Postgraduate Certificate
Embedded Electronic Systems

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Postgraduate Certificate
Embedded Electronic Systems

- Modality: **online**
- Duration: **12 weeks**
- Certificate: **TECH Technological University**
- Dedication: **16h/week**
- Schedule: **at your own pace**
- Exams: **online**

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

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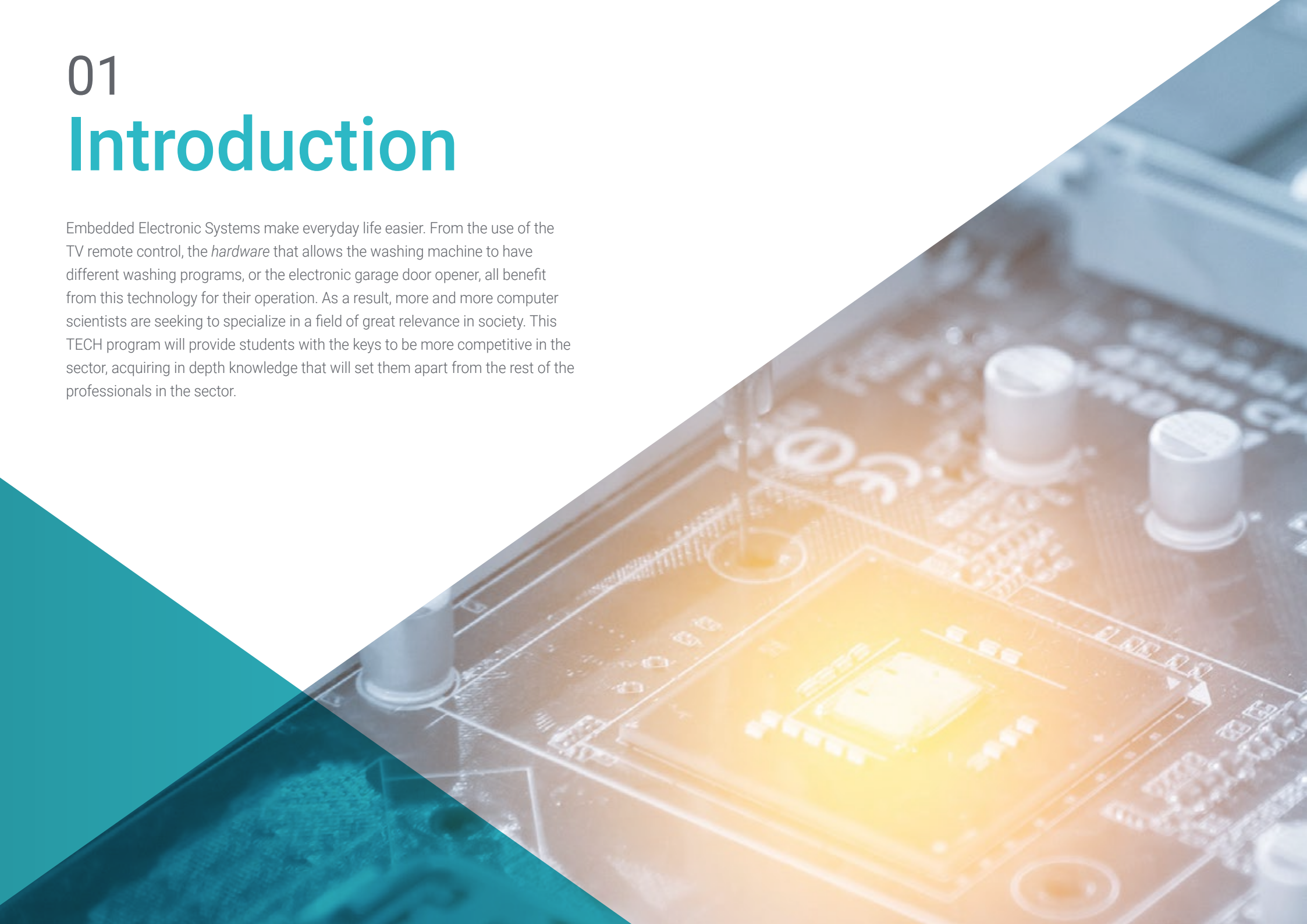
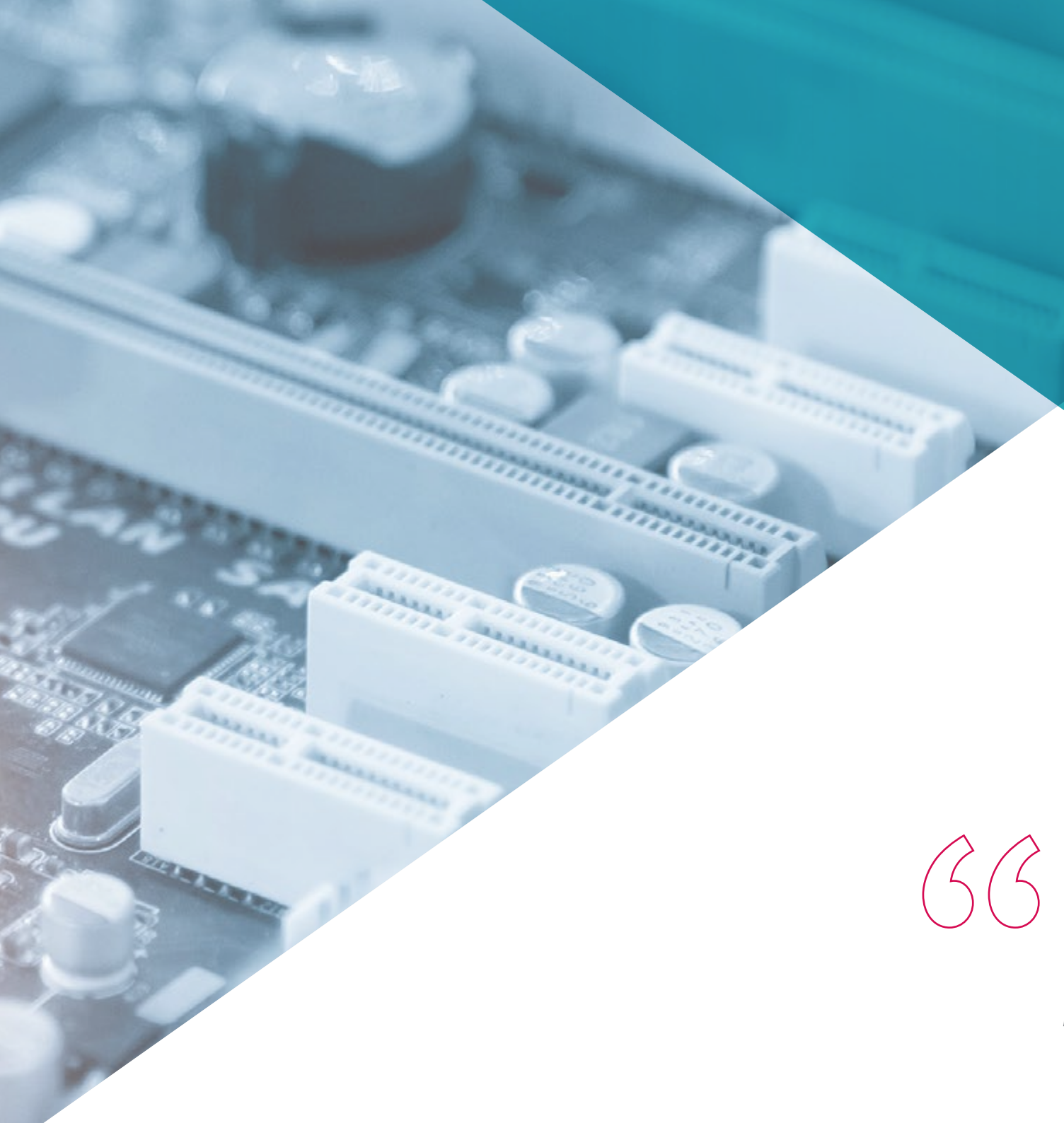
01

