

Postgraduate Diploma

Structures, Materials and Dynamics
in Mechanical Engineering



Postgraduate Diploma Structures, Materials and Dynamics in Mechanical Engineering

- » Modality: **online**
- » Duration: **6 months**
- » Certificate: **TECH Technological University**
- » Dedication: **16h/week**
- » Schedule: **at your own pace**
- » Exams: **online**

Website: www.techtute.com/in/engineering/postgraduate-diploma/postgraduate-diploma-structures-materials-dynamics-mechanical-engineering

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01

Introduction

This program presents the design aspects necessary to master, from a professional point of view, the design of structures and installations in buildings for residential, commercial and industrial use, such as air conditioning, ventilation, water, sanitation and fire protection; as well as special installations, such as those for medical gases or fuels and those that are not mechanical but fall within the scope of a mechanical engineer.

It also delves into the principles of advanced machine dynamics, including the study of vibration and resonance phenomena, as well as the necessary aspects to master the behavior of materials used in engineering, not only metals, but also polymeric, ceramic, composite and nanomaterials.



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Mechanical Engineering has been supported in recent years by new technologies, so professionals in this sector must have extensive digital skills”

The TECH Postgraduate Diploma in Structures, Materials and Dynamics in Mechanical Engineering is a program specifically designed for professionals who need to strengthen their knowledge of both the conventional aspects of their professional activity and the most innovative aspects.

It has an international focus, with content based on that of the most prestigious universities in the world and is aligned with the recommendations of professional associations such as ASME (American Society of Mechanical Engineers) and IMechE (Institution of Mechanical Engineers).

The use of the case method facilitates the learning of concepts, avoiding systematic memorization and repetitive performance of complex calculations.

The content of the Postgraduate Diploma combines the traditional but necessary aspects of the profession, with the most innovative aspects that are renewed in each edition.

With this prestigious training, students will learn to effectively face the challenges of the mechanical engineering profession by mastering all aspects of mechanics and gaining in-depth knowledge of innovation management and continuous improvement processes.

This Postgraduate Diploma provides the necessary foundations to maintain an attitude of active observation of innovation, which allows professionals to remain up-to-date and maintain a capacity to adapt to technological changes.

It should be noted that as this is a 100% online Postgraduate Diploma, the student is not conditioned by fixed schedules or the need to move to another physical location, but can access the contents at any time of the day, balancing their work or personal life with their academic life.

This **Postgraduate Diploma in Structures, Materials and Dynamics in Mechanical Engineering** contains the most complete and up-to-date educational program on the market. The most important features include:

- ◆ The development of case studies presented by experts in Structures, Materials and Dynamics in Mechanical Engineering
- ◆ 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 in Structures, Materials and Dynamics in Mechanical Engineering
- ◆ 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



The completion of this Postgraduate Diploma will place Mechanical Engineering professionals at the forefront of the latest developments in the sector"

“

This Postgraduate Diploma is the best investment you can make in the selection of a refresher program in the field of Structures, Materials and Dynamics in Mechanical Engineering. We offer you quality and free access to content"

Its teaching staff includes professionals belonging to the field of Structures, Materials and Dynamics in Mechanical Engineering, who bring to this training the experience of their work, as well as recognized specialists from leading societies and prestigious universities.

The multimedia content, developed with the latest educational technology, will provide professionals with situated and contextual learning, i.e., a simulated environment that will provide immersive training, designed for training oneself 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 developed by renowned and experienced experts in Structures, Materials and Dynamics in Mechanical Engineering.

This training comes with the best didactic material, providing you with a contextual approach that will facilitate your learning.

This 100% online Postgraduate Diploma will allow you to combine your studies with your professional work. You choose where and when to train.



02

Objectives

The program in Structures, Materials and Dynamics in Mechanical Engineering is oriented to facilitate the professional's performance in order for them to acquire and learn the main novelties in this field, which will allow them to practice their profession with the highest quality and professionalism.





