Postgraduate Diploma

Embedded Electronic Systems

tech technological university

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Postgraduate Diploma

Embedded Electronic Systems

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

Website: **www.techtitute.com/in/information-technology/postgraduate-diploma/postgraduate-diploma-embedded-electronic-systems**

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01

Introduction

Today's job market has a growing demand for professionals specialized in electronic systems. Thus, having specific knowledge of the subjects and branches that make up this world will provide the computer engineer with the fundamental elements to decide their professional future, as well as to carry out any task in the work and professional environment, and to initiate research and innovation in this area. Specifically, this TECH program focuses on embedded electronic systems, which will provide students with a global and specialized vision of a high demand area.

Completing this Postgraduate Diploma will lead you to become a specialist in embedded electronic systems, which will help you to easily join the labor market"

The Postgraduate Diploma in Embedded Electronic Systems at TECH has been designed to generate specialized knowledge in the new lines of the labor market in an increasingly dynamic world such as electronics. This program is aimed at computer engineers who already have previous experience in the sector, but who want to specialize in highly demanded areas and update their knowledge, but also at recent graduates who will find a high quality way to improve their training and competitiveness in the job market.

Embedded systems develop the current techniques, software and hardware, to solve problems that require real time signal processing and can be distributed systems. They are widely used today for applications that require real time signal processing. Specialization in this field is therefore of great importance for computer scientists. The syllabus of this program is much broader, also covering the design of electronic systems to examine the casings of electronic devices with an increasingly higher level of integration, the design techniques of the main internal elements of electronic systems and their shapes and physical dimensions, with the aim of building a prototype.

Finally, the syllabus also includes*smart grids* and the deployment of the technologies that comprise them, which will allow more efficient management of energy flows, adjusting more dynamically to changes in energy supply and demand.

In short, this is a 100% online Postgraduate Diploma that will allow students to distribute their study time, not being conditioned by fixed schedules or having the need to move to another physical location, being able to access all the contents at any time of the day, balancing their work and personal life with their academic life.

This **Postgraduate Diploma in Embedded Electronic Systems** contains the most complete and up to date program on the market. Its most notable features are:

- Practical cases presented by experts in information technology
- The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional development
- Practical exercises where self assessment can be used to improve learning
- Special emphasis on innovative methodologies in Embedded Electronic Systems
- 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

Specializing in embedded electronic systems will provide you with the necessary knowledge to be more efficient in your daily practice”

Complete this Postgraduate Diploma and quickly increase your job opportunities”

This program includes a multitude of case studies that will make studying more understandable and relevant.

TECH is a 21st century university and is committed to online teaching as its main method of learning.

The teaching staff includes professionals from the information technology sector, who bring their 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 an immersive training experience designed to train for real life situations.

This program is designed around Problem Based Learning, whereby the student must try to solve the different professional practice situations that arise throughout the program. This will be done with the help of an innovative system of interactive videos made by renowned experts.

02

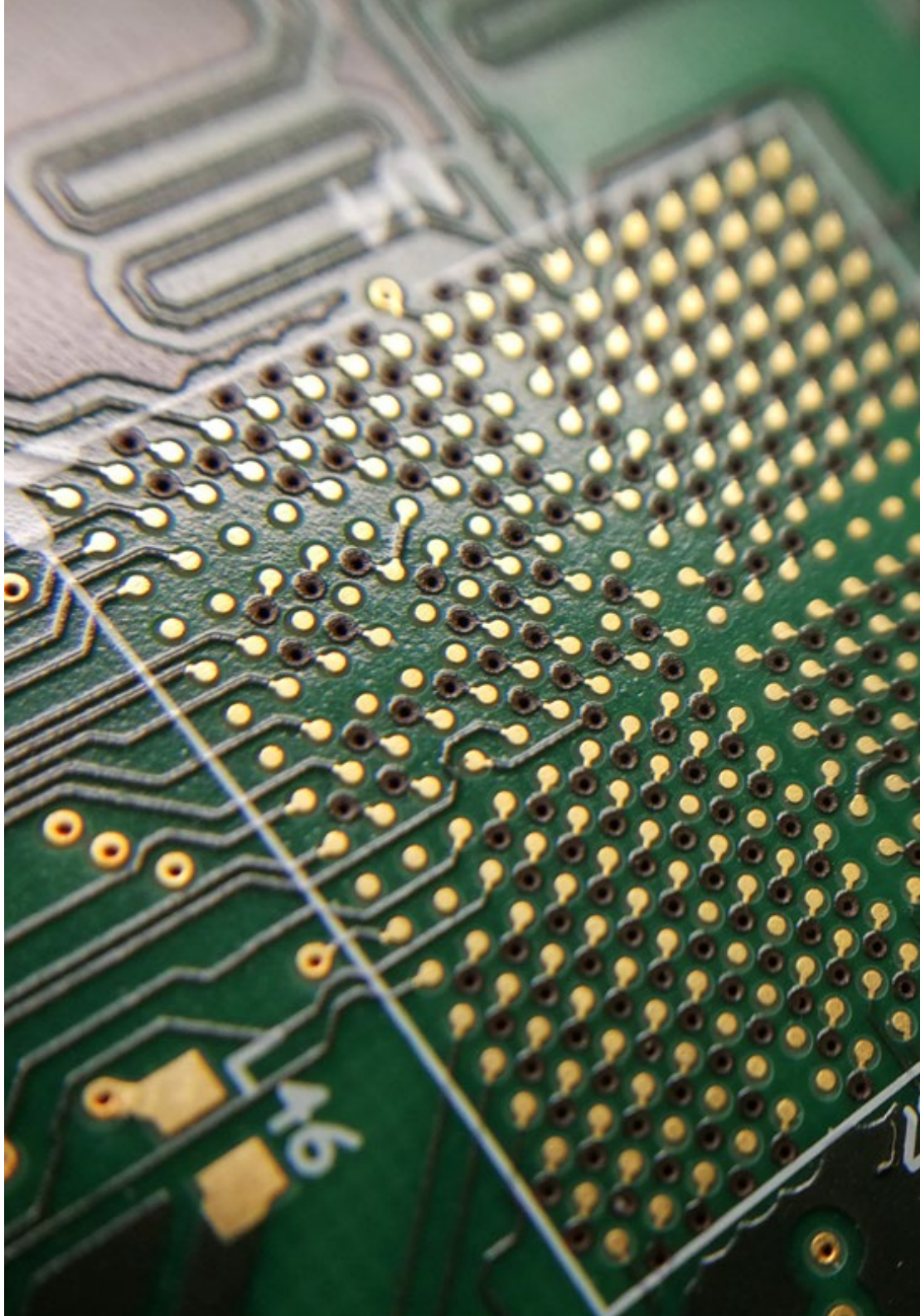
Objectives

The main objective of this TECH Postgraduate Diploma in Embedded Electronic Systems is to offer computer engineers the most complete training in this field at the moment, which will allow them to develop the necessary skills to design and thoroughly analyze this type of electronic systems. A first class program that will be fundamental for students to be able to join a labor market that demands professionals with extensive experience and superior qualifications.