Introduction

Embedded Electronic Systems make everyday life easier. From the use of the TV remote control, the *hardware* that allows the washing machine to have different washing programs, or the electronic garage door opener, all benefit from this technology for their operation. As a result, more and more computer scientists are seeking to specialize in a field of great relevance in society. This TECH program will provide students with the keys to be more competitive in the sector, acquiring in depth knowledge that will set them apart from the rest of the professionals in the sector.





By taking this course you will learn how to design and repair electronic systems that make people's daily lives easier"

Embedded Electronic Systems are widely used today for applications that require real time signal processing. These can have a single processor or several processors working in a distributed manner. In the case of networks, it also highlights the importance of knowing the different types of networks and the risks of suffering attacks that compromise them, as well as the mechanisms for exclusion and acceptance of nodes, and protection of the network and data.

The complexity of these aspects has led to the need to create specific academic programs that allow computer scientists to specialize in an area that is related to everyday aspects. Thus, TECH's Postgraduate Certificate in Embedded Electronic Systems develops the current techniques, *software* and *hardware*, to solve problems that require real time signal processing, which can be distributed systems.

The program also covers the design of electronic systems, focusing on portable devices (computers, cell phones, diagnostic tools, etc.). In this way, the enclosures of electronic devices are examined with an increasingly high level of integrity, among other aspects.

In short, this is a 100% online Postgraduate Diploma that will allow students to distribute their study time, not being restricted by fixed schedules or having 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 Certificate in Embedded Electronic Systems** contains the most complete and up to date educational program on the market. The most outstanding characteristics of this program 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 the self assessment process can be carried out 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

Access a multitude of case studies that will help you to reinforce your theoretical knowledge"

Get to know the particularities of Embedded Electronic Systems and be successful in this field"