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Our goal is for you to become the best professional in your sector. And for this we have the best methodology and content"



General Objectives

- ◆ Scientific and technological training for the professional practice of Mechanical Engineering.
- ◆ Gain complex knowledge of engineering project management and continuous process improvement
- ◆ Gain complex knowledge of the design of machine elements, engines, structures and installations, including the choice of materials, their method of manufacture and reliability, safety and environmental considerations
- ◆ Delve into the necessary knowledge of Industry 4.0 applied to Mechanical Engineering.
- ◆ Delve into the necessary knowledge of advanced and innovative applications of Mechanical Engineering





Specific Objectives

Module 1 Structures and Installations

- ◆ Analyze and evaluate different mold-forming processes
- ◆ Analyze and evaluate different plastic deformation forming processes
- ◆ Analyze and evaluate different material loss forming processes
- ◆ Analyze and evaluate the different heat treatments on machine elements
- ◆ Analyze and evaluate paint and coating application systems
- ◆ Analyze and evaluate the forming processes of polymers and ceramic materials
- ◆ Analyze and evaluate the manufacturing processes of complex materials
- ◆ Analyze and evaluate the different additive manufacturing processes

Module 2 Advanced Dynamics

- ◆ Create, analyze and evaluate robust manufacturing processes to ensure the quality of the finished product
- ◆ Know the principles of nanomaterials
- ◆ Understand, analyze and evaluate the processes of corrosion and degradation of materials
- ◆ Evaluate and analyze the different techniques for non-destructive testing of materials

Module 3 Materials

- ◆ Analyze and evaluate materials used in engineering based on their properties
- ◆ Analyze and evaluate metallic materials, both ferrous and non-ferrous
- ◆ Analyze and evaluate polymeric, ceramic and composite materials

- ◆ Analyze and evaluate materials used in additive manufacturing

Module 4 Mechanics 4.0

- ◆ Master the principles of Industry 4.0 and its applications in Mechanical Engineering
- ◆ Create, evaluate and analyze designs that combine mechanics and electronics
- ◆ Create, evaluate and analyze mechanical systems including sensing, detection, actuators, control systems and machine vision
- ◆ Create, evaluate and analyze digital twins of mechanical systems
- ◆ Evaluate and analyze applications of Internet of Things, Cloud Computing, Big Data, Machine Learning and Artificial Intelligence in Mechanical Engineering
- ◆ Master the principles of reliability, availability, maintainability and safety (RAMS) engineering
- ◆ Evaluate and analyze the reliability of elements and systems using both qualitative and quantitative systems
- ◆ Master the mathematics used in reliability analysis



