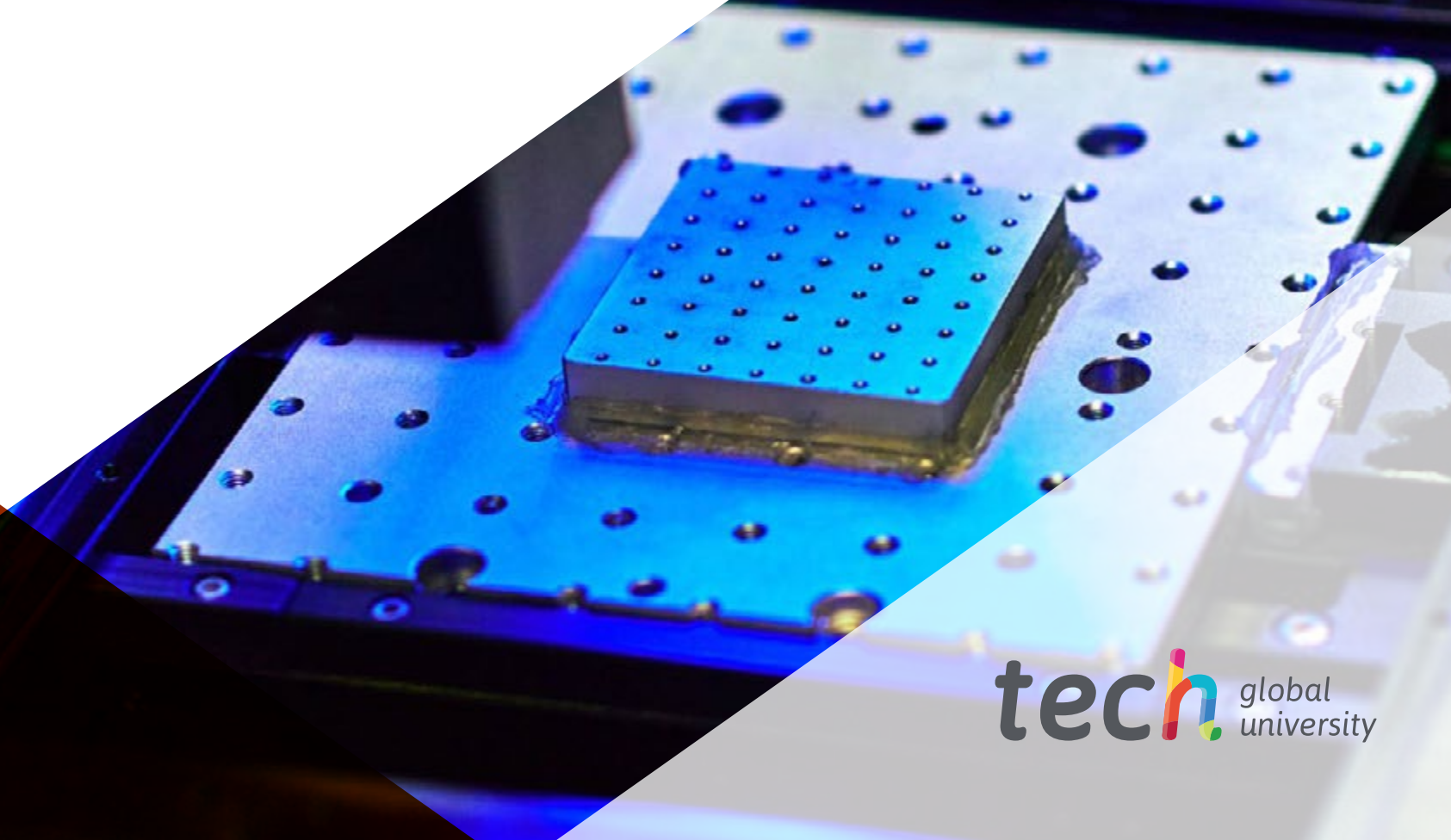


# Postgraduate Certificate Embedded Systems in Mechatronics Engineering





## Postgraduate Certificate Embedded Systems in Mechatronics Engineering

- » 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/embedded-systems-mechatronics-engineering](http://www.techtute.com/us/engineering/postgraduate-certificate/embedded-systems-mechatronics-engineering)

# Index

01

Introduction

---

*p. 4*

02

Objectives

---

*p. 8*

03

Course Management

---

*p. 12*

04

Structure and Content

---

*p. 16*

05

Methodology

---

*p. 20*

06

Certificate

---

*p. 28*

# 01

# Introduction

Embedded systems have established themselves as a key tool for the industry due to the benefits they offer. Moreover, it is a subject that is constantly expanding as more and more devices become "smart". An example of this are advanced drones or space shuttles. In this context, TECH has developed an academic program based on the latest technologies to improve the efficiency of the systems. The program stands out for providing a multidisciplinary vision that encompasses mechanics, electronics and computer science. In addition, its 100% online materials allow the student to complete it comfortably, needing only a device with Internet access, and make a quality leap in their career.