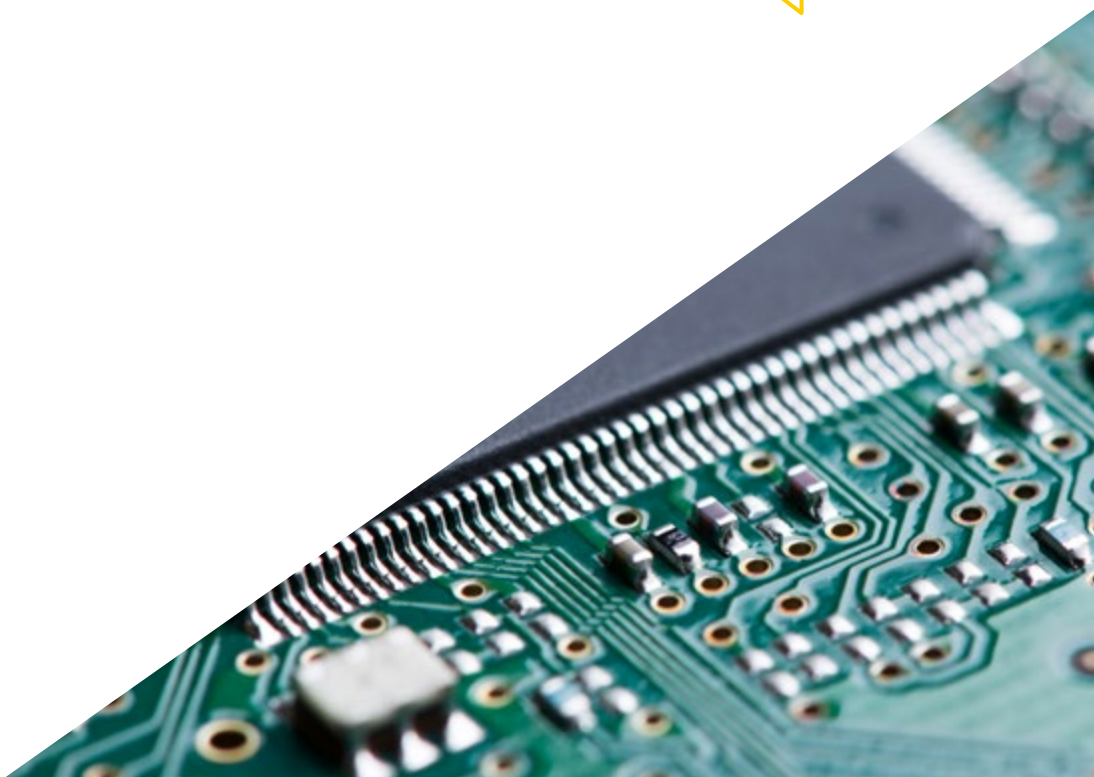
A superior specialization course that will help to give you a boost in your career.

A 100% online training that will allow you to study from anywhere in the world.

Its teaching staff includes professionals from the field of IT, who bring to this program the experience of their work, 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.

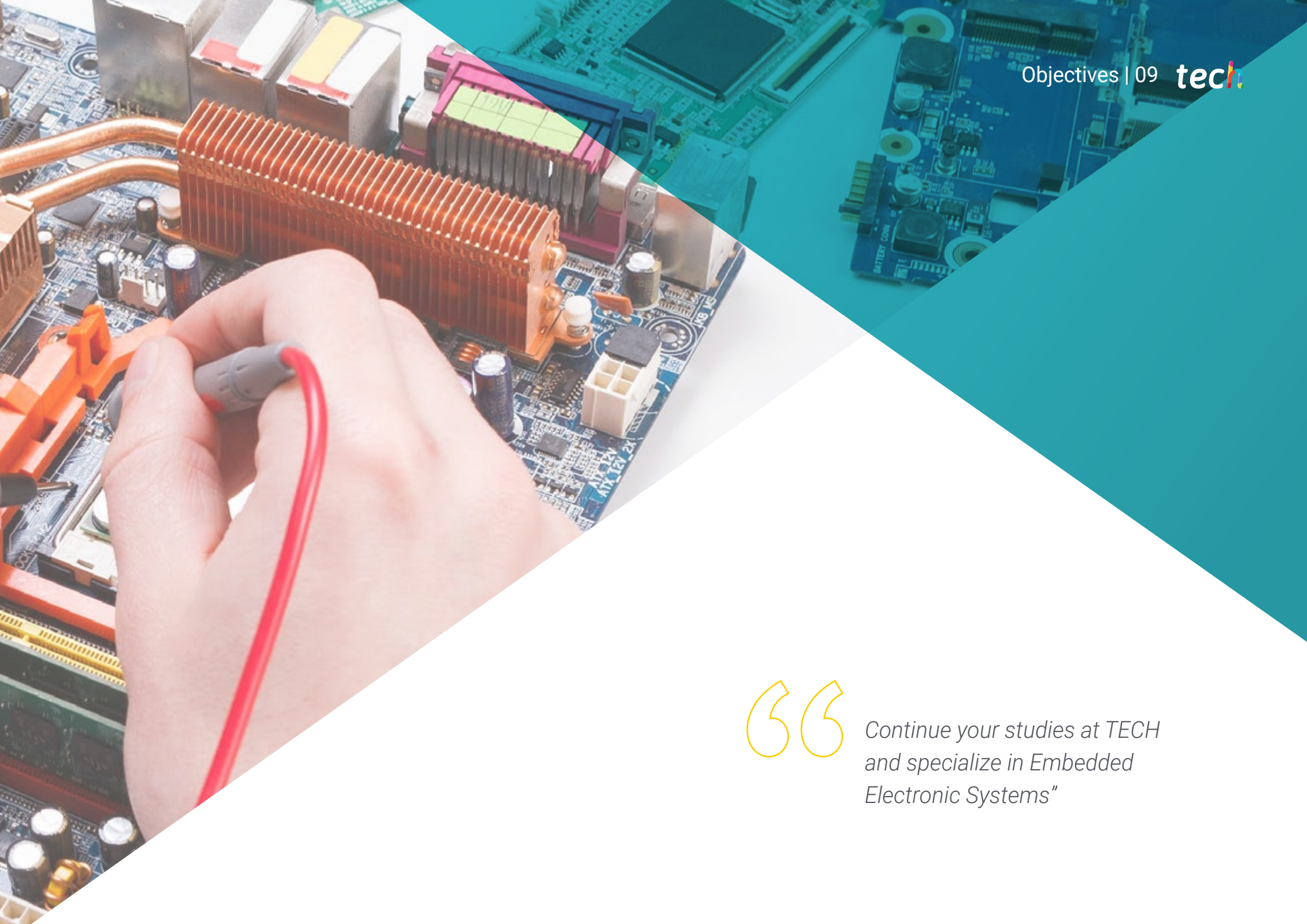
This program is designed around Problem Based Learning, whereby the student must try to solve the different professional practice situations that arise throughout the program. For this purpose, the student will be assisted by an innovative interactive video system created by renowned and experienced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



02

Objectives

The main objective of this Postgraduate Certificate in Embedded Electronic Systems at TECH is to ensure that, upon finishing the course, the students have the necessary qualification to understand, design and repair embedded electronic systems. That's why we have developed a first class program that includes the most up to date information on the market, a specialization that will mark a before and after in the qualification of computer scientists and will provide them with the necessary knowledge to stand out in the field.

