

Postgraduate Diploma

Design of New Materials and Innovations in Engineering and Construction



Design of New Materials and Innovations in Engineering and Construction

- » Modality: **online**
- » Duration: **6 months**
- » Certificate: **TECH Global University**
- » Credits: **18 ECTS**
- » Schedule: **at your own pace**
- » Exams: **online**

Website: www.techtute.com/us/engineering/postgraduate-diploma/postgraduate-diploma-design-new-materials-innovations-engineering-construction

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01

Introduction

There are an infinite number of new technologies that have been developed in civil engineering that many professionals are not aware of. This has not come to completely replace the traditional approach, but rather is a complement that allows us to adapt this field to current requirements. The advances that have been made in the construction materials sector have been equally important in recent years. For this reason, knowing the new trends helps civil engineers to do a more efficient and sustainable job over time. With the following program, the student will delve into this and other important points to boost their professional career in the design of construction materials.





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Perform an exhaustive analysis of the different families of materials and apply them to your infrastructure projects”

Technological innovations in civil engineering have made it possible to create new materials to be used in large and small architectural projects. Similarly, advances in the field of construction elements have been very important in recent years, with ingenious processing techniques and structures that improve the performance of materials.

The Postgraduate Diploma in Design of New Materials and Innovations in Engineering and Construction will introduce students to all the knowledge necessary to discover the process of innovation, protection and financing of development in this field. They will also be able to specify the different areas of civil engineering that are used in road construction, the analysis of new materials and renewable energies. The importance of maritime engineering will also be highlighted here, presenting the latest developments in oceanographic works.

Further on in the syllabus, the different types of components involved in the production of the pavement will be studied in depth, reviewing their characteristics and the properties they have. In the sequence of topics, we will study the layers that make up the rolling surface, which is one that is visible to the naked eye when a road is designed.

Towards the end of the modules we will learn about the advances in the field of construction materials that have been very important in recent years, relating to processing techniques, structure and properties with their behavior. Knowing, in turn, the progress of new trends, from an innovation point of view.

For this reason, we have an excellent teaching staff that offers students their extensive experience in the design, service life and characterization of cement-based materials. With a 100% online Postgraduate Diploma, 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 Diploma in Design of New Materials and Innovations in 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 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



Learn about the contributions of nanoscience and nanotechnology in the development of new materials to prevent structural problems"



Know the main advantages of using innovative building materials from the point of view of energy saving and efficiency”

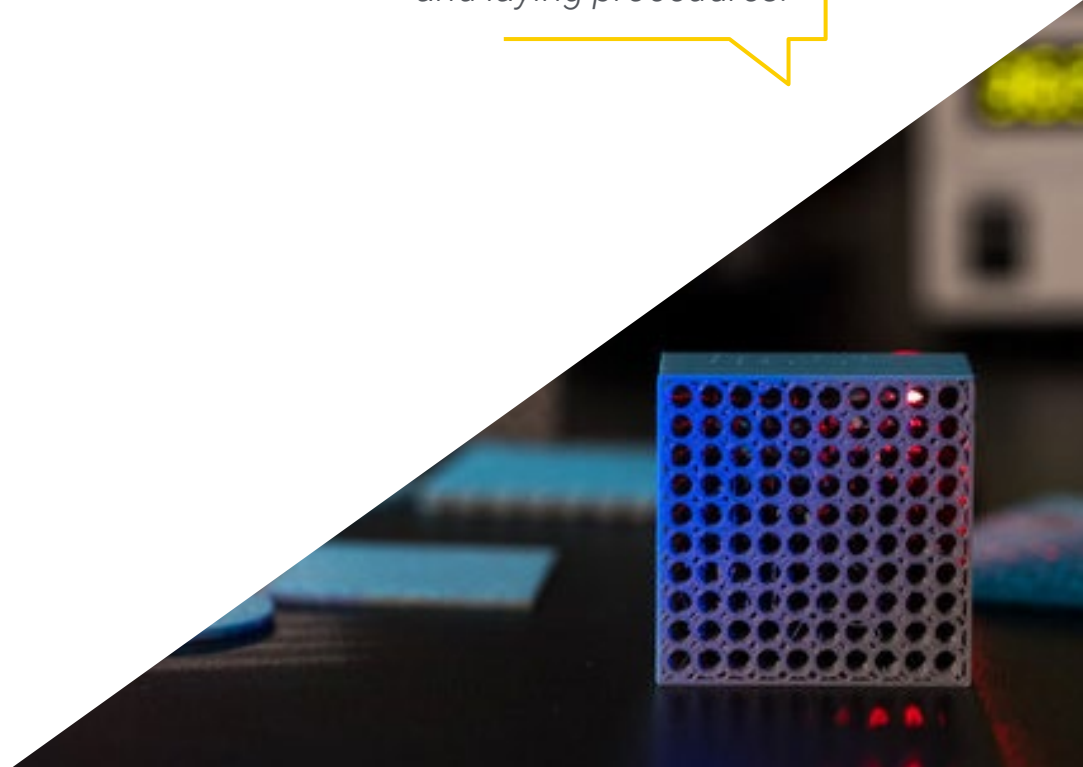
The program's teaching staff includes professionals from sector who contribute their work experience to this training program, as well as renowned specialists from leading societies and prestigious universities.

