

# Postgraduate Certificate

## Analog and Digital Electronics



## Postgraduate Certificate Analog and Digital Electronics

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

Website: [www.techtitute.com/us/engineering/postgraduate-certificate/analog-digital-electronics](http://www.techtitute.com/us/engineering/postgraduate-certificate/analog-digital-electronics)

# Index

01

Introduction

---

*p. 4*

02

Objectives

---

*p. 8*

03

Structure and Content

---

*p. 12*

04

Methodology

---

*p. 16*

05

Certificate

---

*p. 24*



# 01

# Introduction

Although analog and electronic technology are currently converging, it is true that in recent decades the great potential of all devices, equipment, and machines based on digital systems has eclipsed the technological systems that prevailed in the twentieth century. Either, in some cases by reducing costs, or by the potential it offers, the digital world today has a great future in productive sectors such as industry. In this context, there is no doubt that engineering professionals who wish to thrive in their field must have solid knowledge and specialization. In this line, TECH has designed this program, which offers the most advanced knowledge about the operation of circuits, systems, and devices. All this also through multimedia resources that can be accessed 24 hours a day from any device with an Internet connection.







*Explore with this Postgraduate Certificate the wide possibilities offered by the development of Analog and Digital Electronics in the field of Engineering"*

The 20th century is technologically marked by analog electronic systems, which allowed the arrival of televisions in homes, video recorders, audio recorders or the first computers. However, the improvement of technology and tools has made possible the development of digital electronics. Thanks to it, there is now a higher quality of data and information storage.

The digital concept is already present in all economic sectors, including industry, which has been able to take advantage of each of the advances obtained to optimize productivity. This progress in turn has driven the need for engineering professionals with well-founded knowledge in this area, both for the design of new devices and to solve any technical problem in their equipment. That is why this academic institution has created this program, which offers the graduate the most essential information on circuits, systems, and components that make up the Analog and Digital Electronics.

A university program that will provide students with knowledge that will allow them to advance in their professional careers in just 6 weeks. For this purpose, it has a syllabus that provides a theoretical-practical approach in this field and is complemented with video summaries, detailed videos, specialized readings or case studies. All this is prepared by a teaching team specialized in electronics.

The professional is, therefore, facing an excellent opportunity to progress through a university education provided in a convenient and 100% online format. Students only need a computer, tablet, or cell phone with an Internet connection to access the content hosted on the Virtual Campus. In addition, thanks to the Relearning system, you will reduce the hours dedicated to memorization and will flow much more smoothly through this university education.

This **Postgraduate Certificate in Analog and Digital Electronics** contains the most complete and up-to-date program on the market. The most important features include:

- ◆ Practical case studies are presented by experts in Physics
- ◆ 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 the self-assessment process can be carried out 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



*This program allows you to delve into logic functions and combinational circuits whenever you wish, from your computer”*

“*Boost your professional career with a Postgraduate Certificate that provides you with intensive learning on analog and digital electronics”*