Know the keys to embedded electronic systems and work effectively in this field"

General Objectives

- Analyze current techniques to implement sensor networks
- Determine the real time requirements for embedded systems
- Evaluating microprocessor processing times
- Propose solutions adapted to the specific requirements of IoT
- Determine the stages of an electronic system
- Analyze the schematics of an electronic system
- Develop the schematics of an electronic system by virtually simulating its behavior
- Analyze the schematics of an electronic system
- Design the implementation support of an electronic system
- Implement a prototype of an electronic system
- Test and validate the prototype
- Propose the prototype for commercialization
- Determine the advantages of the *smart grids* deployment
- Analyze each one of the technologies that *smart grids* is based on
- Examine the standards and security mechanisms valid for *smart grids*



Specific Objectives

Module 1. Embedded Systems

- Analyze current embedded system platforms focused on the analysis of signals and IoT management
- Analyze the diversity of simulators for configuring distributed embedded systems
- Generate wireless sensor networks
- Verify and evaluate risks of violation of sensor networks
- Process and analyze data through distributed systems platforms
- Program microprocessors
- Identify errors in a real or simulated system and correct them

Module 2. Design of Electronic Systems

- Identify possible problems in the distribution of the circuit elements
- Establish the necessary stages for an electronic circuit
- Evaluate the electronic components to use in the design
- Simulate the behavior of the electronic components as a whole
- Show the correct operation of an electronic system
- Transfer the design to a Printed Circuit Board (PCB)
- Implement the electronic system, compiling those modules that are needed
- Identify potential weaknesses of the design

Module 3. Energy Efficiency. *Smart Grid*

- Develop specialized knowledge of energy efficiency and intelligent networks
- Determine the need for the *smart grids* deployment
- Analyze the functioning of a *Smart Meter* and its need in the *Smart Grid*
- Determine the importance of power electronics in different network architectures
- Evaluate the advantages and disadvantages that are presented by the integration of renewable sources and energy storage systems
- Study automation and control tools required in smart grids
- Evaluate the security mechanisms that allow *smart grids* to become reliable grids

If you are looking for professional excellence in this field, this Postgraduate Diploma will help you to achieve it"

03

Course Management

The teaching team of the Postgraduate Diploma in Embedded Electronic Systems at TECH is made up of leading professionals in the sector. Professors with extensive teaching and research experience, who understand the importance of high level specialization to join a highly competitive labor market. They help students to do so effectively, achieving a level of training that allows computer engineers to become renowned professionals in the field.

Teachers with extensive experience will teach you the keys of embedded electronic systems"

Management

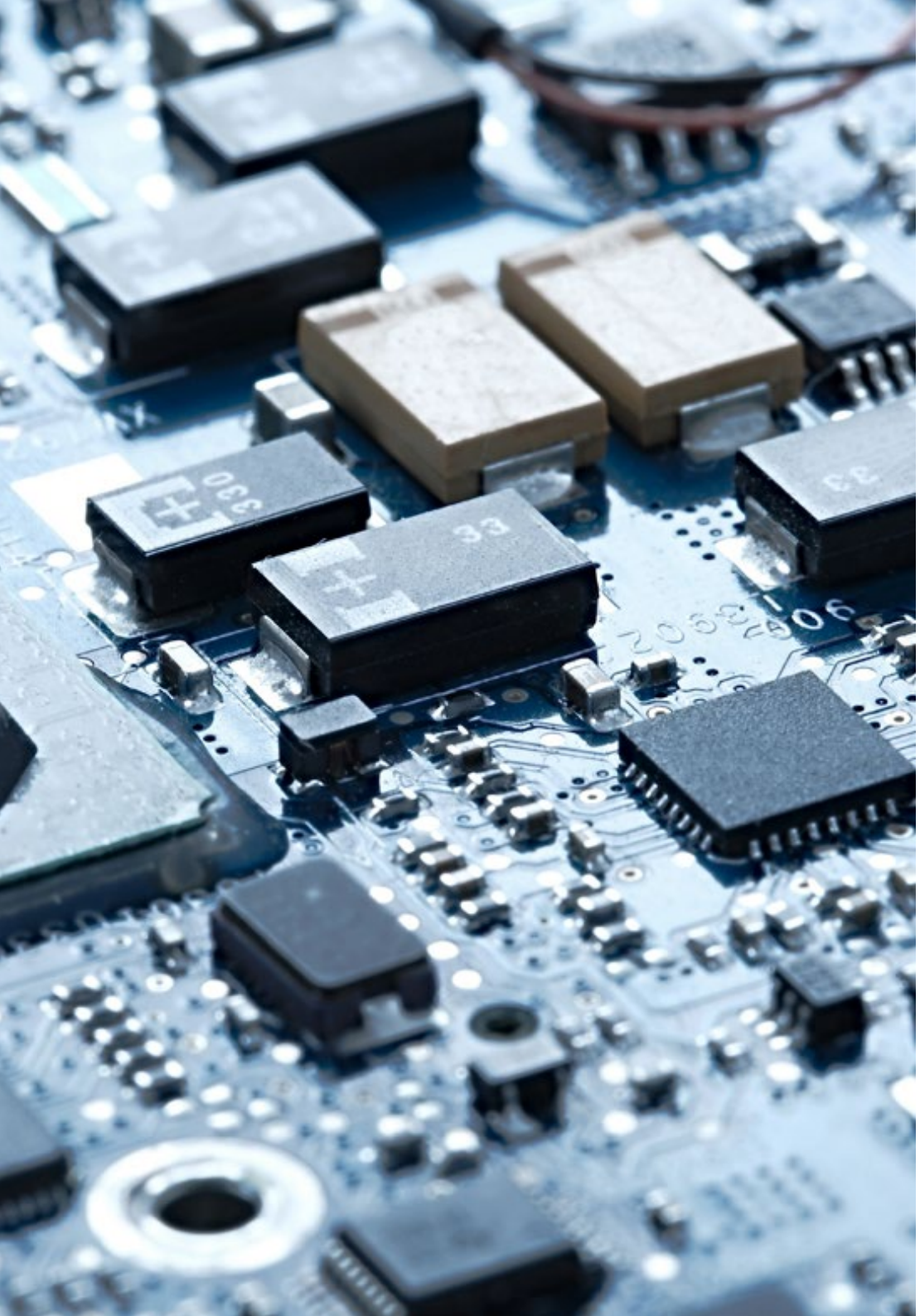
Ms. Casares Andrés, María Gregoria

- Associate professor at Carlos III University of Madrid
- Degree in IT from the Polytechnic University of Madrid
- Researcher at Polytechnic University of Madrid
- Researcher at Carlos III University of Madrid
- Evaluator and creator of OCW courses at Carlos III University of Madrid
- Tutor of courses at INTEF (National Agency for Educational Technology and Teacher Development)
- Support Technician at the Ministry of Education Directorate General of Bilingualism and Quality of Education of the Community of Madrid
- Middle and high school teacher specializing in IT
- Associate professor off the Pontificia de Cimillas University
- Teaching Expert in the Community of Madrid
- Analyst / Project Manager at Banco Urquijo Computer Systems
- ERIA Computer Analyst