“

*This 100% online Postgraduate Certificate will train you on the latest applications of Embedded Systems in sectors such as Industrial Electronics and Automotive”*

The research areas that aim to expand the applications around Embedded Systems, from Mechatronics Engineering, are diverse. In the state of the art of this technological area it is remarkable the development of more powerful and efficient processors in terms of energy consumption. At the same time, the integration of Artificial Intelligence and machine learning algorithms in these components has become more common, enabling more advanced capabilities and real-time decision making in devices.

In turn, Embedded Systems are becoming more and more frequent in the context of the Internet of Things (IoT) due to their versatility for interconnecting devices and collecting data through wireless networks. All these technological resources are implemented in multiple sectors such as Health, Industrial Electronics, Communications, among others. Likewise, getting the most out of these innovations requires highly trained professionals, who are up to date on the latest criteria and in the handling of the latest working tools.

For this reason, TECH has designed this Postgraduate Certificate where engineers will be prepared in an exhaustive way on the importance of Embedded Systems in modern Engineering. For this, they will analyze different microcontrollers, sensors and actuators. Also, they will approach the main means of control and digital signal processing. Likewise, they will delve into the keys for the necessary maintenance and security updates and the mechanisms to integrate their operation to the Internet and the cloud.

All the study materials of this program will be available in a state-of-the-art Virtual Campus, where students will have at their disposal a variety of study materials, complementary readings and multimedia resources such as videos and interactive summaries. In addition, the syllabus is supported by the disruptive *Relearning* teaching system to guarantee the complete mastery of its complex concepts. Upon completion of this academic itinerary, graduates will have the practical competencies most in demand in the professional market.

This **Postgraduate Certificate in Embedded Systems in Mechatronics Engineering** contains the most complete and up-to-date program on the market. The most important features include:

- ♦ The development of case studies presented by experts in Embedded Systems in Mechatronics Engineering
- ♦ The graphic, schematic and practical contents with which it is conceived provide cutting- Therapeutics and practical information on those disciplines that are essential for professional practice
- ♦ Practical exercises where self-assessment can be used to improve learning
- ♦ Its special emphasis on innovative methodologies
- ♦ Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- ♦ Content that is accessible from any fixed or portable device with an Internet connection



*Acquire a comprehensive preparation on communication protocols for Embedded Systems thanks to this course"*

“

*Examine the main threats and vulnerabilities to which Embedded Systems are subject during 6 intensive weeks”*

The program's teaching staff includes professionals from the sector who contribute their work experience to this educational 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 education programmed to learn in real situations.

This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise during the academic year. For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.

*Get up to date on the integration of Embedded Systems in IoT-based processes through this TECH program.*

*A program that fits your schedule and with which you will avoid uncomfortable trips to an on-site study center.*



# 02

# Objectives

TECH's central premise is to provide solid theoretical knowledge and practical skills that are in line with the latest scientific evidence in the field of Mechatronics Engineering. For this reason, this Postgraduate Certificate has an exhaustive syllabus and the most advanced pedagogical methodologies. With these tools in hand, the graduates of this university program will achieve their professional goals faster and will be able to face the main challenges of the sector from an avant-garde and rigorous praxis.





“

*Do not miss this academic opportunity and join TECH, the world's top-rated university by its students according to Trustpilot"*



## General Objectives

---

- ◆ Develop the necessary basis to enable and facilitate versatile learning of new methodologies
- ◆ Identify and analyze the main types of industrial mechanisms
- ◆ Identify the sensors and actuators of a process according to their functionality
- ◆ Delve into CAD design methodology and apply it to mechatronic projects
- ◆ Identify the different equipment involved in the control of industrial processes
- ◆ Establish the analysis typology and FEM calculation model to reproduce the real test of a mechatronic component
- ◆ Present the elements that make up a robotic system
- ◆ Examine the mathematical models governing multibody mechanics
- ◆ Define the fundamentals of embedded systems, including their architecture, components and applications in modern engineering
- ◆ Determine the different models of embedded manufacturing present in the industrial world





