Postgraduate Certificate
Automatic Control Systems in Robotics

tech global university

Postgraduate Certificate
Automatic Control Systems in Robotics

- » 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/automatic-control-systems-robotics**

Index

01
Introduction

Robots are everywhere, they are in charge of managing and ordering warehouses, dismantling means of transport, exploring oceans and planets or helping with household chores. A wide range of applications has led Robotics to grow in recent years. Without the precision and control capacity of machines, all these actions would not be possible. The engineer plays a key role in the construction of robots, which is why this program is taught in 100% online mode, which responds to the demand of a sector that requires highly qualified professionals. All this with advanced multimedia content and at the forefront of current educational teaching.

Be the architect of the next automated aerial vehicle. Take the step and enroll in this program"

The great applications and benefits of Robotics in many industrial, commercial and financial, military sectors are undeniable. However, it requires a deep knowledge not only of Electrical, Mechanical or Industrial Engineering but also of Computer Science, Physics or Mathematics, generating its own fundamentals including Kinematics, Dynamics, Planning, Vision and Control.

In this Postgraduate Certificate, the engineering professional to whom this program is addressed, will delve into one of the main foundations of Robotics: Control Theory. With a practical and specialized approach, students will focus on the development of the most used control tools today, mainly oriented to the field of research from where the ideas, theories, fundamentals and applications that are developed and implemented in the industry are born.

An advanced program where the field of vision control will be analyzed in order to introduce students to predictive control. A technique that in recent years is being widely used in robotic systems such as aerial and ground vehicles. All this with a multimedia content that will allow you to acquire a more enjoyable learning and according to current educational times.

A program that is an excellent opportunity for engineering professionals who wish to advance in a sector in constant growth and demand for qualified personnel. Your objectives can be achieved with a fully online mode, without fixed schedules, and which can be accessed at any time and from a mobile device, laptop or computer with internet connection. An advantage that facilitates the acquisition of knowledge in those professionals who wish to study a quality program while combining their work and personal responsibilities.

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

- Case studies presented by experts in robotic engineering
- The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- Practical exercises where 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

Advance your professional career where you will master the main techniques of motion and predictive control"

Enroll now in a program that will allow you to progress with a team of specialists in the robotics sector"

An education with a Relearning learning system, which will help to you to reduce long hours of study.

This 100% online program will give you a more in-depth understanding of the existing control architectures in the field of robotics.

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 Postgraduate Certificate seeks that students and engineering professionals achieve a boost in their professional career thanks to an education in which they will delve into the automation of industrial processes. This knowledge will allow them to propose new ways of organizing operations by means of state machines, implement control paradigms in real applications and lay the foundations for the design of facilities for Industry 4.0. The Relearning system, used by TECH in all of its programs, will facilitate learning and therefore, the progress of the students.