Professors

Ms. Escandel Varela, Lorena

- Research support technician in the project: "System for the provision and consumption of HD multimedia content in means of collective passenger transport based on LIFI technology for data transmission" At the Carlos III University, Madrid
- Computer Sciences Specialist in Emprestur, Ministry of Toursim, Cuba
- Computer Sciences Specialist in UNE, an electrical company in Cuba
- IT and Communications Specialist, Almacenes Universales S.A., Cuba
- Specialist in Radio Communications in Santa Clara air base, Cuba
- Engineering in Telecommunications and Electronis in the Marta Abreu de las Villas Central University, Santa Clara, Cuba
- Master's Degree in Electronic Systems and Its Application at Carlos III University, Madrid: Leganés Campus, Madrid
- PhD student in Electrical, Electronic and Automation Engineering, Department of Electronic Technology. Carlos III University of Madrid: Leganés Campus



Dr. Fernández Muñoz, Javier

- University Professor. Carlos III University of Madrid
- PhD in Computer Engineering from Universidad Carlos III de Madrid
- Degree in IT from the Polytechnic University of Madrid

Dr. García Vellisca, Mariano Alberto

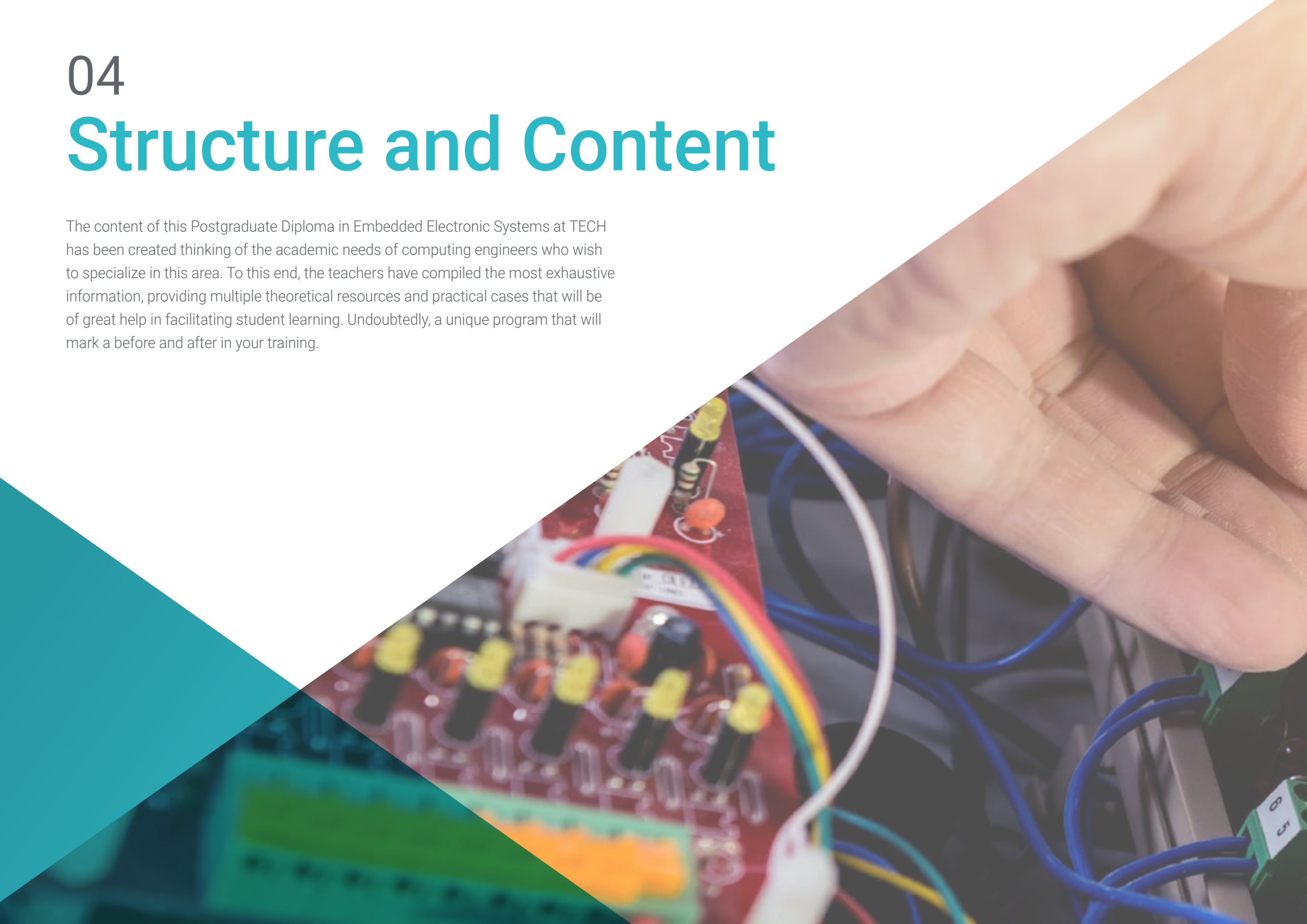
- Professor of vocational training in IES Moratalaz
- PhD's Degree in Biomedical Engineering from the Polytechnic University of Madrid
- Collaborator in Discovery Research-CTB Program Polytechnic University of Madrid
- Senior Research Officer in the BCI-NE research group at the University of Essex, UK
- Research Officer at the Biomedical Technology Center of the Polytechnic University of Madrid
- Electronics engineer in Tecnología GPS S.A
- Electronics engineer in Relequick S.A
- Electronics Engineer from the Complutense University of Madrid
- Master's Degree in Biomedical Engineering from the Polytechnic University of Madrid

Deepen understanding in the most relevant aspects of electronic systems engineering from a top tier teaching team"

04

Structure and Content

The content of this Postgraduate Diploma in Embedded Electronic Systems at TECH has been created thinking of the academic needs of computing engineers who wish to specialize in this area. To this end, the teachers have compiled the most exhaustive information, providing multiple theoretical resources and practical cases that will be of great help in facilitating student learning. Undoubtedly, a unique program that will mark a before and after in your training.



