

Postgraduate Diploma Industrial Robotics



Postgraduate Diploma Industrial Robotics

- » Modality: online
- » Duration: 6 months
- » Certificate: TECH Global University
- » Credits: 18 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: www.techtute.com/us/engineering/postgraduate-diploma/postgraduate-diploma-industrial-robotics

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01

Introduction

The robotization of industrial processes has been a significant boost for sectors as diverse as automotive, metallurgy, agri-food and pharmaceutical production. Its applications range from product monitoring to the assembly of parts, leading to increased performance and a higher level of quality control. Mastering all these applications is imperative for engineers who aspire to stay current. For this reason, TECH has a program that provides these professionals with an exhaustive analysis of Mechatronic Systems and their relationship with automations. In addition, the program has a teaching team of international prestige and supports its academic approach with an innovative 100% online methodology.



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A 100% online Postgraduate Diploma with which you will master the monoarticular linear control systems implemented in Robotics"

Robotics has had a great impact that has allowed it to be introduced in many professional sectors. Its use brings multiple benefits such as increased productivity, efficiency and profitability of companies. For this reason, more and more companies are demanding expert profiles in robotics to add these technologies to their production processes.

In view of this reality, TECH has designed a study program that delves into the main advances in Industrial Robotics. In particular, its syllabus includes an exhaustive analysis of the automation, control and regulation systems involved in this type of technology. At the same time, it deals with the fundamental temperature and pressure sensors, as well as the most advanced pneumatic and hydraulic actuators in this field of Mechatronics.

On the other hand, the academic itinerary covers the classification and specific applications of robots. It also delves into the dynamics, statics and kinematic control of these complex machines. At the same time, it allows the student to master programming languages and the most disruptive techniques to establish direct communication with automated equipment.

From the didactic point of view, engineers have the exclusive seal of TECH's 100% online methodology. This provides them with rigorous study materials based on the latest scientific evidence, as well as various multimedia resources such as explanatory videos and interactive summaries. In addition, this Postgraduate Diploma is not governed by hermetic schedules, nor does it require any unnecessary travel. For this reason, completing this syllabus constitutes a comfortable and flexible academic experience, as well as a demanding one.

This **Postgraduate Diploma in Industrial Robotics** contains the most comprehensive and up-to-date program on the market. Its most notable features are:

- ♦ The development of case studies presented by experts in Industrial Robotics.
- ♦ The graphic, schematic and practical contents with which it is conceived provide cutting- Therapeutics and practical information on those disciplines that are essential for professional practice.
- ♦ Practical exercises where 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



Get up to date with this program about the main technological components and mechanical structures that make up a robot"

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Thanks to TECH you will handle the most advanced software and programming languages of the Robotics Industry”

The program's teaching staff includes professionals from the field 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.

TECH, the best digital university in the world according to Forbes, will guarantee you a 100% online methodology, adapted to your needs and schedules.

Enroll now and you will go deeper into the methods of describing sequential automatisms.



02

Objectives

With this program, engineers will expand their knowledge and skills in Industrial Robotics based on the latest scientific evidence in this field. For this, TECH guarantees rigorously updated study materials and a learning methodology that fits their needs, schedules and objectives. After completing the 6 months that comprise this academic itinerary, graduates will achieve their professional goals by implementing a praxis of excellence in their jobs.