Develop the most advanced control techniques such as predictive control or control based on automatic learning thanks to this Postgraduate Certificate"
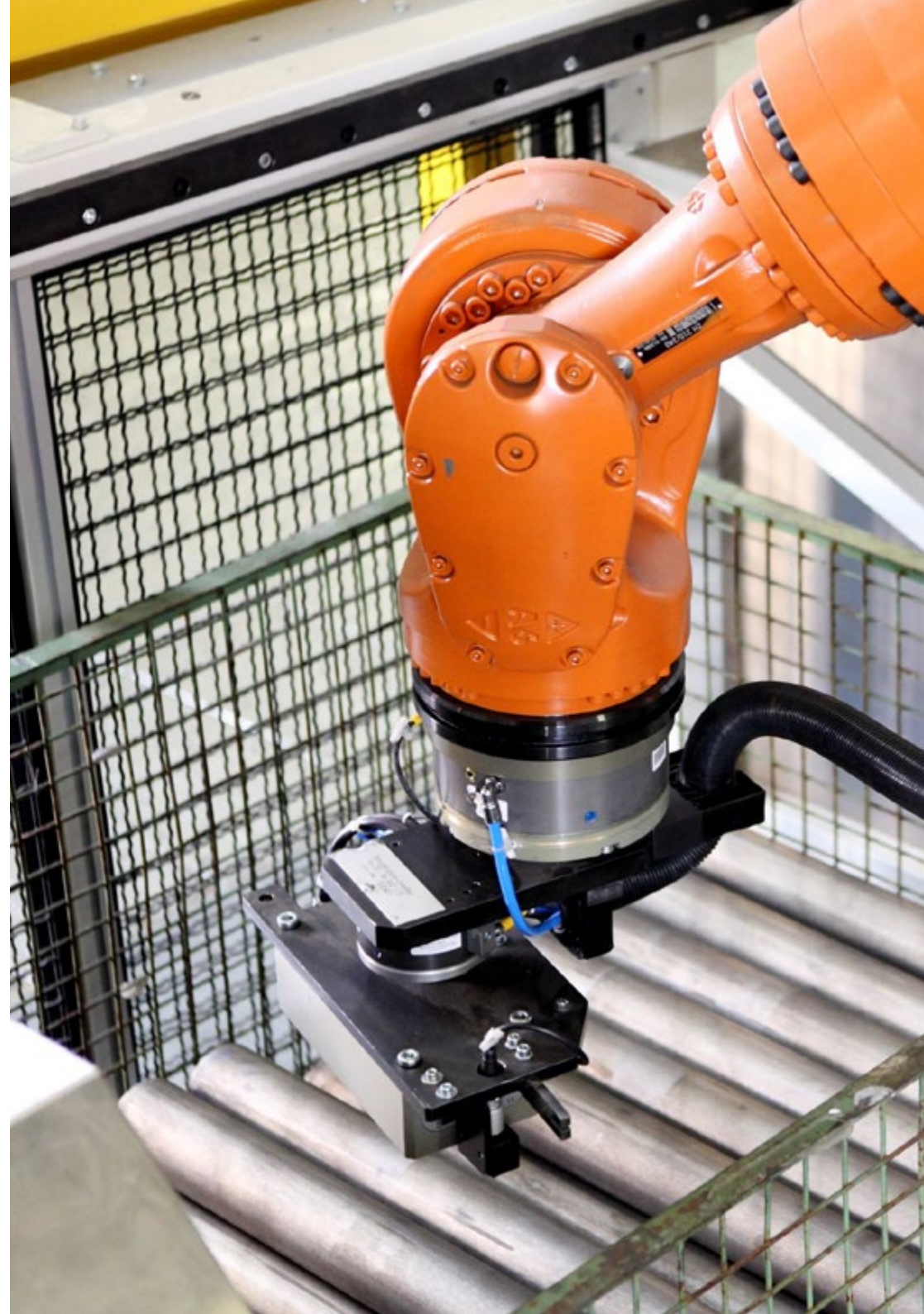
General Objectives

• Develop the theoretical and practical foundations necessary to carry out a robot design and modeling project

• Provide the graduates with an exhaustive knowledge of the automation of industrial processes that will allow them to develop their own strategies

• Acquire the professional skills of an expert in automatic control systems in Robotics

Enroll in a Postgraduate Certificate that will allow you to master kinematic and dynamic modeling in robot arms"

Specific Objectives

- Generate specialized knowledge for the design of nonlinear controllers

- Analyze and study control problems

- Master control models

- Design nonlinear controllers for robotic systems

- Implement controllers and assess them in a simulator

- Determine the different existing control architectures

- Examine the fundamentals of vision control

- Develop state-of-the-art control techniques such as predictive control or machine learning based control

03
Course Management

The direction of the course and the teaching professional who teaches this program has a high level qualification and extensive experience in the field of Robotics. This and its proximity have been decisive for its inclusion in this Postgraduate certificate offered by TECH. In this way, this educational institution offers students an education that maintains the commitment to provide quality content, applicable to their sector and that allows them to grow in an area that is currently booming. In addition, students will be accompanied during the six weeks of this program by the faculty to answer any questions about the syllabus.