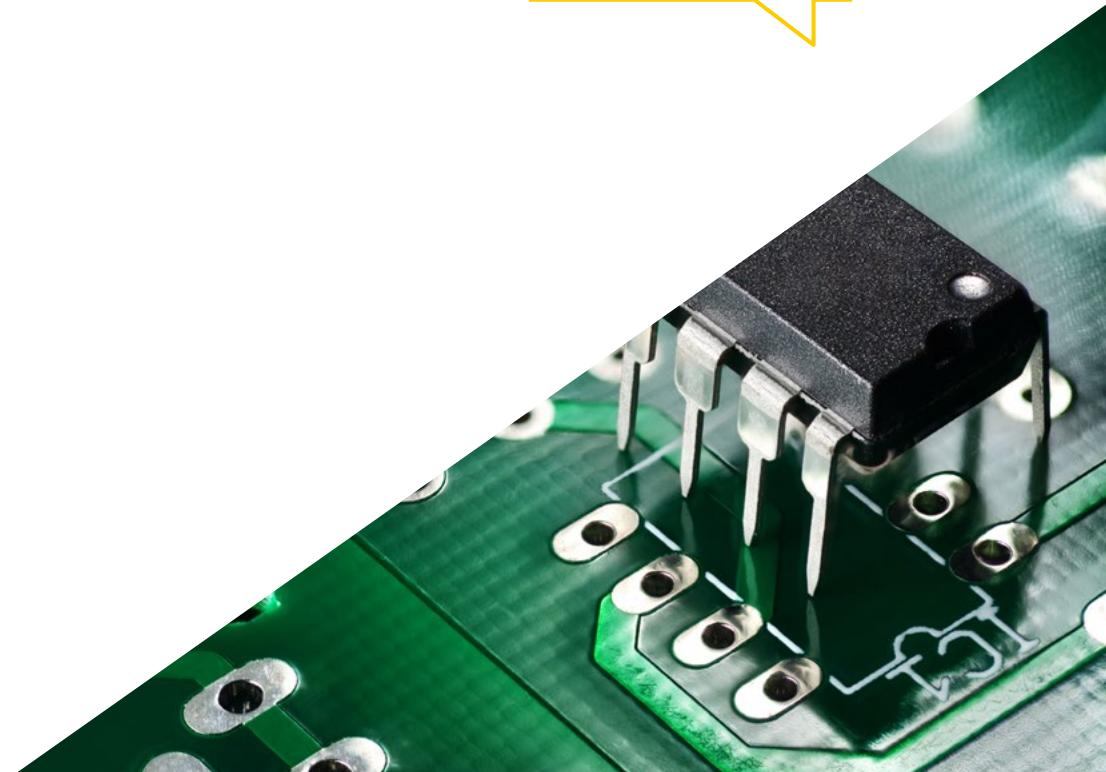
*Become a much more competitive engineering professional by mastering Analog and Digital Electronics.*

*TECH adapts to you and that is why it has designed a 100% online Postgraduate Certificate, with no fixed timetables and flexible schedules.*

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.