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, by means of which the professional will have to try to solve the different situations of Professional Practice, which will be posed throughout the Program. For this purpose, the professional will be assisted by an innovative interactive video system created by renowned and experienced experts.

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.



02

Objectives

The program of this Postgraduate Diploma seeks to provide the tools that the student needs to develop all the capabilities and skills in their field of work. In this way, the student will reinforce their knowledge in the different materials that are used in the construction and conservation of roads. At the same time, they will expand their knowledge of the competitive advantages of financing new materials in engineering. 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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With this program you will become a top level expert in the development of new materials in construction”



General Objectives

- ◆ 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



Advance in your professional career complying with the objectives of this Postgraduate Diploma, with the help of practical cases studies which will prepare you for the daily work of an engineer”





Specific Objectives

Module 1. New Materials and Innovations in Engineering and Construction

- ◆ 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

Module 2. Road Surfaces, Pavements and Asphalt Mixes

- ◆ Establish the classification of soils and their bearing capacity when using them in esplanades
- ◆ Know the different layers and the process of preparation and installation on site
- ◆ Perform a breakdown of binders and conglomerates to make bituminous emulsions
- ◆ Gain knowledge of surface treatments, as well as their risks of priming, adhesion and curing
- ◆ Become familiar with the process of manufacturing and laying asphalt mixes

Module 3. Other Construction Materials

- ◆ Define and characterize the different insulating building materials
- ◆ Know the main advantages of using innovative building materials from the point of view of energy saving and efficiency
- ◆ Identify basic production principles and specify new materials of the future
- ◆ Analyze the fundamentals of advanced and intelligent materials for sectors such as automotive, construction, aerospace, etc.
- ◆ Establish new developments in nanotechnology

03

Course Management

For TECH, it is essential to offer elite education to all its students.

For this reason, we have a high level teaching team which will provide students with all the knowledge they need to establish the design of new materials and be innovative in the field of engineering and construction.





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Innovate and design new materials with the backing of a renowned group of experts from the field of engineering”

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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Innovate and design new materials with the backing of a renowned group of experts from the field of engineering”

04

Structure and Content

The content has been designed to comply with the essential requirements in the field of Design of New Materials and Innovations in Engineering and Construction. 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 to analyze the different elements that are involved in the construction and conservation of roads and the economic challenges that are involved in developing innovative materials.





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*Know the main advantages
of using innovative building
materials from the point of view
of energy saving and efficiency”*

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 II
 - 1.2.1. Circular Economy with New Materials
 - 1.2.2. Self-Repairing Road
 - 1.2.3. Decontaminating Roads
- 1.3. Roads I
 - 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)

