.5.3. Seismic Action
  - 1.5.4. Heuristic Design of Earthquake-Resistant Structures
- 1.6. Complex Geometrics in Architecture
  - 1.6.1. Hyperbolic Paraboloids
  - 1.6.2. Tensile Structures
  - 1.6.3. Pneumatic or Inflatable Structures





- 1.7. Reinforcement of Concrete Structures
  - 1.7.1. Appraisals
  - 1.7.2. Reinforcement of Pillars
  - 1.7.3. Beam Reinforcement
- 1.8. Wooden Structures
  - 1.8.1. Wood Grading
  - 1.8.2. Dimension of Beams
  - 1.8.3. Dimension of Pillars
- 1.9. Automization in Structures. BIM as a Control Tool
  - 1.9.1. BIM
  - 1.9.2. Federated BIM File Exchange Models
  - 1.9.3. New Structure Generation and Control Systems
- 1.10. Additive Manufacturing Through 3D Printing
  - 1.10.1. Principles of 3D Printing
  - 1.10.2. Structural Systems Printed in 3D
  - 1.10.3. Other Systems

“Analyze and apply the necessary measure against earthquakes and adapt them to different structures, such as those made of wood or skyscrapers”



05

# 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.

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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 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.

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

## 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.



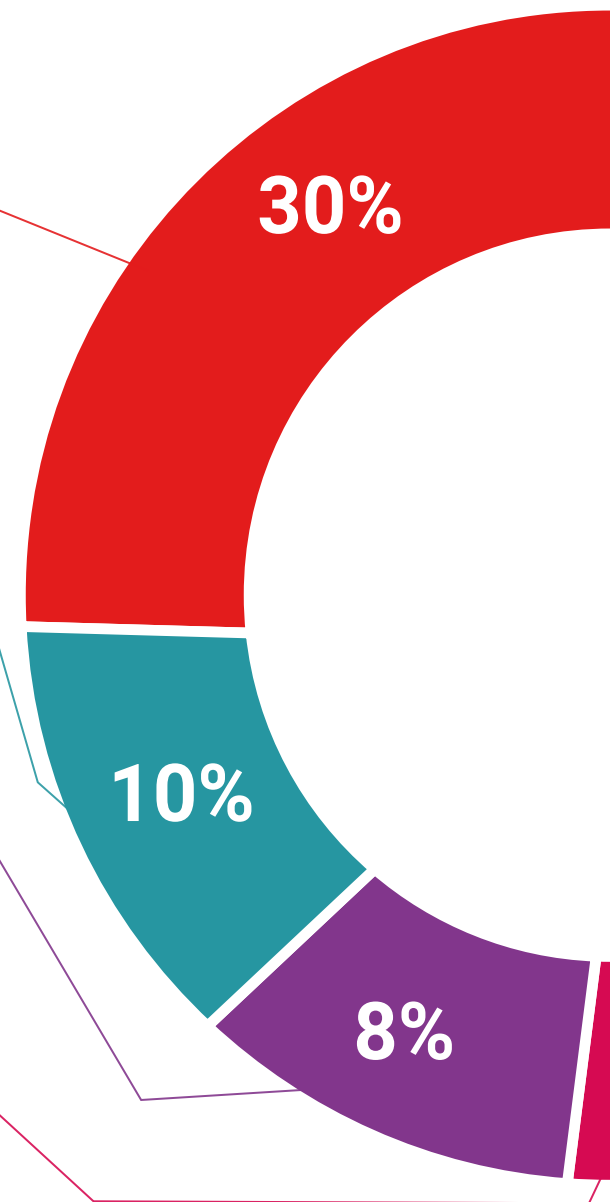
#### Practising Skills and Abilities

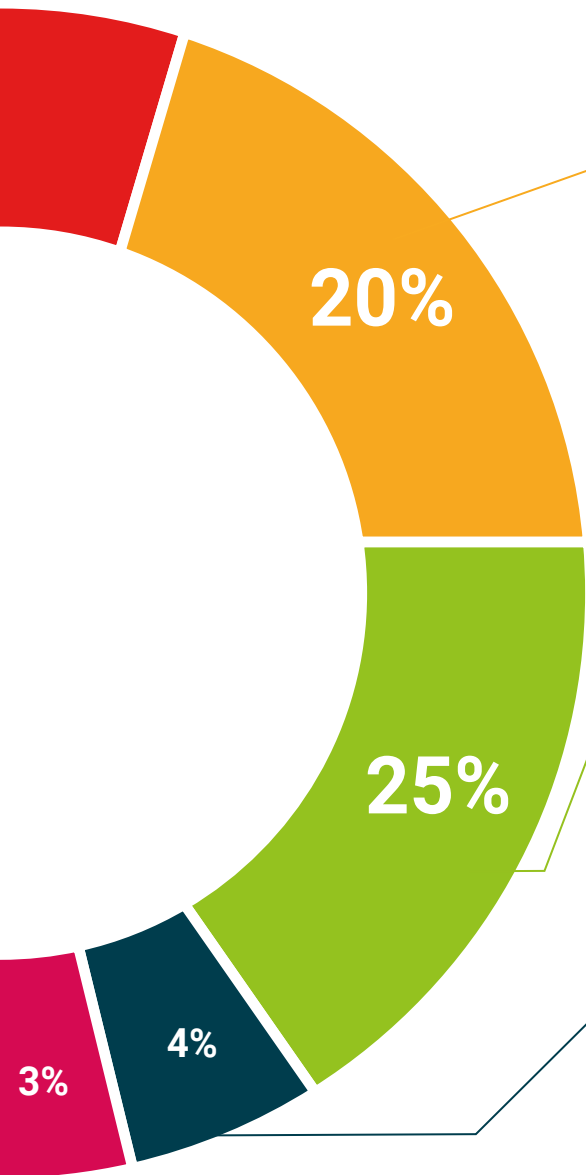
They will carry out activities to develop specific competencies and skills in each thematic area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization we live in.



#### 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 Industrialization and Earthquake-Resistant Construction in addition to the most rigorous and updated training, access to a Postgraduate Certificate issued by TECH Technological University.





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

This **Postgraduate Certificate in Industrialization and Earthquake-Resistant Construction** contains the most complete and updated program on the market.

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

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

Title: **Postgraduate Certificate in Industrialization and Earthquake-Resistant Construction**

Official N° of hours: **150 h.**



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

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



**Postgraduate Certificate**  
Industrialization and  
Earthquake-Resistant  
Construction

Modality: online  
Duration: 6 weeks  
Certificate: TECH Technological University  
Official N° of hours: 150 h.



# Postgraduate Certificate Industrialization and Earthquake-Resistant Construction