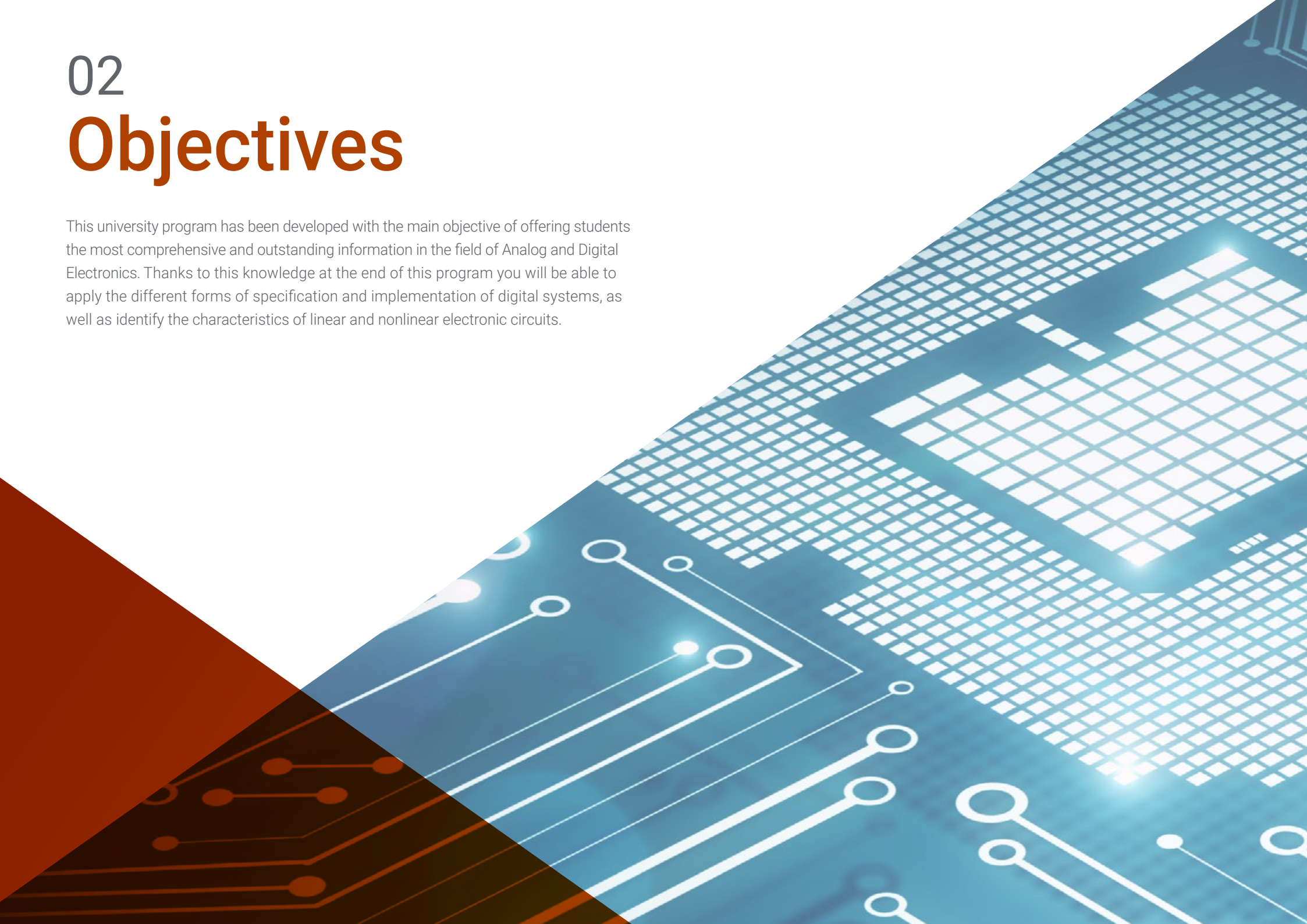




02

# Objectives

This university program has been developed with the main objective of offering students the most comprehensive and outstanding information in the field of Analog and Digital Electronics. Thanks to this knowledge at the end of this program you will be able to apply the different forms of specification and implementation of digital systems, as well as identify the characteristics of linear and nonlinear electronic circuits.





“

*You will achieve the goals you set for yourself through this program and the specialized teaching team, which will resolve any doubts you may have about the syllabus”*