## Specific Objectives

---

- Delve into the study and analysis of microprocessors, including architectures, instruction sets and programming strategies specific to embedded microprocessors
- Develop skills in the design and implementation of real-time embedded systems, addressing applications such as industrial process control, signal filtering, pattern detection, and real-time data acquisition
- Develop competencies in the design and programming of programmable hardware, such as FPGAs, and in the use of single board computers (SBCs) for the creation of embedded systems
- Develop skills to design, develop, and deploy IoT solutions, including connecting embedded devices to the cloud, managing data, and creating IoT applications

“

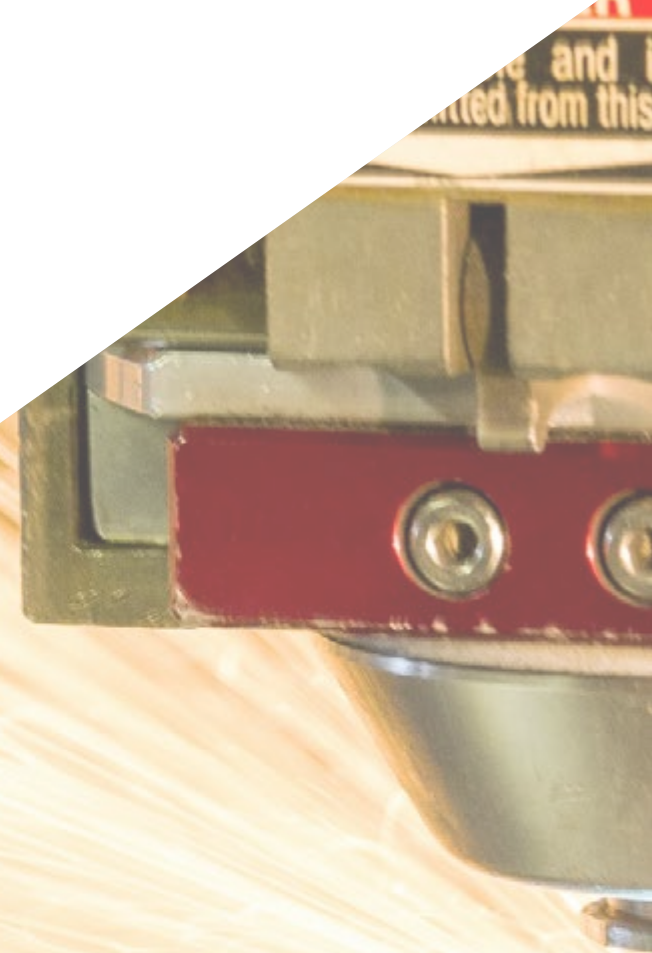
*Delve into the programming of real-time embedded systems with this very complete Postgraduate Certificate”*



03

# Course Management

The academic advising of this TECH program is in the hands of a distinguished faculty. Its members are engineers with extensive experience in the field of Mechatronics. Throughout their careers they have been involved with leading projects and companies within the sector, implementing complex tools and developing advanced solutions to ensure the most effective solutions. These experts have been in charge of the choice of subjects and study materials provided in this program, guaranteeing excellence in all aspects of this university program.





“

*Thanks to TECH, you will have at your fingertips a cutting-edge teaching staff, composed of the best experts in Mechatronics Engineering"*