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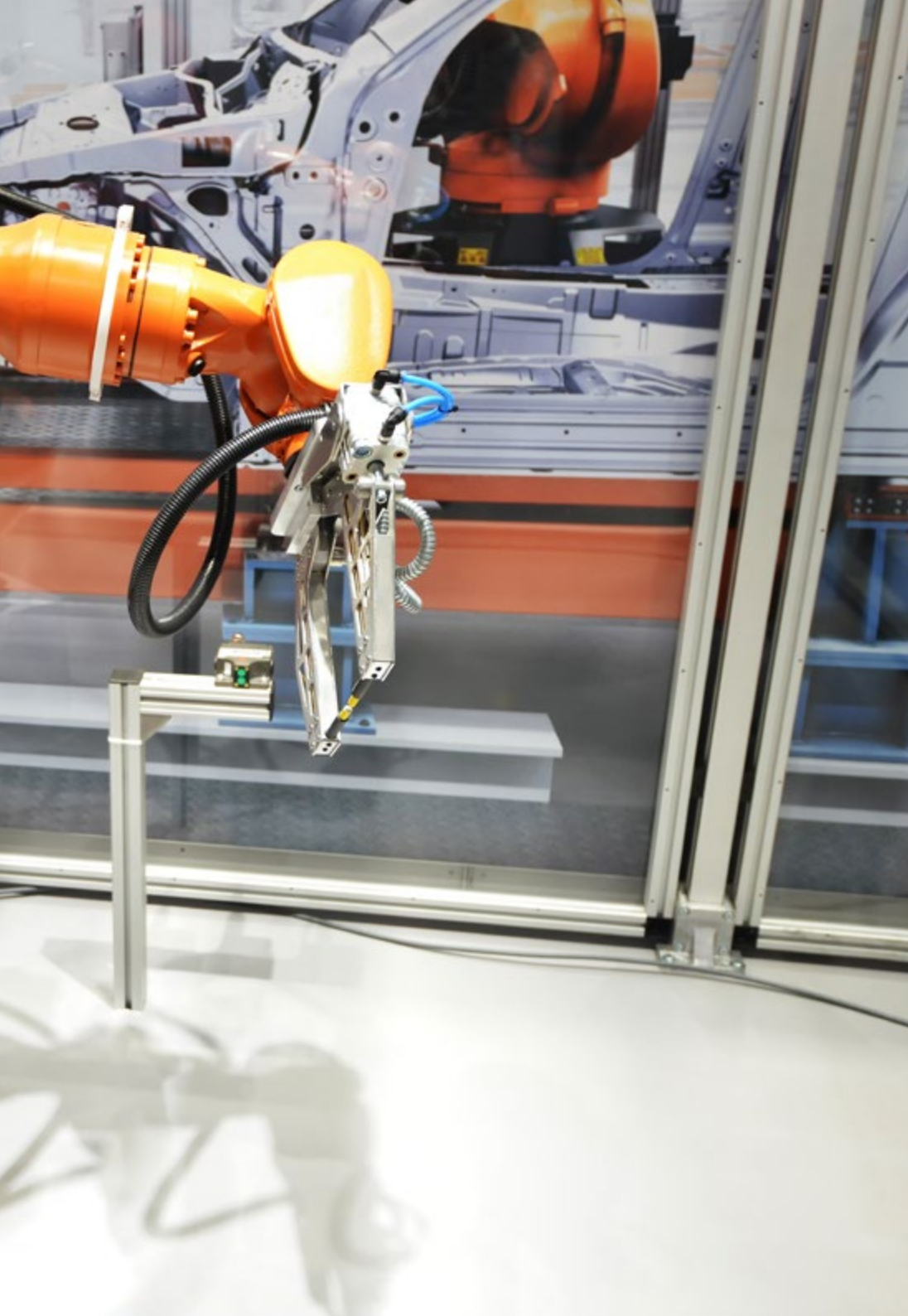
By means of this university program, you will deal with the fundamental electric, pneumatic and hydraulic actuators in Industrial Robotics”



General Objectives

- ◆ Identify the sensors and actuators of a process according to their functionality
- ◆ Select and configure the required type of sensor and actuator involved in a process depending on the parameter to be measured or controlled
- ◆ Design an industrial process and to establish its operating requirements
- ◆ Analyze the operation of a production system according to the components involved in it
- ◆ Identify the different equipment involved in the control of industrial processes
- ◆ Select and program the mechatronic equipment involved in a process according to the machine or process to be automated
- ◆ Understand machine automation
- ◆ Design an industrial process and to establish its operating requirements
- ◆ Present the elements that make up a robotic system
- ◆ Analyze the mathematical models used in the analysis and design of a robot
- ◆ Develop control methods used in a robot
- ◆ Present the programming languages used in various industrial robots





Specific Objectives

Module 1. Sensors and Actuators

- ◆ Recognize and select the sensors and actuators involved in an industrial process according to their practical application
- ◆ Configure a sensor or an actuator according to the proposed technical requirements
- ◆ Design an industrial production process according to the proposed technical requirements