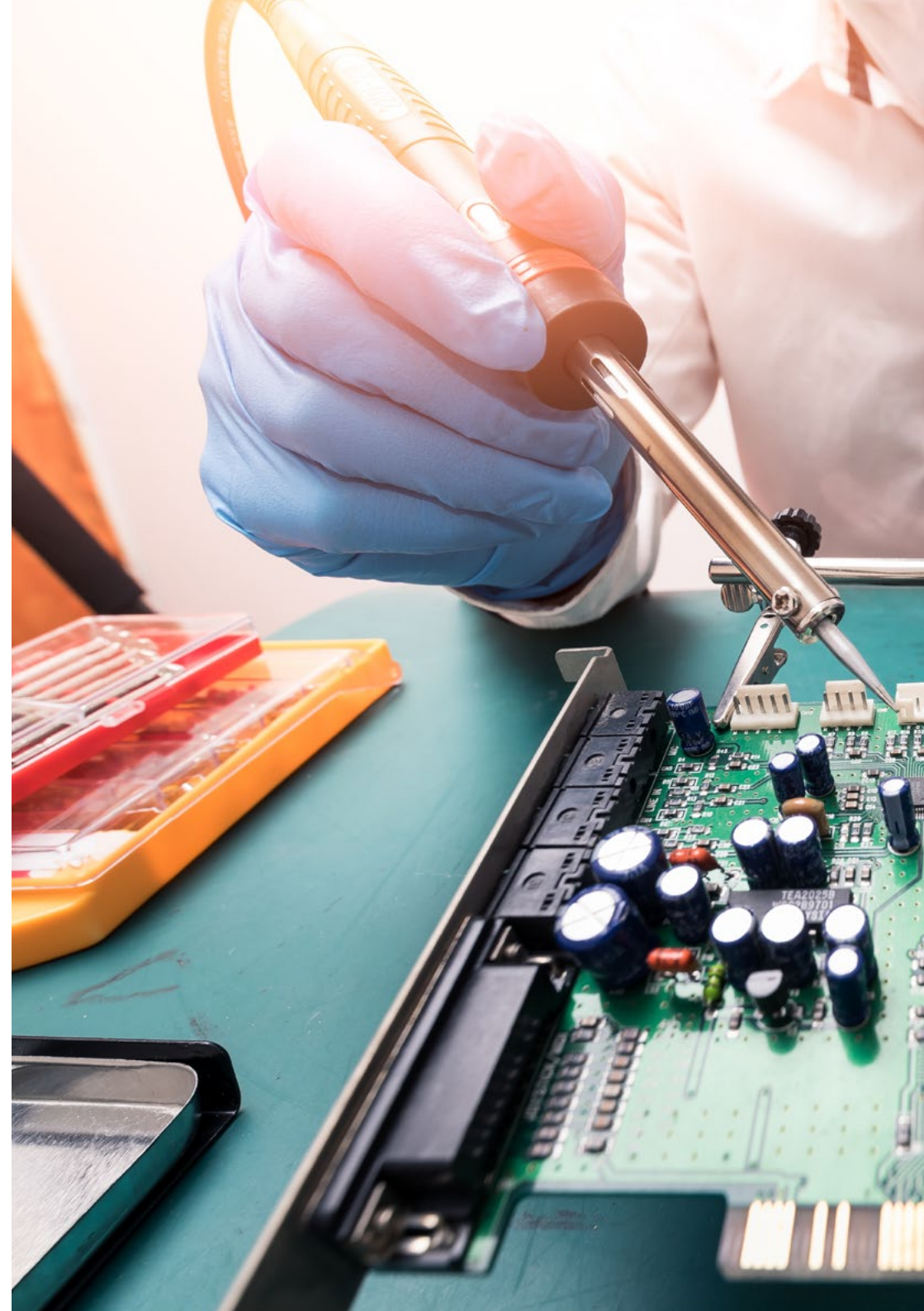
## General Objectives

---

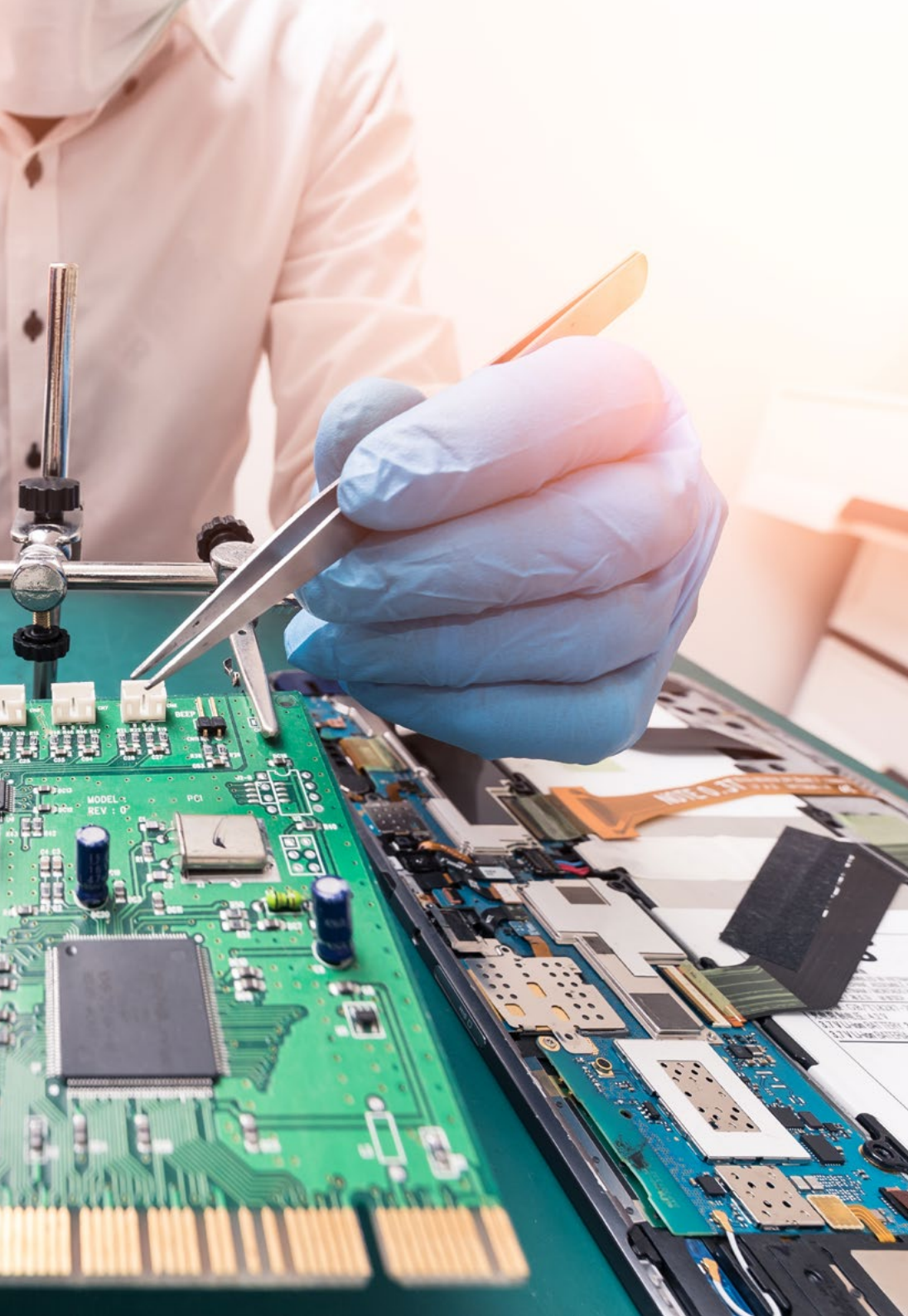
- ◆ To learn the main characteristics of Analog and Digital Electronics
- ◆ Obtain a theoretical-practical vision of electronics
- ◆ Understand the application of concepts in advanced technology