A very well structured syllabus that will facilitate your learning to become an expert in the subject"

Module 1. Embedded Systems

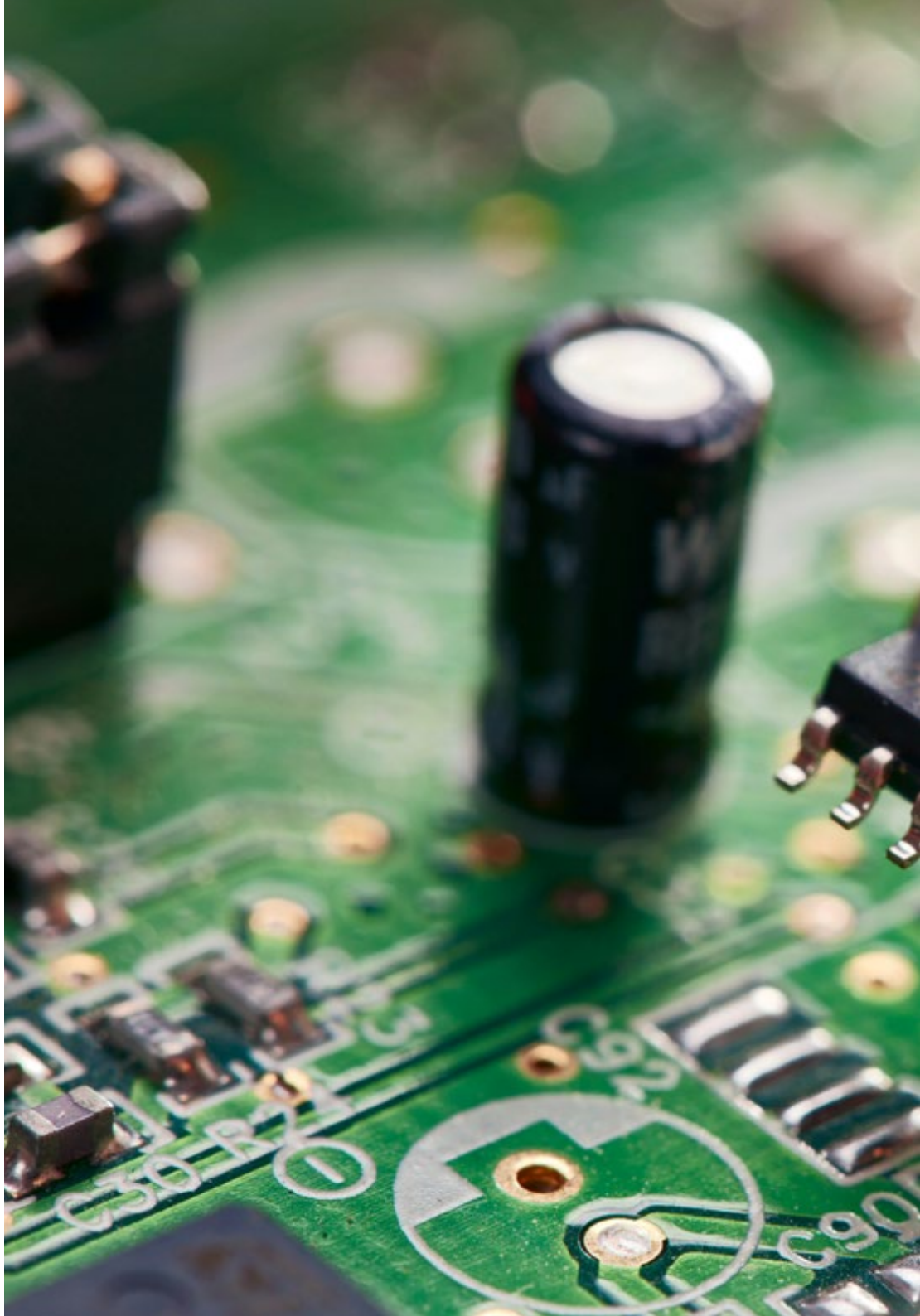
1.1. Embedded Systems
- 1.1.1. Embedded System
- 1.1.2. Requirements of Embedded Systems and Benefits
- 1.1.3. Evolution of Embedded Systems

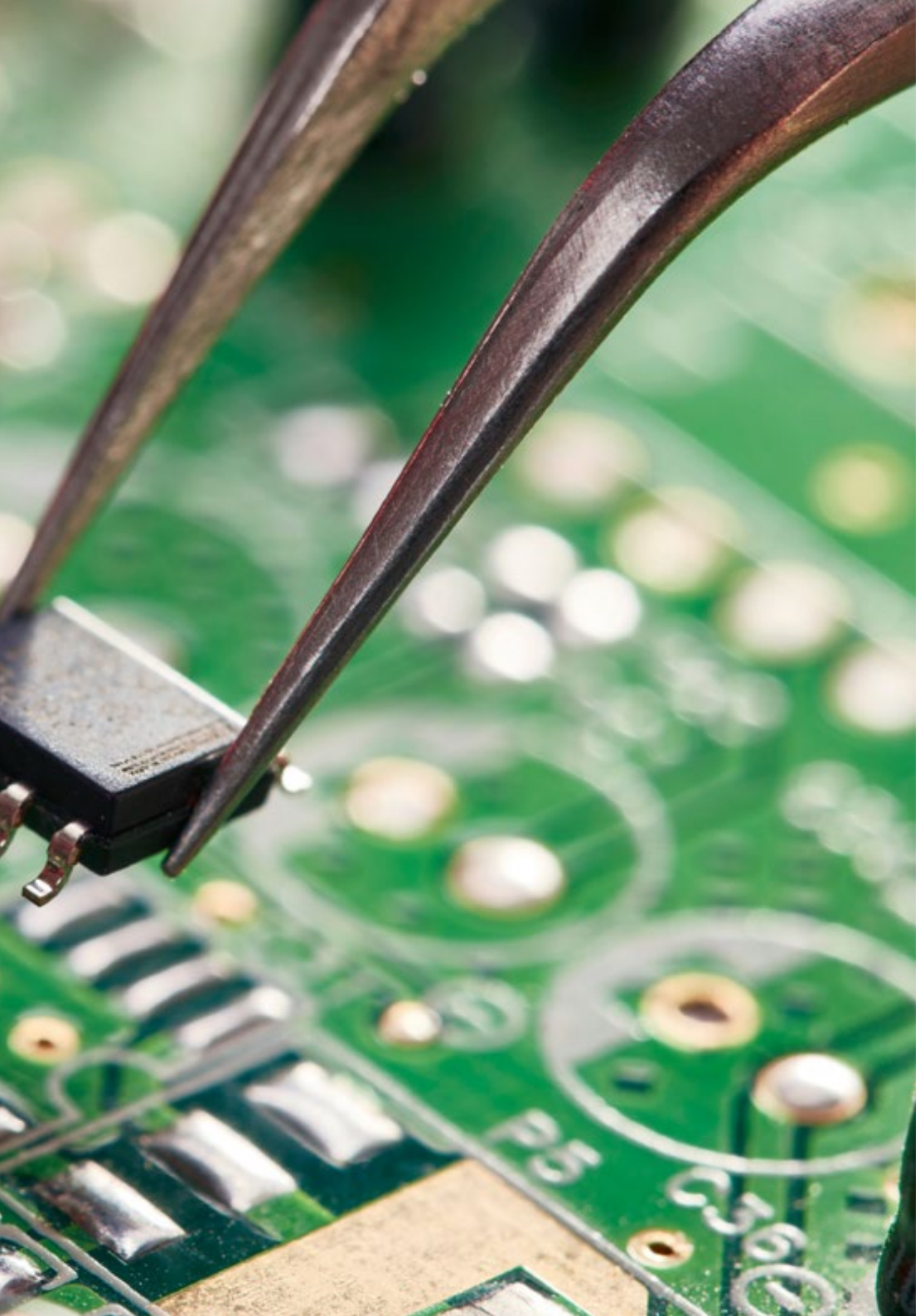
1.2. Microprocessors
- 1.2.1. Evolution of Microprocessors
- 1.2.2. Families of Microprocessors
- 1.2.3. Future Trend
- 1.2.4. Commericial Operating System