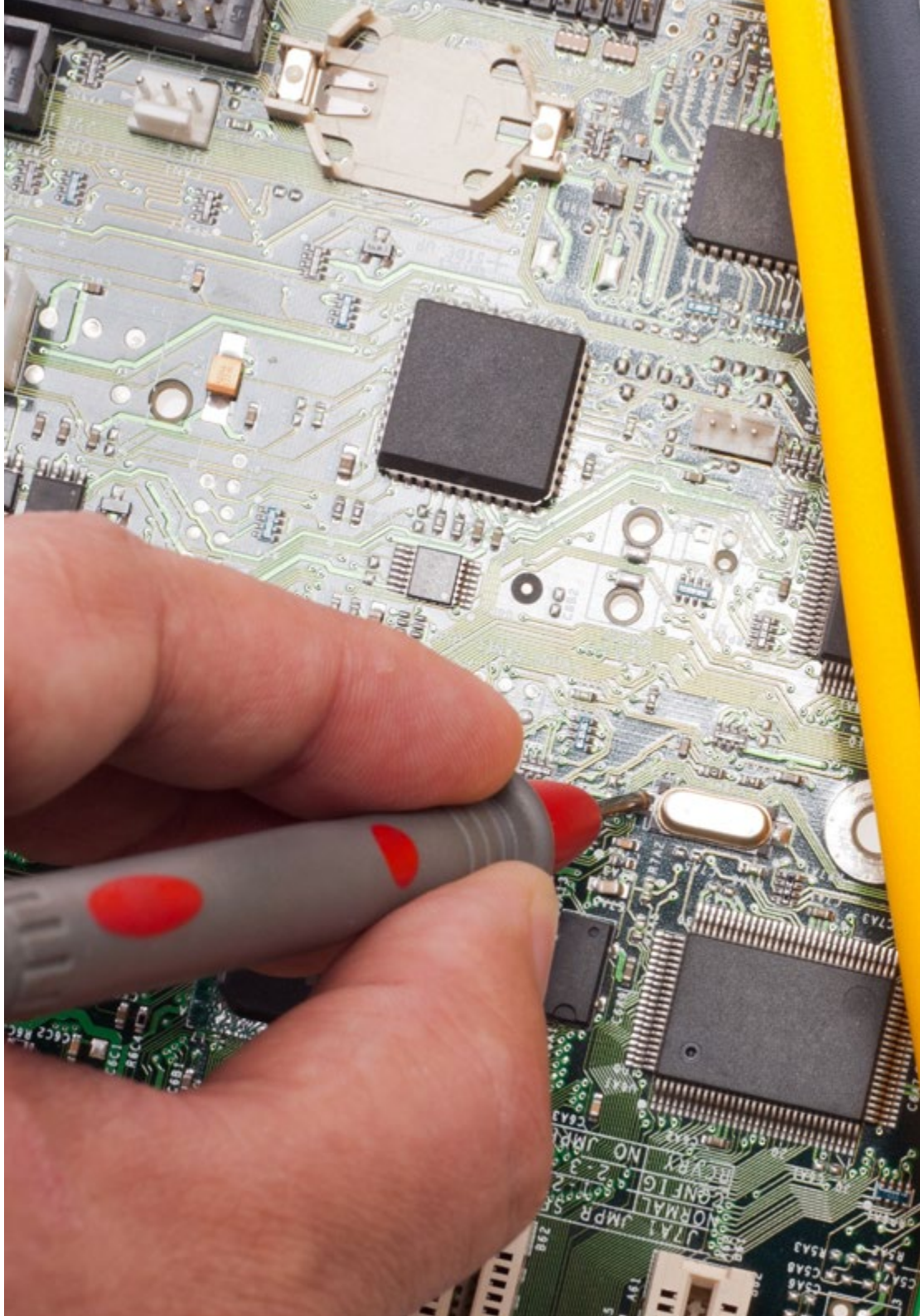


Continue your studies at TECH and specialize in Embedded Electronic Systems"

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

Acquire the necessary skills to develop successfully in the field"



Specific Objectives

- 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
- 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

03

Course Management

The teachers of this TECH program are professionals with extensive experience in the industry, who understand the importance of quality specialization in order to excel in an area that is currently in high demand, such as Embedded Electronic Systems. In this way, the main objective is for computer scientists to achieve the higher qualification needed to become true experts in the field, increasing their employment opportunities in very little time.