An experienced teaching team will show you the skills to design control techniques for advanced nonlinear systems"

Management

Dr. Ramón Fabresse, Felipe

- Senior Software Engineer at Acurable
- NLP Software Engineer at Intel Corporation
- Software Engineer in CATEC, Indisys
- Researcher in Aerial Robotics at the University of Seville
- PhD Cum Laude in Robotics, Autonomous Systems and Telerobotics at the University of Seville
- Degree in Computer Engineering at the University of Seville
- Master's Degree in Robotics, Automation and Telematics at the University of Seville

Professors

Dr. Jiménez Cano, Antonio Enrique

- Engineer at Aeronautical Data Fusion Engineer
- Researcher in European projects (ARCAS, AEROARMS and AEROBI) at the University of Seville
- Researcher in Navigation Systems at CNRS-LAAS
- LAAS MBZIRC2020 System Developer
- Group of Robotics, Vision and Control (GRVC) of the University of Seville
- PhD in Automatics, Electronics and Telecommunications at the University of Seville
- Graduated in Automatic Engineering and Industrial Electronics at the University of Seville
- Degree in Technical Engineering in Computer Systems at the University of Seville

04
Structure and Content

The syllabus of this Postgraduate Certificate has been designed so that, in the 180 teaching hours, the students reach an exhaustive and up to date knowledge in the field of automatic control in Robotics. Through video summaries, specialized readings and real case studies, the engineering professional will acquire a broad knowledge in the field of nonlinear systems design, the main control techniques, architecture, and key concepts in motion and force control. The syllabus will also include automatic control in different types of robots: aerial and terrestrial.

This Postgraduate Certificate will allow you to master the most used techniques and programs for the creation of terrestrial and aerial robots"

Module 1. Automatic Control Systems in Robotics

1.1.   Analysis and Design of Nonlinear Systems
  1.1.1.   Analysis and Modeling of Nonlinear Systems
  1.1.2.   Feedback Control
  1.1.3.   Linearization by Feedback

1.2.   Design of Control Techniques for Advanced Non-linear Systems
  1.2.1.   Sliding Mode Control (Sliding Mode control)
  1.2.2.   Lyapunov and Backstepping Control
  1.2.3.   Control Based on Passivity

1.3.   Control Architectures
  1.3.1.   The Robotics Paradigm
  1.3.2.   Control Architectures
  1.3.3.   Applications and Examples of Control Architectures

1.4.   Motion Control for Robotic Arms
  1.4.1.   Kinematic and Dynamic Modeling
  1.4.2.   Control in Joint Space
  1.4.3.   Control in Operational Space

1.5.   Actuator Force Control
  1.5.1.   Force Control
  1.5.2.   Impedance Control
  1.5.3.   Hybrid Control

1.6.   Terrestrial Mobile Robots
  1.6.1.   Equations of Motion
  1.6.2.   Control Techniques for Terrestrial Robots
  1.6.3.   Mobile Manipulators

1.7.   Aerial Mobile Robots
  1.7.1.   Equations of Motion
  1.7.2.   Control Techniques in Aerial Robots
  1.7.3.   Aerial Manipulation

Learn with a practical approach to configure robotic arm systems and autonomous ground vehicles with this Postgraduate Certificate. Click and enroll now"

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.

01 learning from evidence

02 relearning from evidence

03 testing

04 learning from an expert

05 neurocognitive context dependent learning

06 Von-Restorff effect

07 case based learning through storytelling

08 competencies testing (retesting)

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.

30%

10%

8%

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.

20%

25%

4%

3%

Certificate

The Postgraduate Certificate in Automatic Control Systems in Robotics 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 Automatic Control Systems in Robotics** 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 Automatic Control Systems in Robotics**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**

tech global university

Mr./Ms. _____, with identification document _____ has successfully passed and obtained the title of:

Postgraduate Certificate in Automatic Control Systems in Robotics

This is a program of 180 hours of duration equivalent to 6 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024

Dr. Pedro Navarro Illana
Rector

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 diploma issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.

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