1.3. Structure of a Microprocessor
- 1.3.1. Basic Microprocessor Structure
- 1.3.2. Central Processing Unit
- 1.3.3. Input and Output
- 1.3.4. Buses and Logic Levels
- 1.3.5. Structure of a System Based on Microprocessors

1.4. Processing Platforms
- 1.4.1. Cyclic Executive Operation
- 1.4.2. Events and Interruptions
- 1.4.3. Hardware Management
- 1.4.4. Distributed Systems

1.5. Analysis and Design of Programs for Embedded Systems
- 1.5.1. Requirements Analysis
- 1.5.2. Design and Integration
- 1.5.3. Implementation, Tests and Maintenance





1.6. Operating Systems in Real Time
- 1.6.1. Real Time, Types
- 1.6.2. Operating Systems in Real Time. Requirements
- 1.6.3. Microkernel Architecture
- 1.6.4. Planning
- 1.6.5. Task Management and Interruptions
- 1.6.6. Advanced Operating System

1.7. Embedded Systems Design Technique
- 1.7.1. Sensors and Magnitudes
- 1.7.2. Low Power Modes
- 1.7.3. Languages for Embedded Systems
- 1.7.4. Peripherals

1.8. Networks and Multi-Processors in Embedded Systems
- 1.8.1. Types of Networks
- 1.8.2. Distributed Embedded Systems Networks
- 1.8.3. Multiprocessors

1.9. Embedded Systems Simulators
- 1.9.1. Commercial Simulators
- 1.9.2. Simulation Parameters
- 1.9.3. Error Checking and Error Handling

1.10. Embedded Systems for the Internet of Things (IoT)
- 1.10.1. IoT
- 1.10.2. Wireless Sensor Networks
- 1.10.3. Attacks and Protection Measures
- 1.10.4. Resources Management
- 1.10.5. Commercial Platforms

Module 2. Design of Electronic Systems

2.1. Electronic Design
- 2.1.1. Resources for the Design
- 2.1.2. Simulation and Prototype
- 2.1.3. Testing and Measurements

2.2. Circuit Design Techniques
- 2.2.1. Schematic Diagrams
- 2.2.2. Current Limiting Resistors
- 2.2.3. Voltage Dividers
- 2.2.4. Special Resistors
- 2.2.5. Transistors
- 2.2.6. Errors and Precision

2.3. Power Supply Design
- 2.3.1. Power Supply Selection
  - 2.3.1.1. Common Voltages
  - 2.3.1.2. Battery Design
- 2.3.2. Switch Mode Power Supplies
  - 2.3.2.1. Types
  - 2.3.2.2. Pulse Width Modulation
  - 2.3.2.3. Components

2.4. Amplifier Design
- 2.4.1. Types
- 2.4.2. Specifications
- 2.4.3. Gain and Attenuation
  - 2.4.3.1. Input and Output Impedances
  - 2.4.3.2. Maximum Transfer of Power
- 2.4.4. Design of Operational Amplifiers (OP AMP)
  - 2.4.4.1. CC Connection
  - 2.4.4.2. Open Loop Operation
  - 2.4.4.3. Frequency Response
  - 2.4.4.4. Upload Speed
- 2.4.5. OP AMP Applications
  - 2.4.5.1. Inverters
  - 2.4.5.2. Buffer
  - 2.4.5.3. Adder
  - 2.4.5.4. Integrator
  - 2.4.5.5. Restorer
  - 2.4.5.6. Instrumentation Amplification
  - 2.4.5.7. Error Source Compensator
  - 2.4.5.8. Comparator
- 2.4.6. Power Amplifiers

2.5. Oscillator Design
- 2.5.1. Specifications
- 2.5.2. Sinusoidal Oscillators
  - 2.5.2.1. Wien Bridge
  - 2.5.2.2. Colpitts
  - 2.5.2.3. Quartz Crystal
- 2.5.3. Clock Signal
- 2.5.4. Multivibrators
  - 2.5.4.1. *Schmitt Trigger*
  - 2.5.4.2. 555
  - 2.5.4.3. XR2206
  - 2.5.4.4. LTC6900
- 2.5.6. Frequency Synthesizers
  - 2.5.6.1. Phase Lock Loop (PLL)
  - 2.5.6.2. Direct Digital Synthesizer (DDS)

2.6. Filter Design
- 2.6.1. Types
  - 2.6.1.1. Low Pass
  - 2.6.1.2. High Pass
  - 2.6.1.3. Band Pass
  - 2.6.1.4. Band Eliminator
- 2.6.2. Specifications
- 2.6.3. Behavior Models
  - 2.6.3.1. Butterworth
  - 2.6.3.2. Bessel
  - 2.6.3.3. Chebyshev
  - 2.6.3.4. Elliptical
- 2.6.4. RC Filter
- 2.6.5. Band Pass LC Filter
- 2.6.6. Band Eliminator Filter
  - 2.6.6.1. Twin-T
  - 2.6.6.2. LC Notch
- 2.6.7. Active RC Filters

2.7. Electromechanic Design
- 2.7.1. Contact Switches
- 2.7.2. Electromechanical Relays
- 2.7.3. Solid State Relays (SSR)
- 2.7.4. Coils
- 2.7.5. Motors
  - 2.7.5.1. Ordinary
  - 2.7.5.2. Servomotors

2.8. Digital Design
- 2.8.1. Basic Logic of Integrated Circuits (ICs)
- 2.8.2. Programmable Logic
- 2.8.3. Micro-controllers
- 2.8.4. Demorgan Theorem
- 2.8.5. Functional Integrated Circuits
  - 2.8.5.1. Decodifiers
  - 2.8.5.2. Multiplexers
  - 2.8.5.3. Demultiplexers
  - 2.8.5.4. Comparators