A prestigious teaching team will help you to specialize in this field"

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

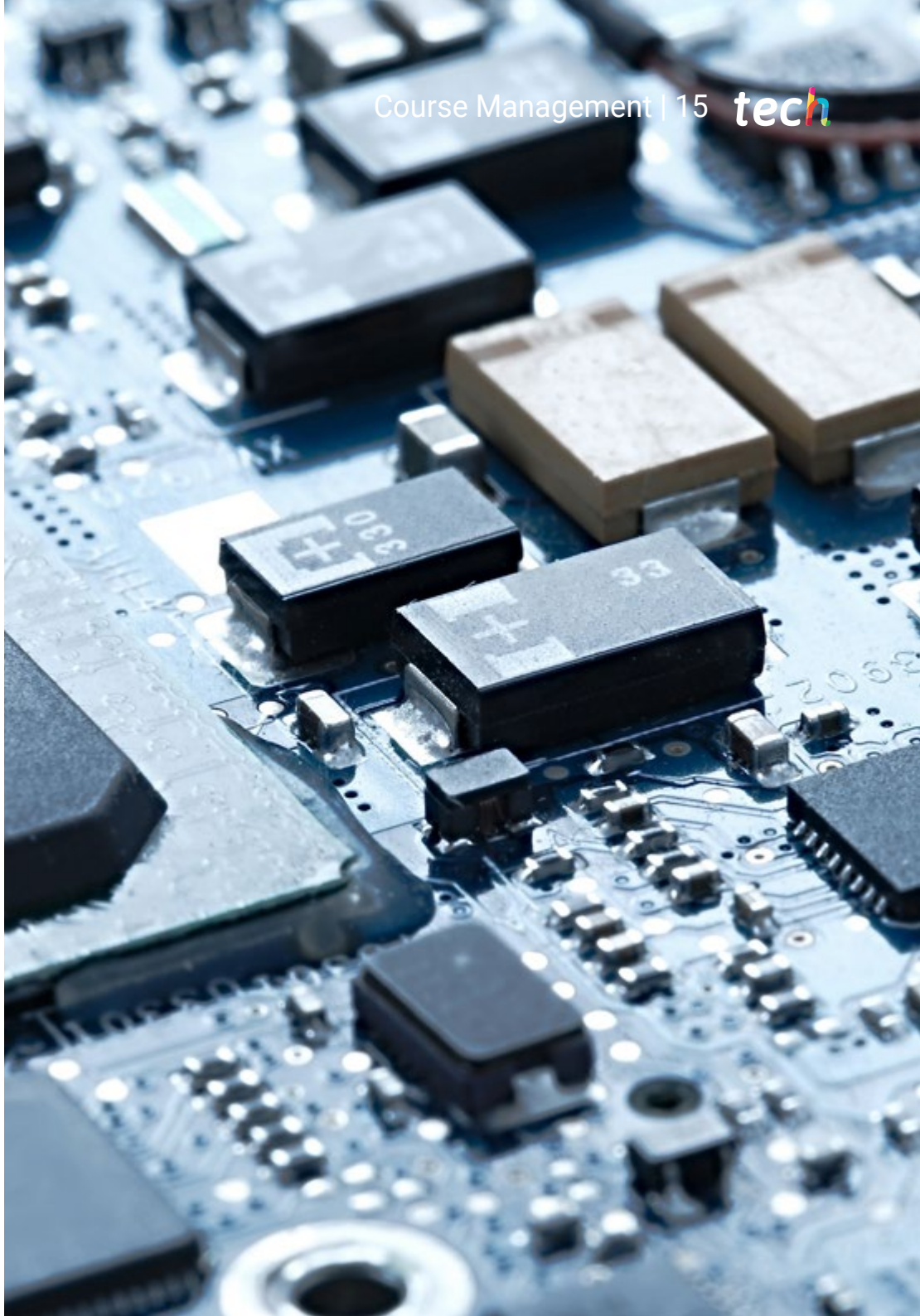
Professors

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

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



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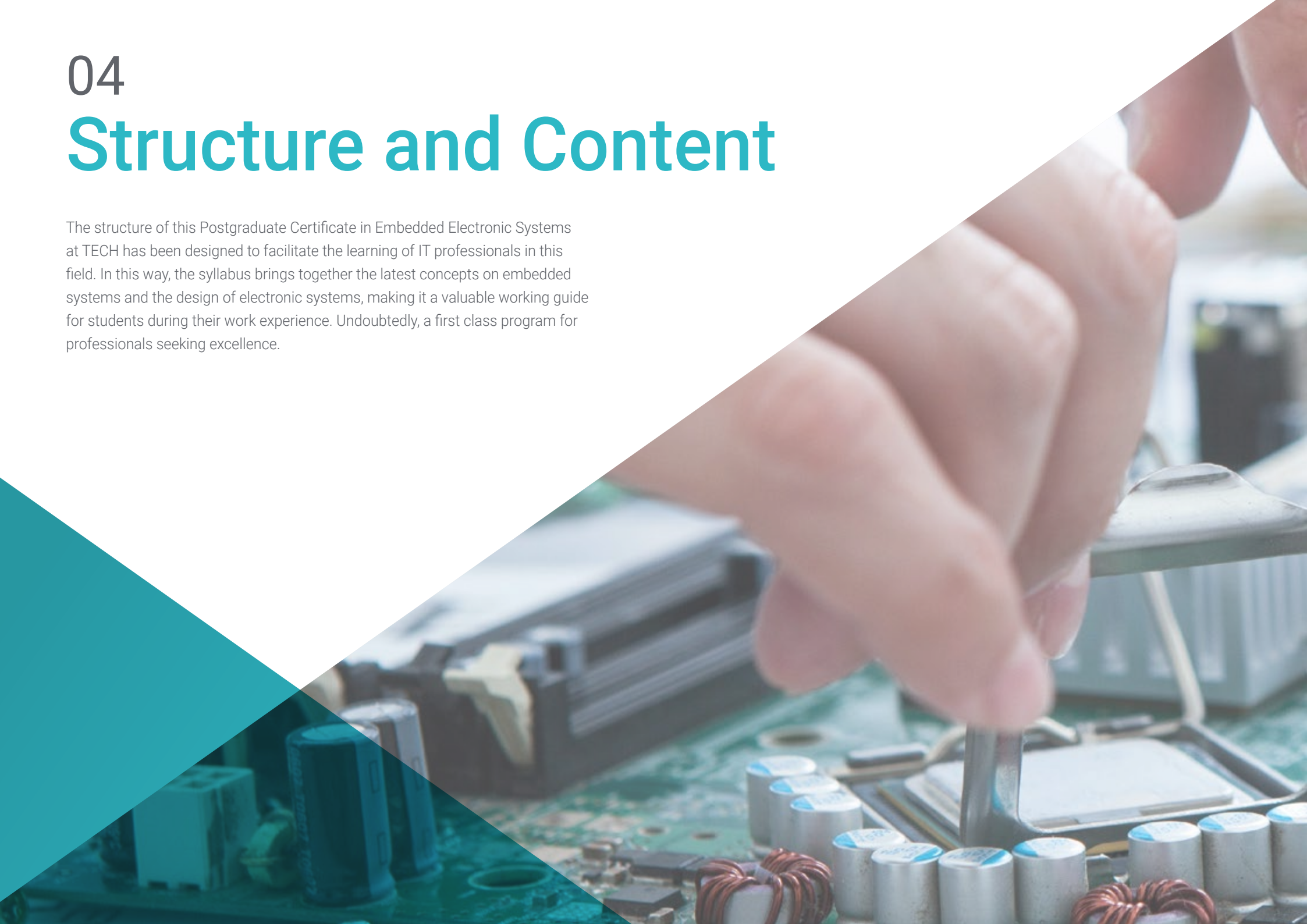
Structure and Content

The structure of this Postgraduate Certificate in Embedded Electronic Systems at TECH has been designed to facilitate the learning of IT professionals in this field. In this way, the syllabus brings together the latest concepts on embedded systems and the design of electronic