Module 2. Axis Control, Mechatronic Systems and Automation

- ◆ Identify the elements that make up the controllers of industrial systems, relating their function with the elements that make up the automation processes
- ◆ Be able to configure and program a controller according to the technical requirements proposed in the process
- ◆ Work with the special characteristics of machine automation
- ◆ Be able to design an industrial production process according to the proposed technical requirements

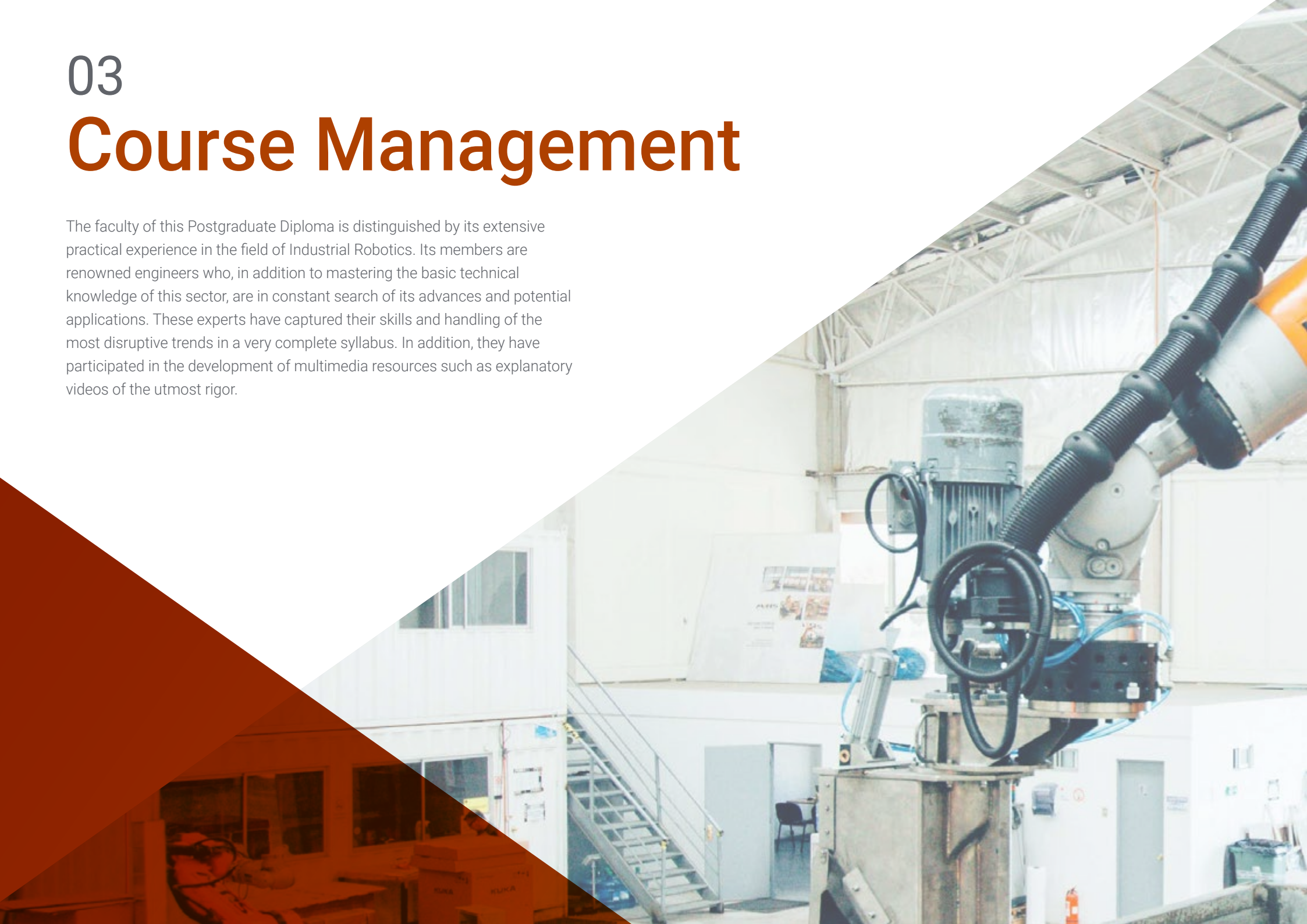
Module 3. Robotics Applied to Mechatronics Engineering

- ◆ Identify the components that are part of a robot
- ◆ Fundamentals of the mathematical principles used in the study of the kinematics and dynamics of a ROBOT
- ◆ Specify the mechanical formulation used in the analysis and design of a robot
- ◆ Develop the trajectory planning techniques used in kinematic control

03

Course Management

The faculty of this Postgraduate Diploma is distinguished by its extensive practical experience in the field of Industrial Robotics. Its members are renowned engineers who, in addition to mastering the basic technical knowledge of this sector, are in constant search of its advances and potential applications. These experts have captured their skills and handling of the most disruptive trends in a very complete syllabus. In addition, they have participated in the development of multimedia resources such as explanatory videos of the utmost rigor.