2.9. Programmable Logic Devices and Micro-Controllers
- 2.9.1. Programmable Logic Devices (PLD)
  - 2.9.1.1. Programming
- 2.9.2. Field Programmable Gate Array (FPGA)
  - 2.9.2.1. VHDL and Verilog Language
- 2.9.3. Micro-Controllers Design
  - 2.9.3.1. Embedded Micro-Controller Design

2.10. Component Selection
- 2.10.1. Resistance
  - 2.10.1.1. Resistor Encapsulation
  - 2.10.1.2. Materials of Construction
  - 2.10.1.3. Standard Values
- 2.10.2. Capacitors
  - 2.10.2.1. Capacitor Packages
  - 2.10.2.2. Materials of Construction
  - 2.10.2.3. Code of Values
- 2.10.3. Coils
- 2.10.4. Diodes
- 2.10.5. Transistors
- 2.10.6. Integrated Circuits

Module 3. Energy Efficiency. *Smart Grid*

3.1. *Smart Grids* and *Microgrids*
- 3.1.1. *Smart Grids*
- 3.1.2. Benefits
- 3.1.3. Obstacles for its Implementation
- 3.1.4. *Microgrids*

3.2. Measuring Equipment
- 3.2.1. Architecture
- 3.2.2. *Smart Meters*
- 3.2.3. Sensor Networks
- 3.2.4. Fasorial Measurement Units

3.3. Advanced Measuring Infrastructure
- 3.3.1. Benefits
- 3.3.2. Services
- 3.3.3. Protocols and Standards
- 3.3.4. Security/safety

3.4. Distributed Generation and Energy Storage
- 3.4.1. Generation Technologies
- 3.4.2. Storage Systems
- 3.4.3. Electric Vehicle
- 3.4.4. *Microgrids*

3.5. Power Electronics in the Energetic Field
- 3.5.1. Needs of *Smart Grids*
- 3.5.2. Technologies
- 3.5.3. Applications

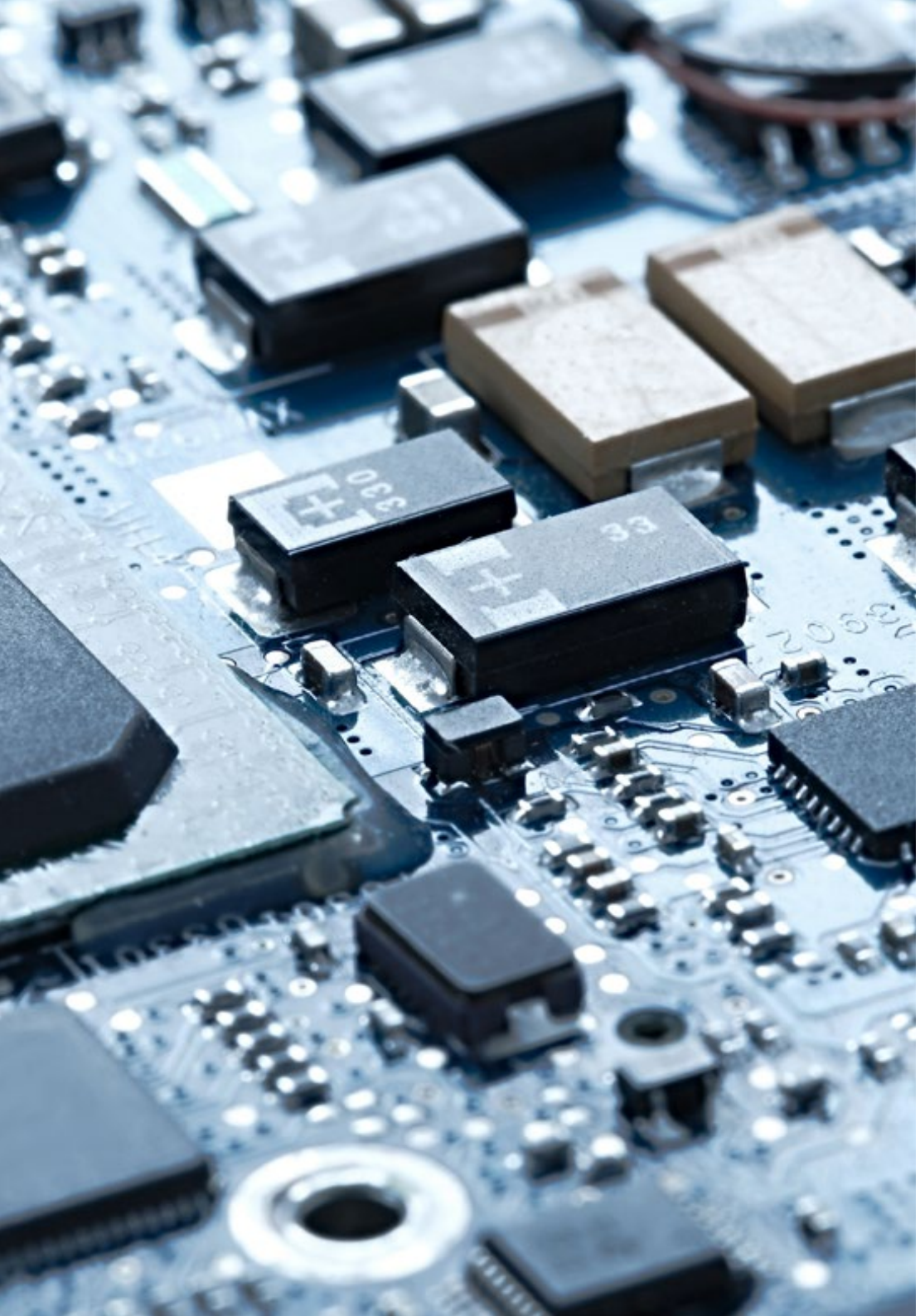
3.6. Response to Demand
- 3.6.1. Objectives
- 3.6.2. Applications
- 3.6.3. Models

3.7. General Architecture Behind a *Smart Grid*
- 3.7.1. Models
- 3.7.2. Local Networks: HAN, BAN, IAN
- 3.7.3. Neighbourhood Area Network and Field Area Network
- 3.7.4. Wide Area Network

3.8. Communication in *Smart Grids*
- 3.8.1. Requirements
- 3.8.2. Technologies
- 3.8.3. Communications Standards and Protocols

3.9. Interoperability, Standards and Security in *Smart Grids*
- 3.9.1. Interoperability
- 3.9.2. Standards
- 3.9.3. Security/safety

3.10. Big Data for *Smart Grids*
- 3.10.1. Analytical Models
- 3.10.2. Scope of Application
- 3.10.3. Data Sources
- 3.10.4. Storage Systems
- 3.10.5. Frameworks



Specialize in Embedded Electronic Systems with this complete academic program"

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 has been the most widely used learning system among the world's leading Information Technology schools for as long as they have existed. 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 course, students 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