systems, making it a valuable working guide for students during their work experience. Undoubtedly, a first class program for professionals seeking excellence.



A very well structured syllabus that will help you in your self guided learning"

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.

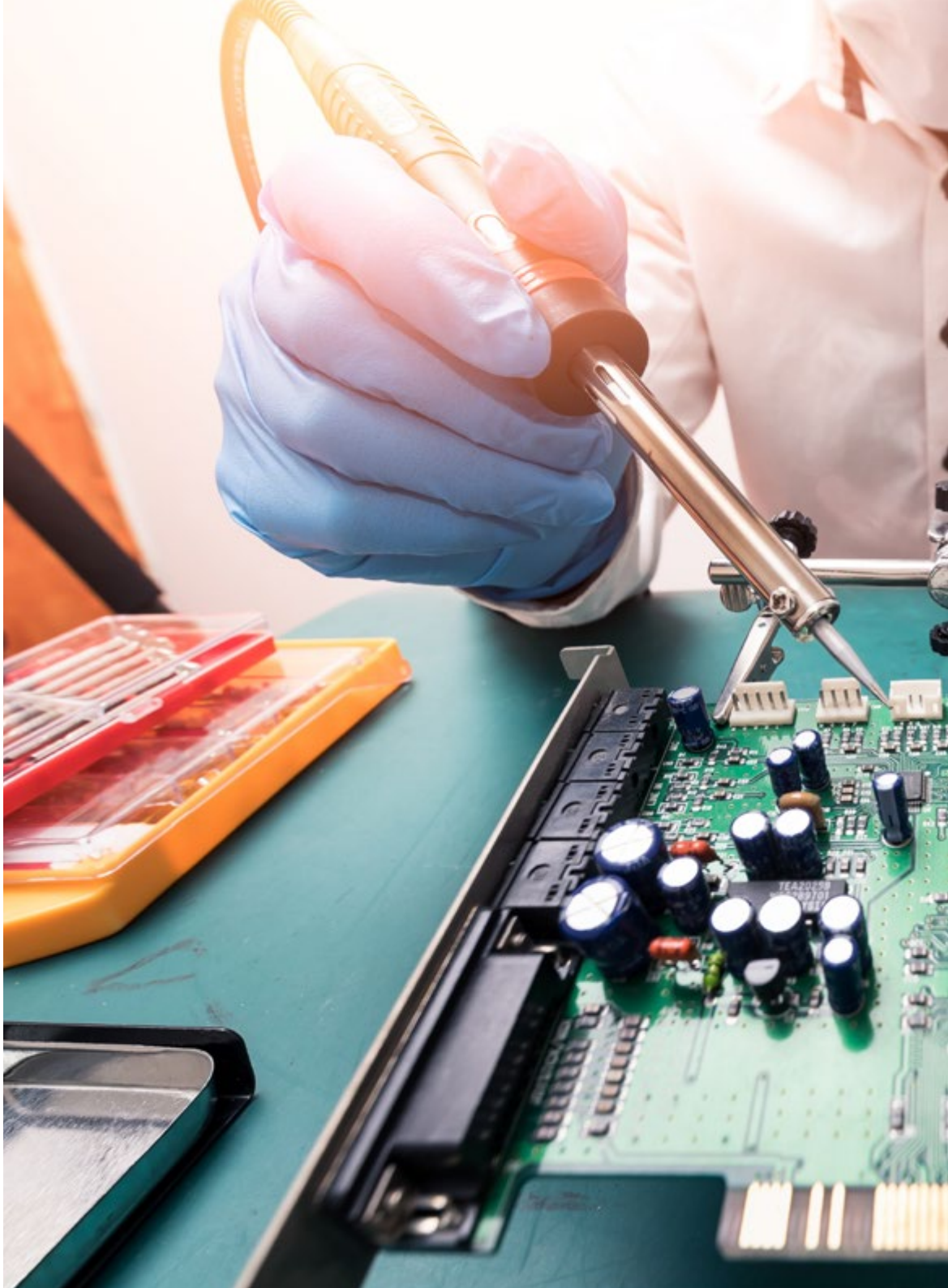
2.4. Amplifier Design
- 2.4.1. Types
- 2.4.2. Specifications
- 2.4.3. Gain and Attenuation
  - 2.4.3.1. Input and Output Impedances
  - 2.4.3.2. Maximum Transfer of Power
- 2.4.4. Design of Operational Amplifiers (OP AMP)
  - 2.4.4.1. CC Connection
  - 2.4.4.2. Open Loop Operation
  - 2.4.4.3. Frequency 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