## Management



### Dr. López Campos, José Ángel

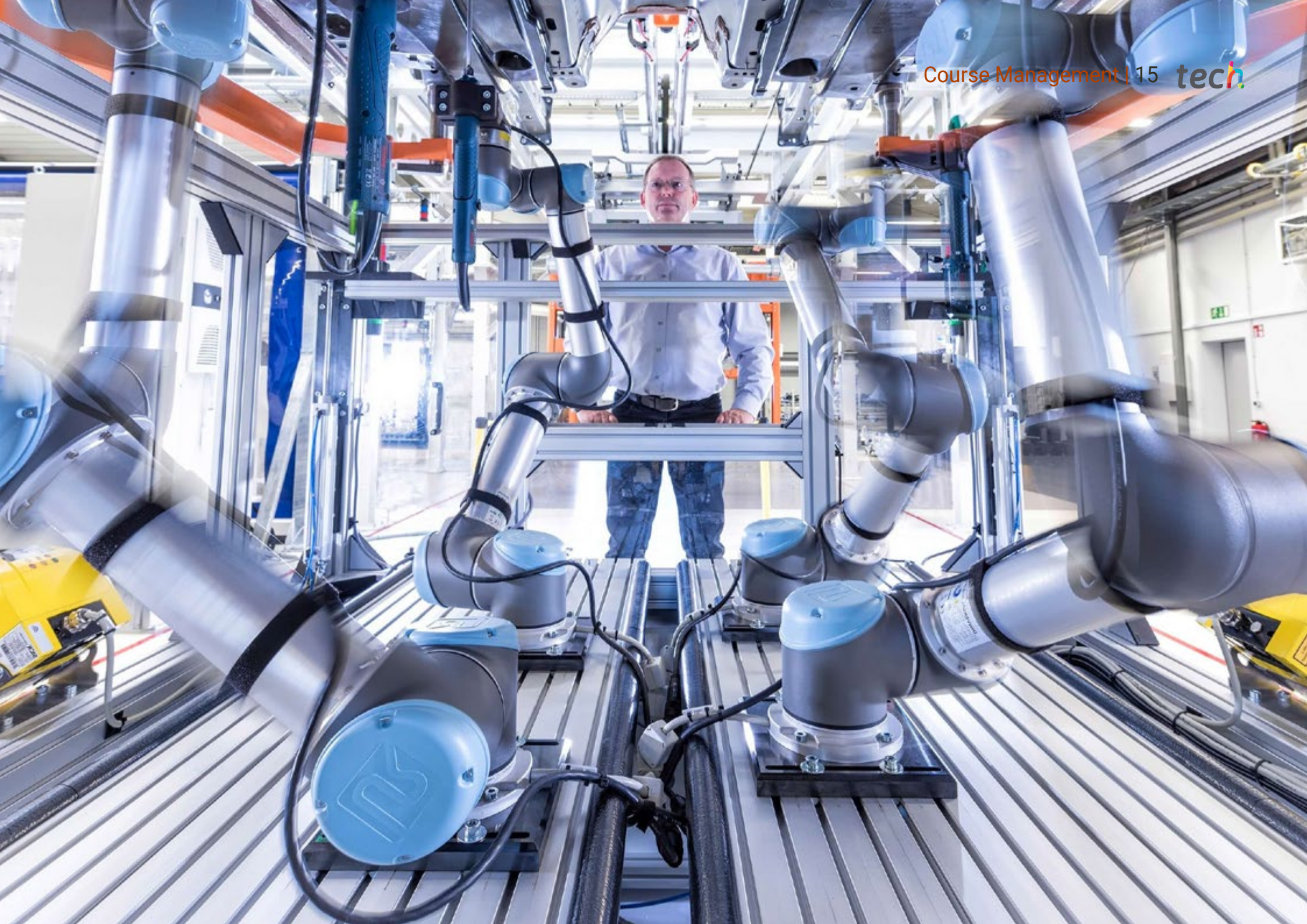
- ♦ Specialist in design and numerical simulation of mechanical systems
- ♦ Calculation Engineer at ITERA TÉCNICA S.L
- ♦ PhD in Industrial in Engineering from the University of Vigo
- ♦ Professional Master's Degree in Automotive Engineering from the University of Vigo
- ♦ Professional Master's Degree in Competition Vehicle Engineering, Antonio de Nebrija University
- ♦ University Specialist FEM by the Polytechnic University of Madrid
- ♦ Degree in Mechanical Engineering from the University of Vigo

## Professors

### Mr. Peláez Rodríguez, César

- ♦ Specialist in Information and Communications Technologies
- ♦ Visiting Assistant in Research Yale University
- ♦ R&D Engineer at SEADAM - Valladolid
- ♦ Researcher in several projects at the University of Alcalá de Henares
- ♦ Degree in Industrial Technologies Engineering from the University of Valladolid
- ♦ Professional Master's Degree in Industrial Engineering from the University of Valladolid
- ♦ Collaborator in several scientific publications







# 04

# Structure and Content

Through this comprehensive syllabus, engineers will delve into advances such as microcontrollers, sensors and actuators for Embedded Systems. Also, the syllabus includes the analysis of digital signal processing and the most advanced keys to implement programmable hardware and single-board computers. At the same time, this university program delves into the applications of these mechanisms in correlation with the Internet of Things (IoT). Likewise, these exhaustive contents will be available on a 100% online platform, which students will access in a personalized way, according to their individual schedules and interests.