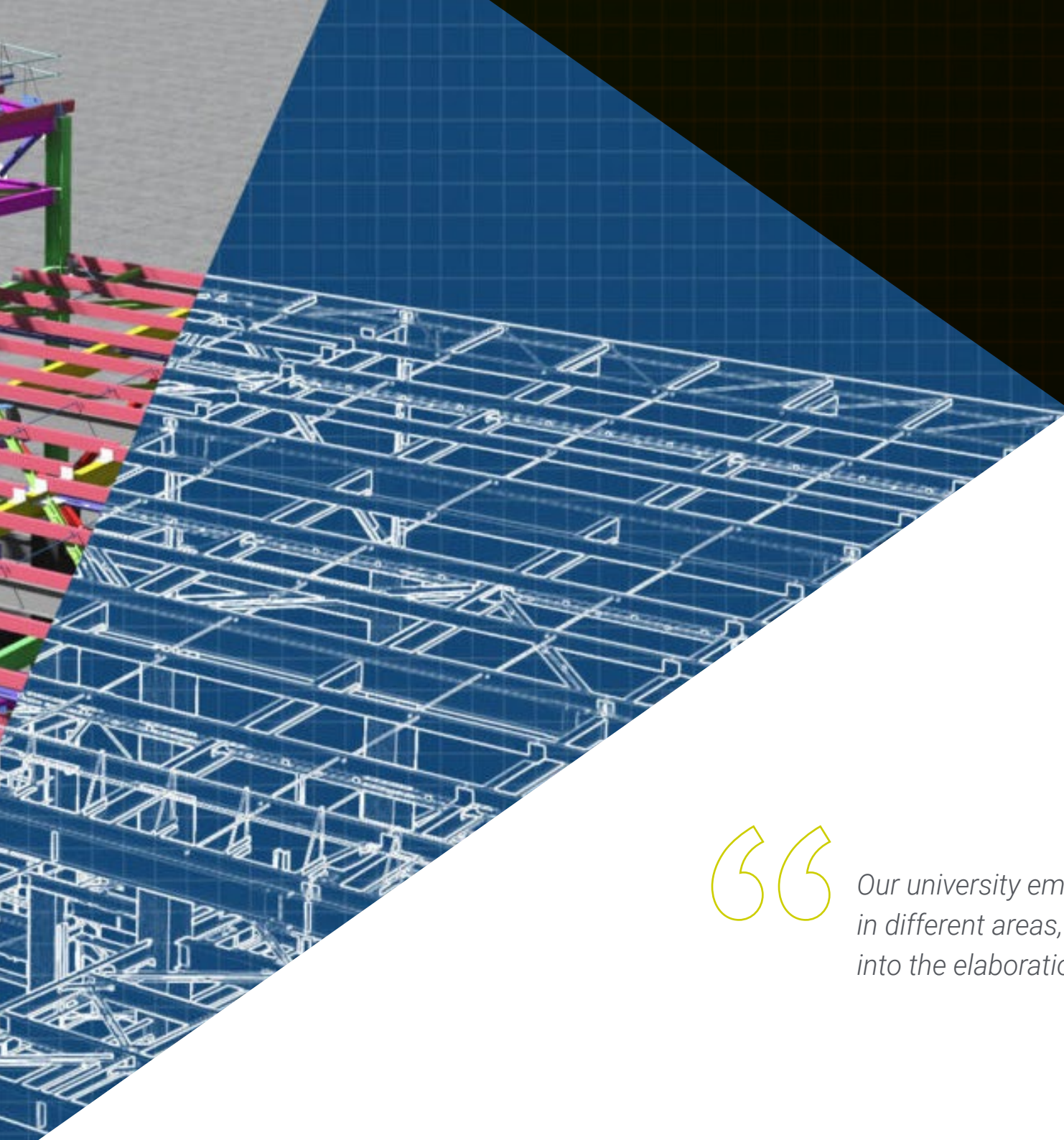
*Join us and we will help you
achieve professional excellence"*

03

Course Management

In our university we have professionals specialized in each area of study, who pour their expertise into our specialization courses.





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Our university employs the best professionals in different areas, who pour their knowledge into the elaboration of this complete program"

Management



Mr. Asiain Sastre, Jorge

- ♦ Industrial-Mechanical Technical Engineer University of Salamanca.
- ♦ Director and Co-Founder of AlterEvo Ltd. Professor of Mechanical Engineering
- ♦ Chartered Engineer member of Institution of Mechanical Engineers (CEng MIMechE)
- ♦ Master's Degree in Automotive Engineering
- ♦ MBA

Professors

Ms. Prieto Díaz, Beatriz

- ♦ Mechanical Engineer at Riegos y Electricidad Salamanca, SL
- ♦ Degree in Mechanical Engineering, University of Salamanca
- ♦ Master's Degree in Industrial Mechanics, Carlos III University of Madrid

Mr. Panero, David

- ♦ Mechanical Engineer in the Mechanical Design Department, Horiba Automotive Test Systems, Madrid, Spain
- ♦ Double Master's Degree in Mechatronics Engineering and Industrial Technologies Engineering

Mr. Berdún Barbero, Daniel

- ♦ Superior Industrial Engineering, Superior Technical School of Industrial Engineering
- ♦ Technical Office Manager at INSTER

Mr. De Lama Burgos, Carlos

- ♦ Technical Advisor at the Association of Industrial Technical Engineers of Madrid
- ♦ Technical and legal advice in the field of industrial engineering
- ♦ Industrial Safety
- ♦ Professor at the School of Architecture, Engineering and Design, European University, Madrid

Mr. Iglesias Alonso, Luis

- ♦ Certification Engineer in charge of Electrical Safety, Batteries and Electromagnetic Compatibility at SCANIA
- ♦ Vice President of the Technical Commission for Production and New Product Launching, Spanish Association of Automotive Professionals (ASEPA)
- ♦ Foundation of Eleanor Homologaciones. Currently performing supervisory duties



04

Structure and Content

The structure of the contents has been designed by the best professionals in the Mechanical Engineering sector, with extensive experience and recognized prestige in the profession, and aware of the benefits that the latest educational technology can bring to higher education.