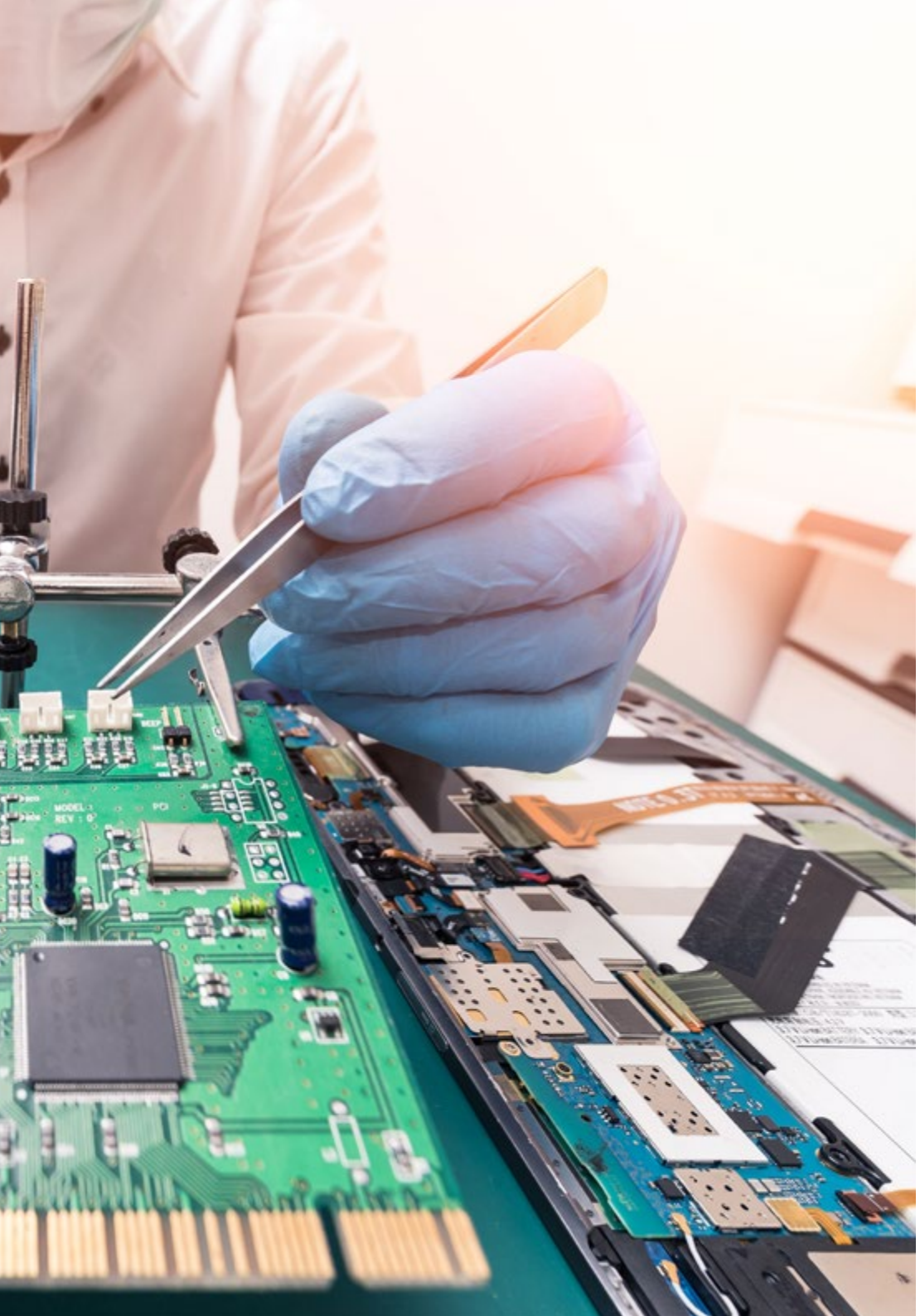
2.5. Oscillator Design
- 2.5.1. Specifications
- 2.5.2. Sinusoidal Oscillators
  - 2.5.2.1. *Wien* Bridge
  - 2.5.2.2. *Colpitts*
  - 2.5.2.3. Quartz Crystal
- 2.5.3. Clock Signal
- 2.5.4. Multivibrators
  - 2.5.4.1. *Schmitt Trigger*
  - 2.5.4.2. 555
  - 2.5.4.3. XR2206
  - 2.5.4.4. LTC6900
- 2.5.5. Frequency Synthesizers
  - 2.5.5.1. Phase Lock Loop (PLL)
  - 2.5.5.2. 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. Morgan's 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

Update your knowledge in this field and work more effectively in your daily practice”

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.