“

*During this university program you will have at your fingertips the latest scientific evidence on Mechatronics Engineering and multiple complementary readings”*

## Module 1. Embedded Systems

- 1.1. Embedded Systems in Engineering
  - 1.1.1. Embedded Systems
  - 1.1.2. Embedded systems in engineering
  - 1.1.3. Importance of Embedded Systems in Modern Engineering
- 1.2. Microcontrollers
  - 1.2.1. Microcontrollers
  - 1.2.2. Differences between Microcontrollers and Development Boards
  - 1.2.3. Microcontrollers and Development Boards
  - 1.2.4. Programming Languages for Microcontrollers
- 1.3. Sensors and Actuators
  - 1.3.1. Industrial Sensors
  - 1.3.2. Industrial Actuators
  - 1.3.3. Communication between Sensors and the Central Unit
  - 1.3.4. Actuator Control in Embedded Systems
- 1.4. Embedded Systems for Real-Time Control
  - 1.4.1. *Hard Real Time* System
  - 1.4.2. *Soft Real Time* System
  - 1.4.3. Programming of Real Time Systems
- 1.5. Embedded Digital Signal Processing Systems
  - 1.5.1. Digital Signal Processing (DSP)
  - 1.5.2. Design of DSP Algorithms in Embedded Systems
  - 1.5.3. Applications of DSP in Engineering by Means of Embedded Systems
- 1.6. Programmable Hardware in Embedded Systems
  - 1.6.1. Programmable Logic and FPGAs
  - 1.6.2. Design of Logic Circuits in Programmable Hardware
  - 1.6.3. Programmable Hardware Technologies
- 1.7. Single Board Computers (SBC)
  - 1.7.1. Parts of Single Board Computers
  - 1.7.2. Main Architectures
  - 1.7.3. Single-board Computers vs. Desktop Computers







- 1.8. Embedded Systems in the Internet of Things (IoT)
  - 1.8.1. *Internet of things* (IoT)
  - 1.8.2. Integration of Embedded Systems in the IoT
  - 1.8.3. Sensors and IoT Devices
  - 1.8.4. Use Cases and Practical Applications
- 1.9. Security and Reliability in Embedded Systems
  - 1.9.1. Threats and Vulnerabilities in Embedded Systems
  - 1.9.2. Secure Design and Coding Practices
  - 1.9.3. Maintenance and Security Updates
- 1.10. Embedded Systems Communication and Connectivity
  - 1.10.1. Communication Protocols for Embedded Systems
  - 1.10.2. Sensor Networks and Wireless Communication
  - 1.10.3. Integration with the Internet and the Cloud

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.

“

*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 innovative

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 confidence in future difficult decisions.



### Practising Skills and Abilities

They will carry out activities to develop specific skills and abilities in each subject 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 Certificate in Embedded Systems in Mechatronics Engineering guarantees you, in addition to the most rigorous and updated training, access to a Executive Master's Degree issued by TECH Global University.





“

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

This program will allow you to obtain your **Postgraduate Certificate in Embedded Systems in Mechatronics Engineering** 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.

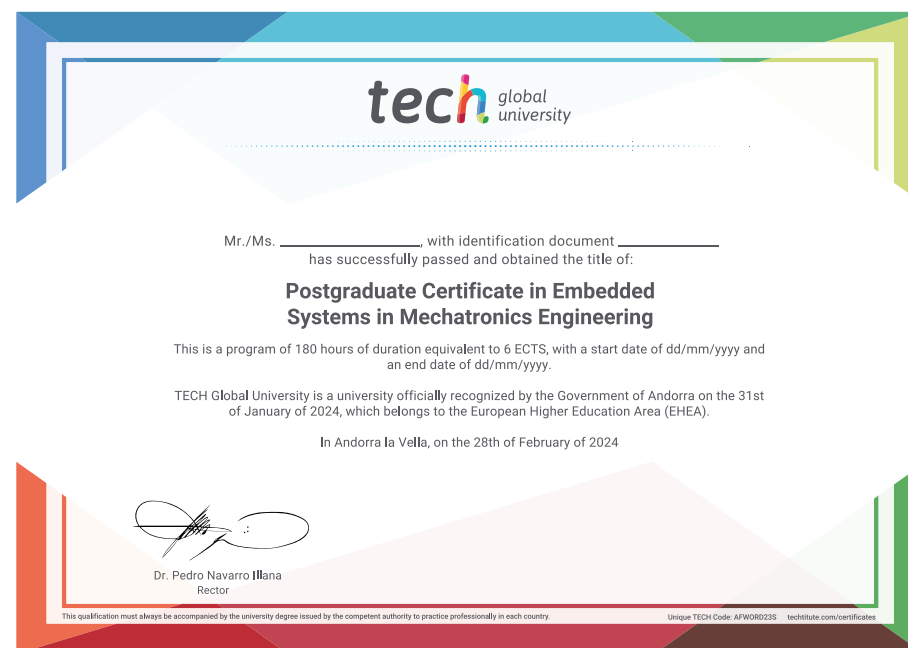
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Certificate in Embedded Systems in Mechatronics Engineering**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**



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



## Postgraduate Certificate Embedded Systems in Mechatronics Engineering

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



# Postgraduate Certificate Embedded Systems in Mechatronics Engineering