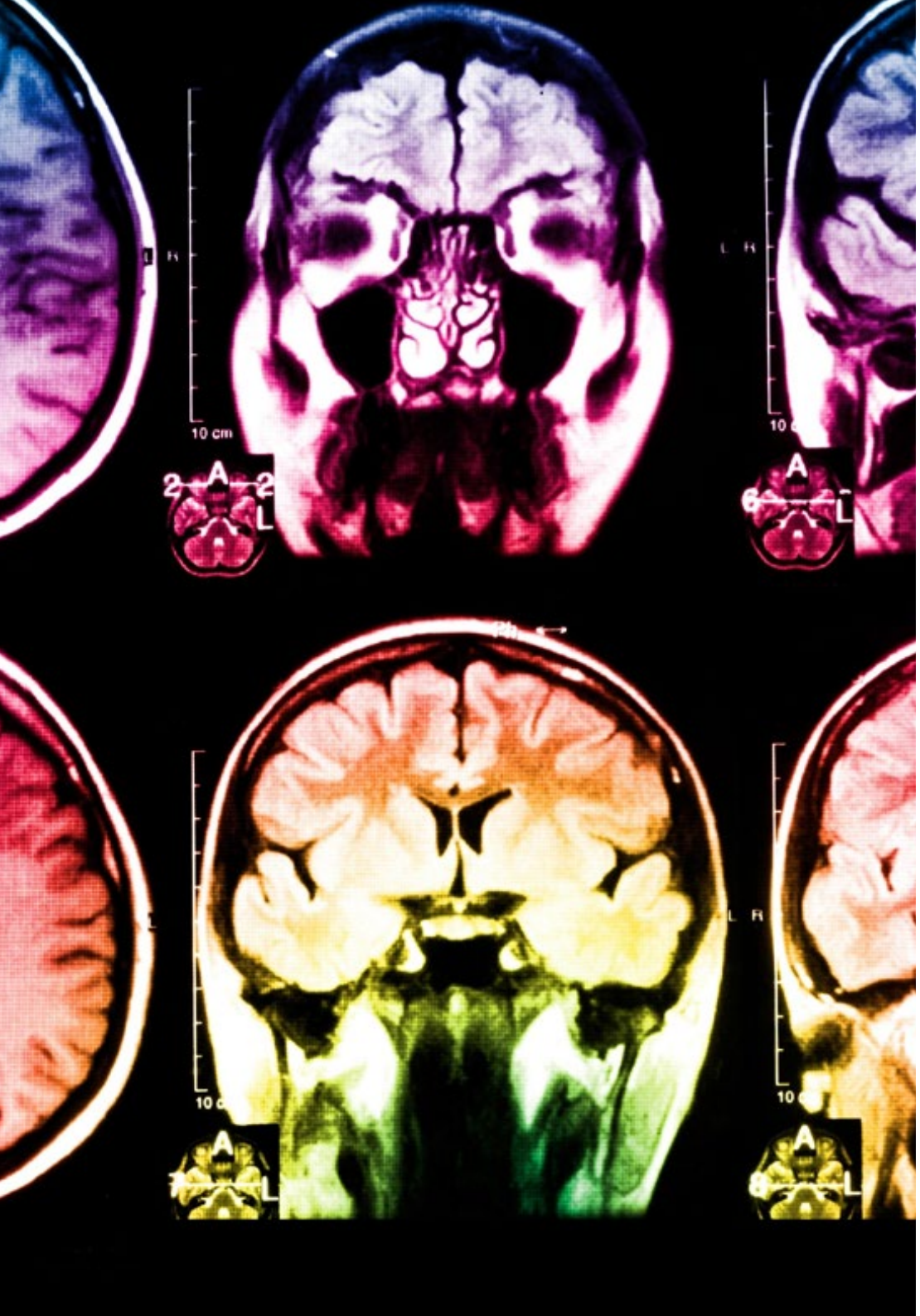
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

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.

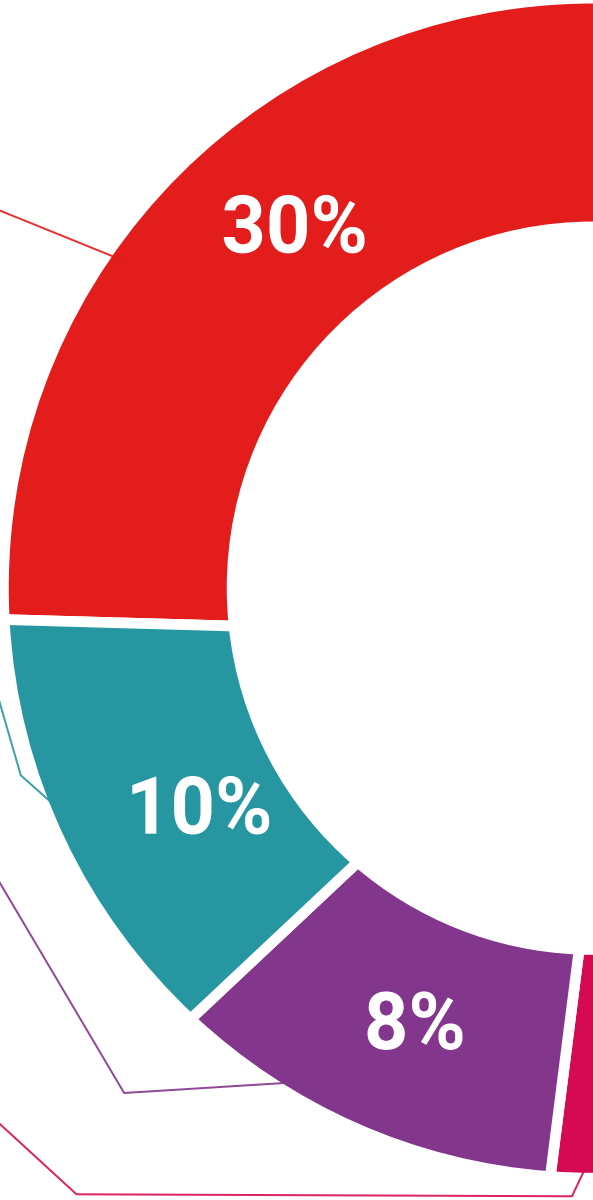
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