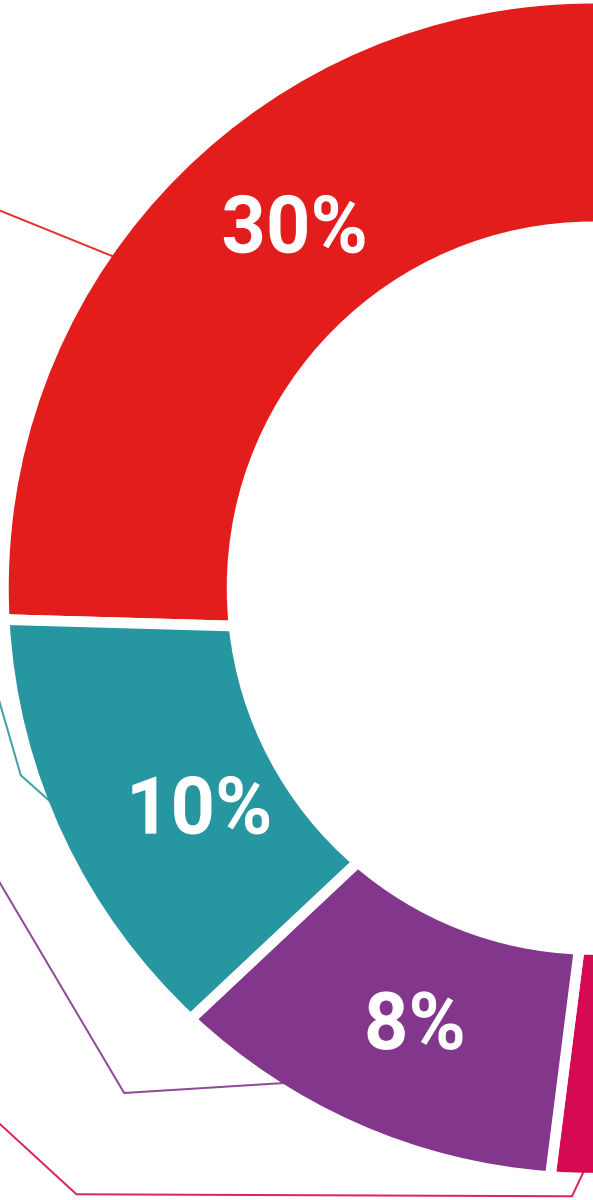
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

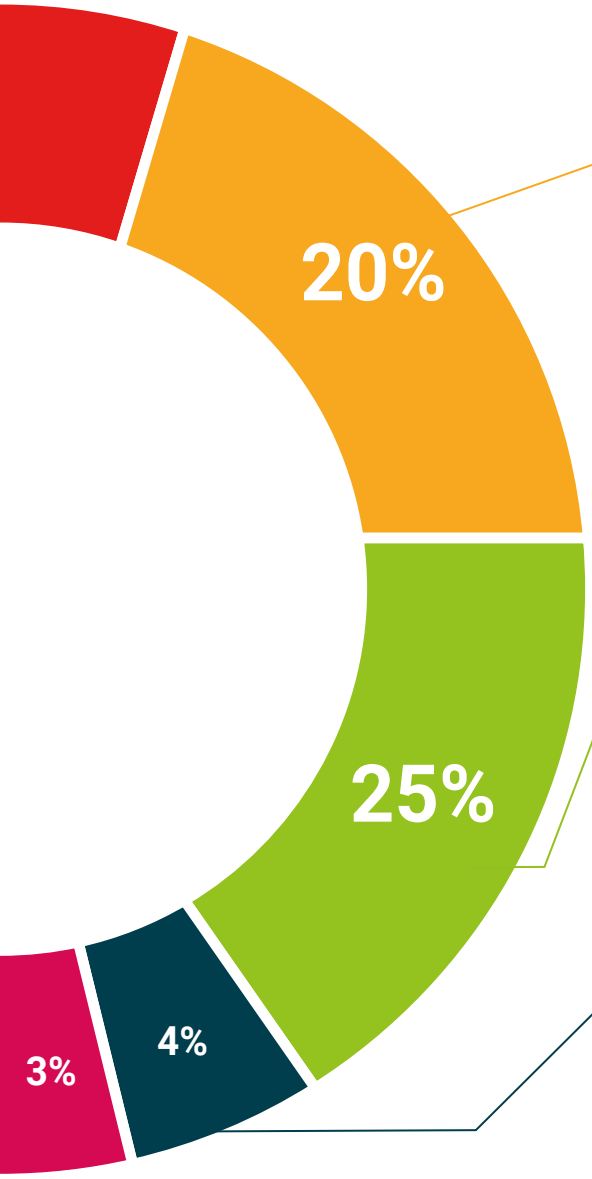
Practising Skills and Abilities

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

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

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

After the student has passed the assessments, they will receive their corresponding **Postgraduate Certificate** 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 Certificate in Embedded Electronic Systems**
Official Nº of hours: **300 h.**


tech technological university

Awards the following

CERTIFICATE

to

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

For having passed and accredited the following program

POSTGRADUATE CERTIFICATE

in

Embedded Electronic Systems

This is a qualification awarded by this University, equivalent to 300 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.

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