*Are you looking for a Postgraduate Certificate that will allow you to master digital electronics? You are in the right academic path. Enroll now”*







## Specific Objectives

---

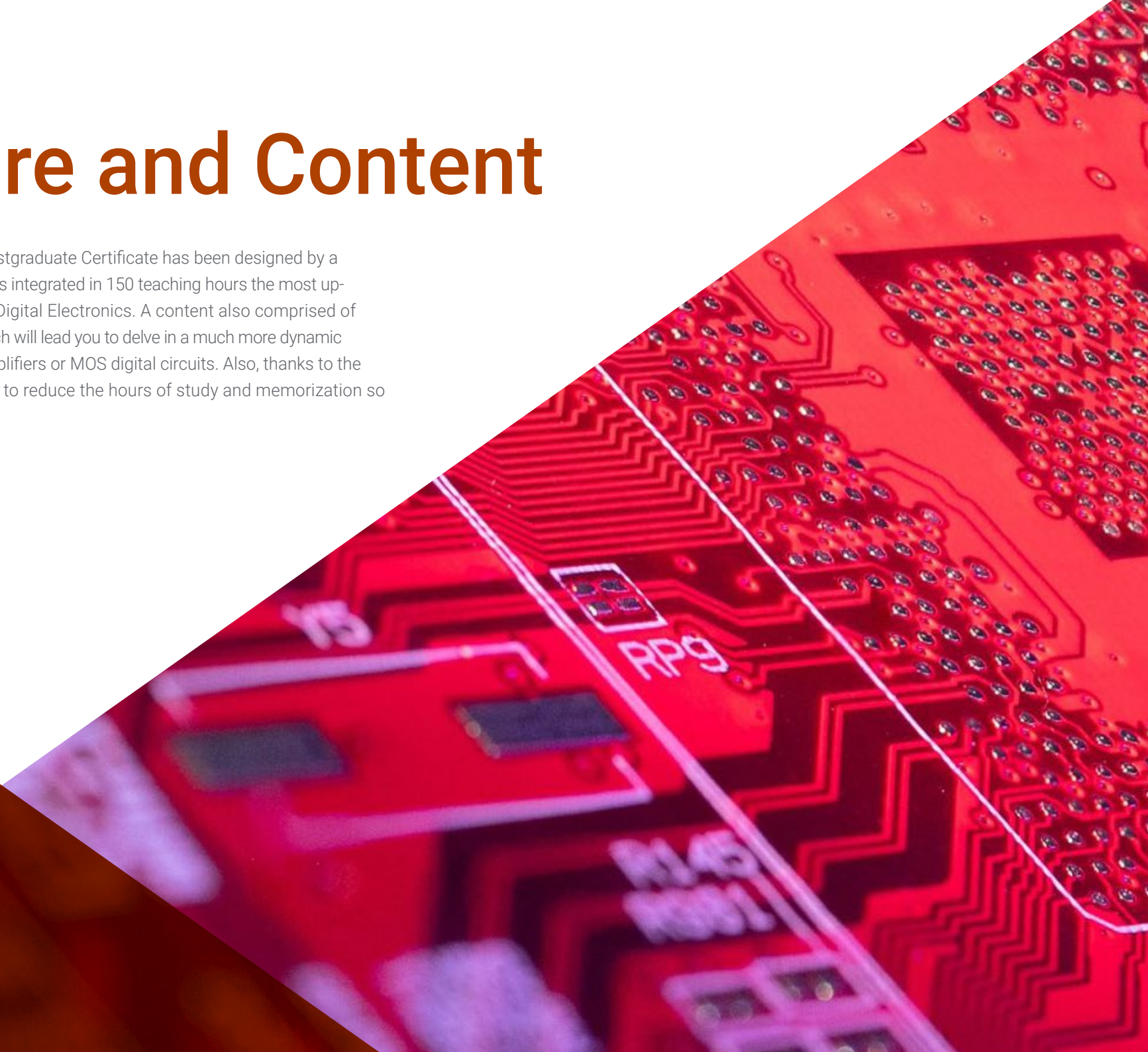
- ◆ Understand the operation of linear, nonlinear and digital electronic circuits
- ◆ Know the different forms of specification and implementation of digital systems
- ◆ Identify the different electronic devices and their operation
- ◆ Master the MOS digital circuits