Module 2. Road Surfaces, Pavements and Asphalt Mixes

- 2.1. Drainage and Sewage Systems
 - 2.1.1. Elements of Underground Drainage
 - 2.1.2. Drainage of Road Surface
 - 2.1.3. Drainage of Earthworks
- 2.2. Esplanades
 - 2.2.1. Classification of Soils
 - 2.2.2. Soil Compaction and Bearing Capacity
 - 2.2.3. Formation of Esplanades
- 2.3. Base Layers
 - 2.3.1. Gravel Layers. Natural, Artificial and Draining Layers
 - 2.3.2. Behavior Models
 - 2.3.3. Preparation and Commissioning Processes
- 2.4. Treated Layers for Bases and Subbases
 - 2.4.1. Layers Treated with Cement: Soil-Cement and Gravel-Cement
 - 2.4.2. Layers Treated with Other Binders

- 2.4.3. Layers Treated with Bituminous Binding Agents. Gravel-Emulsion
- 2.5. Binders and Binding Agents
 - 2.5.1. Asphalt Bitumens
 - 2.5.2. Fluidized and Fluxed Bitumens. Modified Binders
 - 2.5.3. Bituminous Emulsions
- 2.6. Aggregates for Pavement Layers
 - 2.6.1. Aggregate Sources. Recycled Aggregates
 - 2.6.2. Nature
 - 2.6.3. Properties
- 2.7. Surface Treatments
 - 2.7.1. Priming Bonding and Curing Sprays
 - 2.7.2. Gravel Irrigation
 - 2.7.3. Bituminous Slurries and Cold Micro-Agglomerates
- 2.8. Bituminous Mixtures
 - 2.8.1. Hot Mix Asphalt
 - 2.8.2. Tempered Blends
 - 2.8.3. Cold Asphalt Mixes
- 2.9. Concrete Sidewalks
 - 2.9.1. Types of Rigid Sidewalks
 - 2.9.2. Concrete Slabs
 - 2.9.3. Joints
- 2.10. Manufacturing and Laying of Asphalt Mixtures
 - 2.10.1. Manufacturing, Commissioning and Quality Control
 - 2.10.2. Conservation, Rehabilitation and Maintenance



2.10.3. Surface Characteristics of Pavements

Module 3. Other Construction Materials

- 3.1. Nanomaterials
 - 3.1.1. Nanoscience
 - 3.1.2. Applications in Construction Materials
 - 3.1.3. Innovation and Applications
- 3.2. Foams
 - 3.2.1. Types and Design
 - 3.2.2. Properties
 - 3.2.3. Uses and Innovation
- 3.3. Biomimetic Materials
 - 3.3.1. Features
 - 3.3.2. Properties
 - 3.3.3. Applications
- 3.4. Metamaterials
 - 3.4.1. Features
 - 3.4.2. Properties
 - 3.4.3. Applications
- 3.5. Biohydrometallurgy
 - 3.5.1. Features
 - 3.5.2. Technology of Recovery
 - 3.5.3. Environmental Advantages
- 3.6. *Self-Healing* and Photoluminescent Materials
 - 3.6.1. Types
 - 3.6.2. Properties
 - 3.6.3. Applications
- 3.7. Insulating and Thermoelectric Materials
 - 3.7.1. Energy Efficiency and Sustainability

- 3.7.2. Typology
- 3.7.3. Innovation and New Design
- 3.8. Ceramics
 - 3.8.1. Properties
 - 3.8.2. Classification
 - 3.8.3. Innovations in this Sector
- 3.9. Composite Materials and Aerogels
 - 3.9.1. Description
 - 3.9.2. Training
 - 3.9.3. Applications
- 3.10. Other Materials
 - 3.10.1. Stone Materials
 - 3.10.2. Plaster
 - 3.10.3. Others



Identify the main basics of production and specify the new materials of the future to carry you work proposals to the next level”

05

Methodology

This academic program offers students 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: Re-learning.

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 Re-learning.

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.

Re-learning 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 Diploma in Design of New Materials and Innovations in Engineering and Construction guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Diploma 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 Diploma in Design of New Materials and Innovations in 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 Diploma in Design of New Materials and Innovations in Engineering and Construction**

ECTS: 18

Official N° of Hours: 450 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.

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



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Design of New Materials
and Innovations in
Engineering and Construction

- » Modality: **online**
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- » Certificate: **TECH Global University**
- » Credits: **18 ECTS**
- » Schedule: **at your own pace**
- » Exams: **online**

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