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We have the most complete and up-to-date academic program in the market. We strive for excellence and for you to achieve it too.”

Module 1 Structures and Installations

- 1.1. Structural Calculations
 - 1.1.1. Beam Calculation
 - 1.1.2. Column Calculations
 - 1.1.3. Gantry Calculations
 - 1.1.4. Foundations
 - 1.1.5. Preloaded Structures
- 1.2. Low Voltage Electrical Installations
- 1.3. Air Conditioning and Ventilation Installations
 - 1.3.1. Heating Installations
 - 1.3.2. Air Conditioning Installations
 - 1.3.3. Ventilation Systems
- 1.4. Sanitary Water Installations and Sewage Systems
 - 1.4.1. Water Installations
 - 1.4.2. Domestic Hot Water Systems- DHW
 - 1.4.3. Sanitation Networks
- 1.5. Fire Safety Installations
 - 1.5.1. Portable Extinguishing Systems
 - 1.5.2. Detection and Alarm Systems
 - 1.5.3. Automatic Extinguishing Systems
 - 1.5.4. BIEs, Dry Columns and Hydrants
- 1.6. Communication, Home Automation and Security Installations
- 1.7. Thermal and Acoustic Insulation
- 1.8. Steam, Compressed Air and Medical Gases Installations
 - 1.8.1. Steam Installations
 - 1.8.2. Compressed Air Installations
 - 1.8.3. Medical Gas Installations

- 1.9. Gas and Liquid Fuels Installations
 - 1.9.1. Natural Gas Installations
 - 1.9.2. Liquefied Petroleum Gas Installations
 - 1.9.3. Liquid Hydrocarbon Facilities
- 1.10. Energy Certifications
 - 1.10.1. Energy Demand Control
 - 1.10.2. Renewable Energy Contribution
 - 1.10.3. Energy Audits
 - 1.10.4. ISO 50001 Energy Certification

Module 2 Advanced Dynamics

- 2.1. Advanced Machine Dynamics
- 2.2. Vibrations and Resonance
- 2.3. Longitudinal Vehicle Dynamics
 - 2.3.1. Vehicle Performance
 - 2.3.2. Vehicle Braking
- 2.4. Transverse Vehicle Dynamics
 - 2.4.1. Steering Geometry
 - 2.4.2. Circulation in Curves
- 2.5. Railroad Dynamics
 - 2.5.1. Traction Efforts
 - 2.5.2. Braking Efforts
- 2.6. Dynamics of Mechanical Microsystems
- 2.7. Robot Kinematics
 - 2.7.1. Direct Kinematic Problem
 - 2.7.2. Inverse Kinematic Problem
- 2.8. Robot Dynamics
- 2.9. Biomimicry
- 2.10. Dynamics of Human Movement

Module 3 Materials

- 3.1. Material Properties
 - 3.1.1. Mechanical Properties
 - 3.1.2. Electrical Properties
 - 3.1.3. Optical Properties
 - 3.1.4. Magnetic Properties
- 3.2. I-Ferrous Metallic Materials
- 3.3. II-Ferrous Metallic Materials
- 3.4. Polymeric Materials
 - 3.4.1. Thermoplastics
 - 3.4.2. Thermosetting Plastics
- 3.5. Ceramic Materials
- 3.6. Composite Materials
- 3.7. Biomaterials
- 3.8. Nanomaterials
- 3.9. Corrosion and Degradation of Materials
 - 3.9.1. Types of Corrosion
 - 3.9.2. Oxidation of Metals
 - 3.9.3. Corrosion Control
- 3.10. Non-Destructive Testing
 - 3.10.1. Visual Inspections and Endoscopies
 - 3.10.2. Ultrasound
 - 3.10.3. X-rays
 - 3.10.4. Foucault's Currents (Eddy Currents)
 - 3.10.5. Magnetic Particles
 - 3.10.6. Penetrating Liquids
 - 3.10.7. Infrared Thermography