# 03

## Structure and Content

The syllabus that makes up this Postgraduate Certificate has been designed by a specialized teaching team, which has integrated in 150 teaching hours the most up-to-date knowledge on Analog and Digital Electronics. A content also comprised of innovative multimedia material, which will lead you to delve in a much more dynamic way in analog systems, devices, amplifiers or MOS digital circuits. Also, thanks to the Relearning system, you will be able to reduce the hours of study and memorization so frequent in other courses.







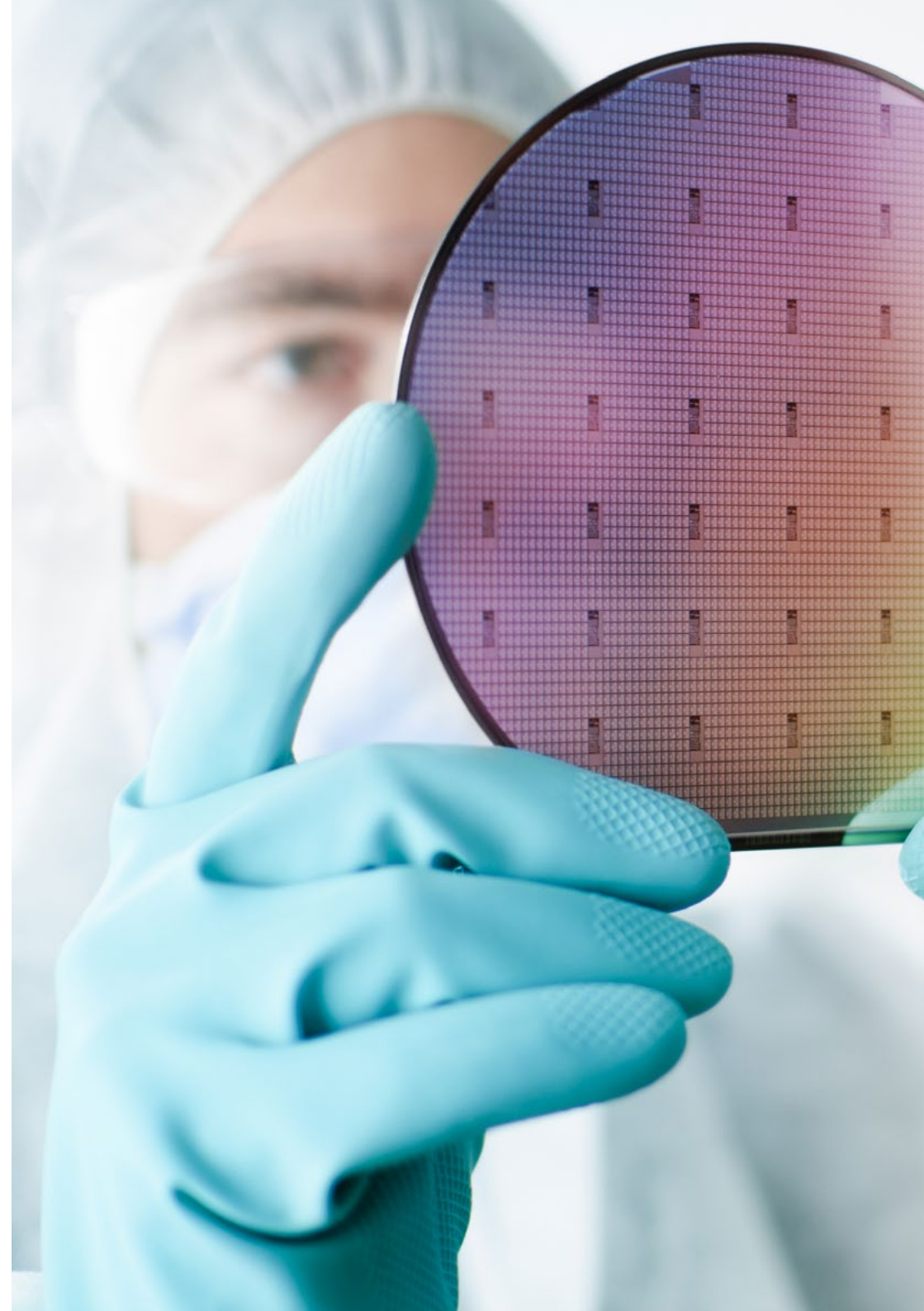
“

*You will get all the knowledge you need about Analog and Digital Electronics through the content hosted on our virtual platform"*