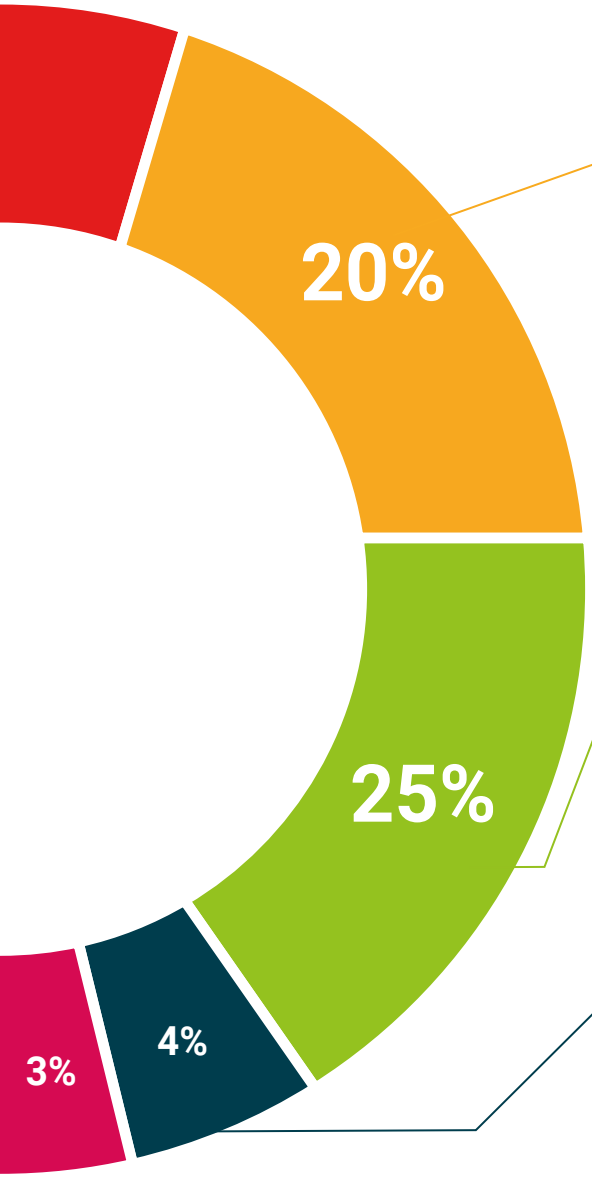
Practising Skills and Abilities

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 Diploma in Embedded Electronic Systems guarantees students, in addition to the most rigorous and up to date education, access to a Postgraduate Diploma issued by TECH Technological University.

By successfully completing this program, you will receive your TECH qualification without the need for complicated paperwork"

This **Postgraduate Diploma in Embedded Electronic Systems** contains the most complete and up to date scientific program on the market.

After the students has 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 Certificate and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Diploma in Embedded Electronic Systems**

Official Nº of hours: **450 h.**


tech technological university

Awards the following

CERTIFICATE

to

Mr./Ms. _____, with identification number _____.

For having passed and accredited the following program

POSTGRADUATE DIPLOMA

in

Embedded Electronic Systems

This is a qualification awarded by this University, equivalent to 450 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH is a Private Institution of Higher Education recognized by the Ministry of Public Education as of June 28, 2018.

June 17, 2020

Tere Guevara Navarro

Dean

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country.

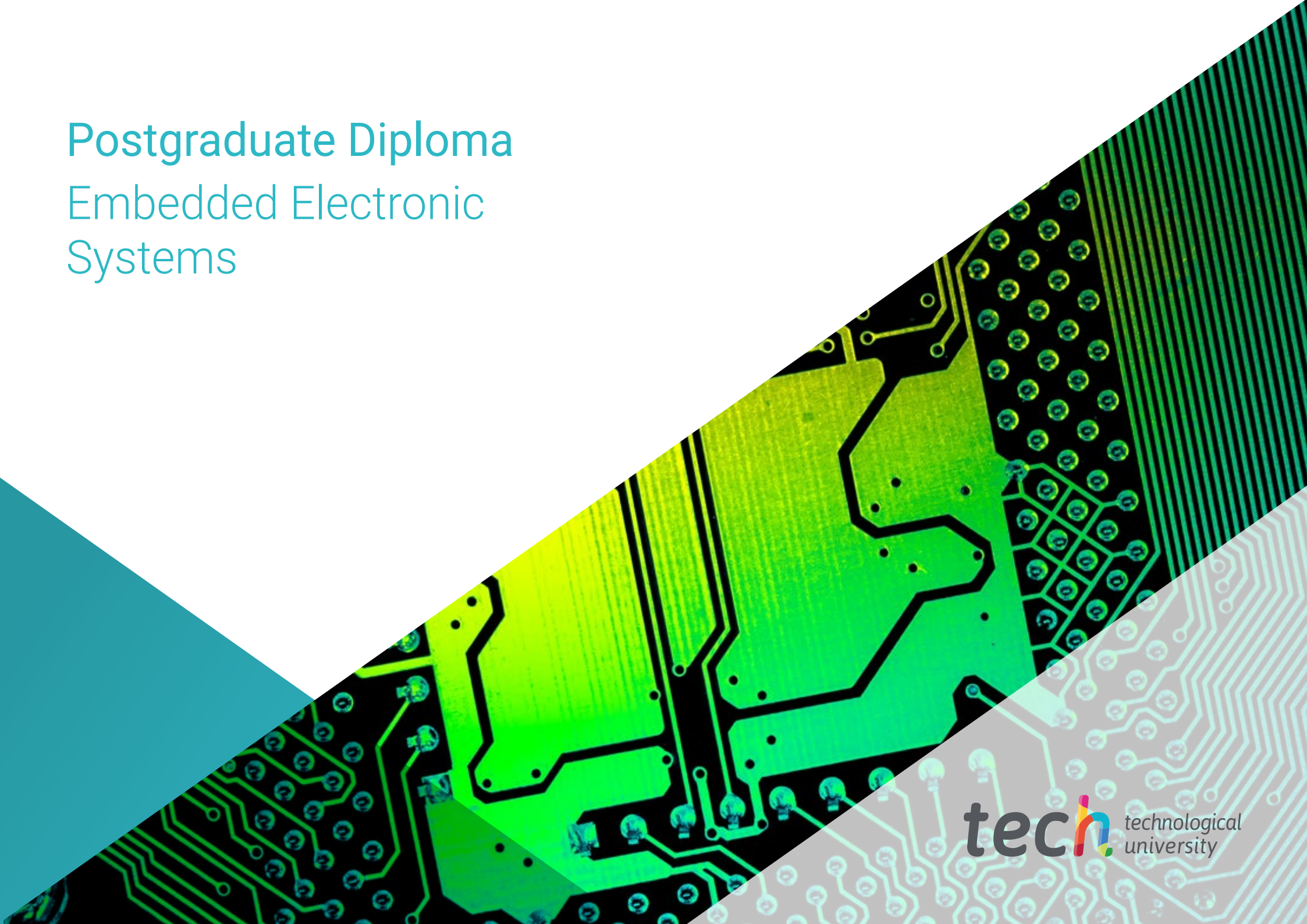
Unique TECH Code: AFWORD23S techtitute.com/certificates

*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.


tech technological university
Postgraduate Diploma
Embedded Electronic Systems
» Modality: online
» Duration: 6 months
» Certificate: TECH Technological University
» Dedication: 16h/week
» Schedule: at your own pace
» Exams: online

Postgraduate Diploma

Embedded Electronic Systems



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