Module 4 Mechanics 4.0

- 4.1. Introduction to Industry 4.0
- 4.2. Principles of Mechatronics
- 4.3. Sensorization and Detection
 - 4.3.1. Range Detection
 - 4.3.2. Proximity Detection
 - 4.3.3. Contact Sensors
 - 4.3.4. Force Detection
- 4.4. Actuators
- 4.5. Control Systems
- 4.6. Artificial Vision
 - 4.6.1. Vision Sensors
 - 4.6.2. Integrated Vision Systems
 - 4.6.3. Advanced Vision Systems
- 4.7. Digital Twins
- 4.8. The Internet of Things
 - 4.8.1. Hardware
 - 4.8.2. Software and Connectivity
 - 4.8.3. Rules
 - 4.8.4. Services
- 4.9. *Cloud Computing and Big Data*
 - 4.9.1. Storage Technology
 - 4.9.2. Analysis Techniques
- 4.10. Machine Learning and Artificial Intelligence



*This training will allow you to advance
in your career in a comfortable way"*

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.





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"

Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

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At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world”



You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.



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

A learning method that is different and innova-

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.



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 in 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 effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

We enhance the Case Study 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 one 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



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 that we are experiencing.



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

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best 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 educational system for presenting multimedia content 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 their goals.



06

Certificate

The Postgraduate Diploma in Structures, Materials and Dynamics in Mechanical Engineering guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Diploma issued by TECH Technological University.





*Successfully complete this program
and receive your university qualification
without having to travel or fill out laborious*

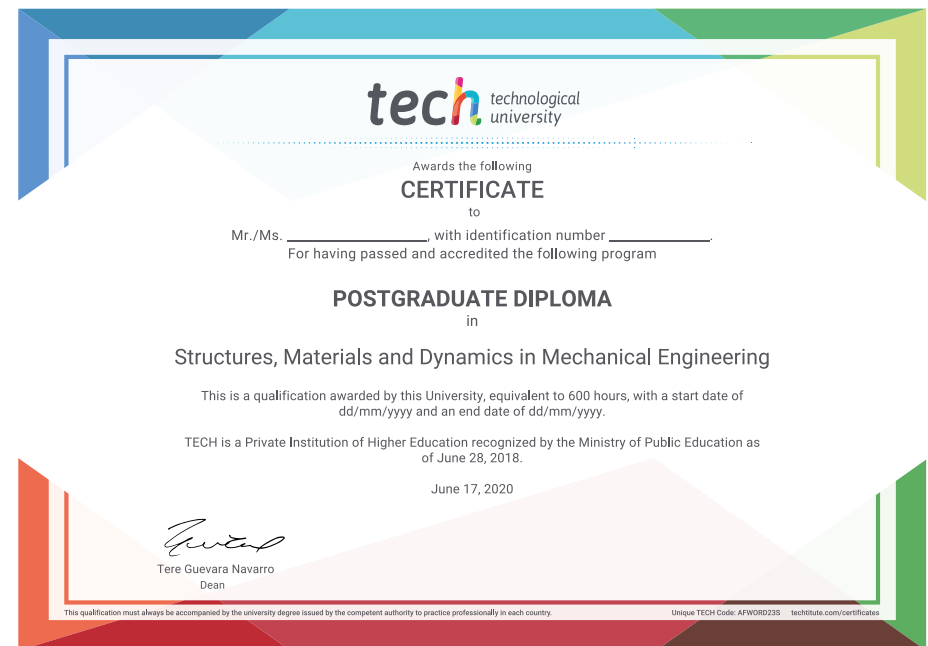
This **Postgraduate Diploma in Structures, Materials and Dynamics in Mechanical Engineering** contains the most complete and up-to-date program on the market.

After the students have passed the assessments, they will receive their corresponding **Postgraduate Diploma** issued by **TECH Technological University** via tracked delivery.

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

Title: **Postgraduate Diploma in Structures, Materials and Dynamics in Mechanical Engineering**

Official N° of Hours: **600 hours**.



*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

tech technological
university

personalized service innovation

knowledge present quality
online training

development language

virtual classroom

Postgraduate Diploma Structures, Materials and Dynamics in Mechanical Engineering

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