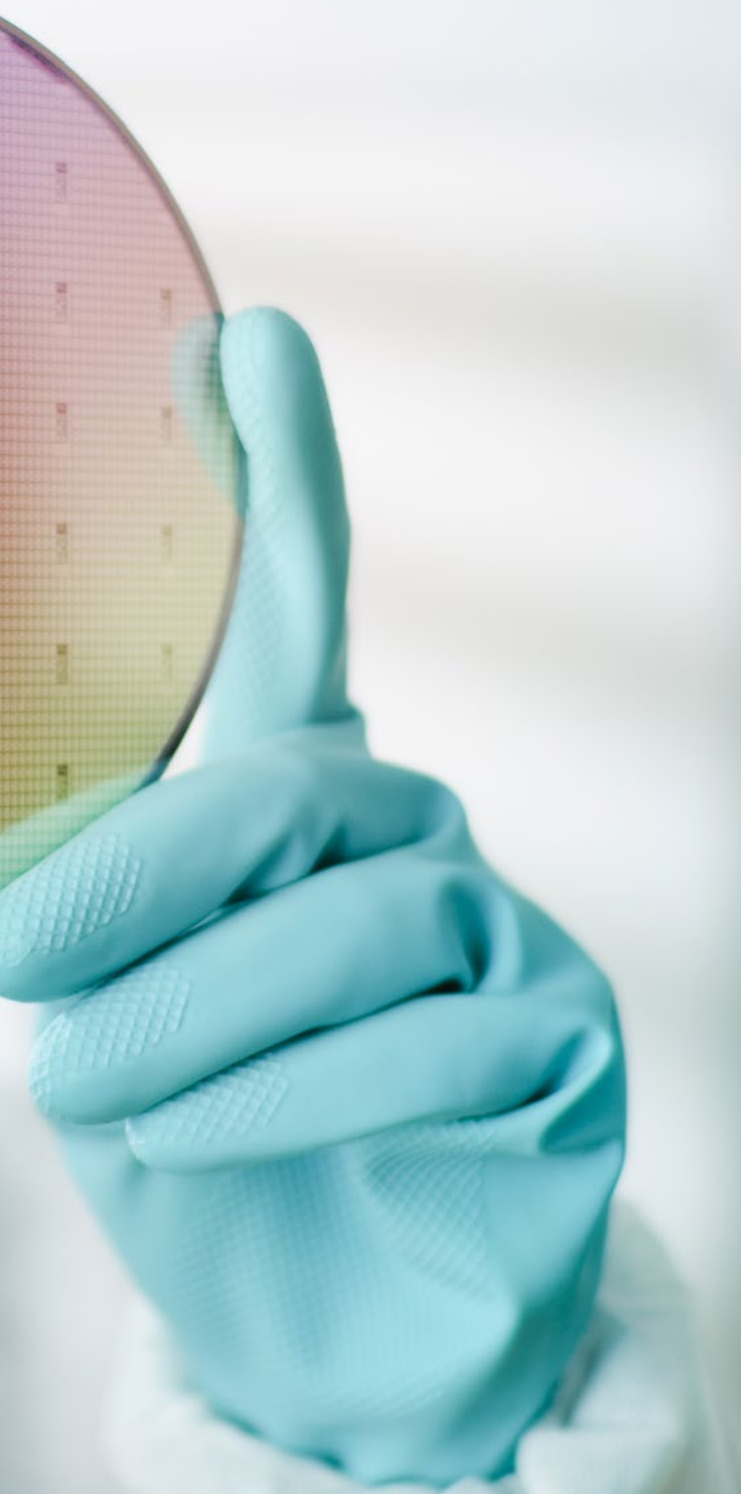


## Module 1. Analog and Digital Electronics

- 1.1. Circuit Analysis
  - 1.1.1. Element Constraints
  - 1.1.2. Connection Constraints
  - 1.1.3. Combined Constraints
  - 1.1.4. Equivalent Circuits
  - 1.1.5. Voltage and Current Division
  - 1.1.6. Circuit Reduction
- 1.2. Analog Systems
  - 1.2.1. Kirchoff's Laws
  - 1.2.2. Thévenin's Theorem
  - 1.2.3. Norton's Theorem
  - 1.2.4. Introduction to Semiconductor Physics
- 1.3. Devices and Characteristic Equations
  - 1.3.1. Diode
  - 1.3.2. Bipolar Transistors (BJTs) and MOSFETs
  - 1.3.3. Pspice Model
  - 1.3.4. Characteristic Curves
  - 1.3.5. Regions of Operation
- 1.4. Amplifiers
  - 1.4.1. Amplifier Operation
  - 1.4.2. Equivalent Circuits of Amplifiers
  - 1.4.3. Feedback
  - 1.4.4. Frequency Domain Analysis
- 1.5. Amplification Stages
  - 1.5.1. BJT and MOSFET Amplifier Function
  - 1.5.2. Polarization
  - 1.5.3. Equivalent Small-Signal Model
  - 1.5.4. Single-Stage Amplifiers
  - 1.5.5. Frequency Response
  - 1.5.6. Connection of Amplifier Stages in Cascade
  - 1.5.7. Differential Torque
  - 1.5.8. Current Mirrors and Application as Active Loads







- 1.6. Operational Amplifier and Applications
  - 1.6.1. Ideal Operational Amplifier
  - 1.6.2. Deviations from Ideality
  - 1.6.3. Sinusoidal Oscillators
  - 1.6.4. Comparators and Relaxation Oscillators
- 1.7. Logic Functions and Combinational Circuits
  - 1.7.1. Information Representation in Digital Electronics
  - 1.7.2. Boolean Algebra
  - 1.7.3. Simplification of Logic Functions
  - 1.7.4. Two-Level Combinational Structures
  - 1.7.5. Combinational Functional Modules
- 1.8. Sequential Systems
  - 1.8.1. Concept of Sequential System
  - 1.8.2. Latches, Flip-Flops and Registers
  - 1.8.3. State Tables and State Diagrams: Moore and Mealy Models
  - 1.8.4. Synchronous Sequential Systems Implementation
  - 1.8.5. General Structure of a Computer
- 1.9. MOS Digital Circuits
  - 1.9.1. Inverters
  - 1.9.2. Static and Dynamic Parameters
  - 1.9.3. Combinational MOS Circuits
    - 1.9.3.1. Step Transistor Logic
    - 1.9.3.2. Implementing Latches and Flip-Flops
- 1.10. Bipolar and Advanced Technology Digital Circuits
  - 1.10.1. BJT Switch. BTJ Digital Circuits
  - 1.10.2. TTL Transistor-Transistor Logic Circuits
  - 1.10.3. Characteristic Curves of a Standard TTL
  - 1.10.4. Emitter-Coupled Logic Circuits ECL
  - 1.10.5. Digital Circuits with BiCMOS

04

# 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.





05

# Certificate

The Postgraduate Certificate in Analog and Digital Electronics guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate 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 Analog and Digital Electronics** 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 Analog and Digital Electronics**

Modality: **online**

Duration: **6 months**

Accreditation: **6 ECTS**



\*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH GLOBAL will make the necessary arrangements to obtain it, at an additional cost.



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



## Postgraduate Certificate

Analog and Digital  
Electronics

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

# Postgraduate Certificate

## Analog and Digital Electronics