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The teachers of this TECH program face the main challenges of Robotics on a daily basis and obtain the best results"

Management



Dr. López Campos, José Ángel

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

Professors

Mr. Bretón Rodríguez, Javier

- ♦ Industrial Engineering Specialist
- ♦ Industrial Technical Engineer at FLUNCK S.A
- ♦ Industrial Technical Engineer at the Ministry of Education and Science of the Government of Spain
- ♦ University teacher in the area of Systems and Automatic Engineering at the University of La Rioja
- ♦ Industrial Technical Engineer at the University of Zaragoza
- ♦ Industrial Engineer, University of La Rioja
- ♦ Postgraduate Certificate of Advanced Studies and Research Sufficiency in the Electronics Branch

Mr. Elvira Izurrategui, Carlos

- ♦ Specialist in Electrical Engineering and Systems and Automation Engineering
- ♦ Deputy Director of the Industrial Engineering Section of the Center for Scientific and Technical Education of the University of La Rioja
- ♦ Director of the Center for Scientific and Technical Education of the University of La Rioja
- ♦ University Professor in various masters and undergraduate programs
- ♦ Industrial Engineer from the University of Cantabria
- ♦ Industrial Technical Engineer (specializing in Electricity) from the University of Zaragoza
- ♦ Director of several teaching research projects



04

Structure and Content

This syllabus contains the most disruptive technological advances in the field of modern Industrial Robotics. During this 6-month academic itinerary, engineers will delve into sophisticated models of sensors and actuators. They will also analyze the specific programming languages for this type of machinery. At the same time, they will delve into the characteristics, classification and fundamental means to control the parameters of a robot. For this exhaustive approach they will have at their disposal an innovative methodology, the *Relearning*, which favors the assimilation of complex concepts in a faster and more flexible way.





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No predefined schedules or continuous evaluations: this is how TECH will provide you with access to its academic content of excellence”

Module 1. Sensors and Actuators

- 1.1. Sensors
 - 1.1.1. Sensor Selection
 - 1.1.2. Sensors in Mechatronic Systems
 - 1.1.3. Application Examples
- 1.2. Presence or Proximity Sensors
 - 1.2.1. Limit Switches: Principle of Operation and Technical Characteristics
 - 1.2.2. Inductive Detectors: Operating Principle and Technical Characteristics
 - 1.2.3. Capacitive Detectors: Principle of Operation and Technical Characteristics
 - 1.2.4. Optical Detectors: Principle of Operation and Technical Characteristics
 - 1.2.5. Ultrasonic Detectors: Operating Principle and Technical Characteristics
 - 1.2.6. Selection Criteria
 - 1.2.7. Application Examples
- 1.3. Position Sensors
 - 1.3.1. Incremental Encoders: Principle of Operation and Technical Characteristics
 - 1.3.2. Absolute Encoders: Principle of Operation and Technical Characteristics
 - 1.3.3. Laser Sensors: Principle of Operation and Technical Characteristics
 - 1.3.4. Magnetostrictive Sensors and Linear Potentiometers
 - 1.3.5. Selection Criteria
 - 1.3.6. Application Examples
- 1.4. Temperature Sensors
 - 1.4.1. Thermostats: Operating Principle and Technical Characteristics
 - 1.4.2. Resistance Thermometers: Principle of Operation and Technical Characteristics
 - 1.4.3. Thermocouples: Principle of Operation and Technical Characteristics
 - 1.4.4. Radiation Pyrometers: Principle of Operation and Technical Characteristics
 - 1.4.5. Selection Criteria
 - 1.4.6. Application Examples
- 1.5. Sensors for the Measurement of Physical Variables in Processes and Machines
 - 1.5.1. Pressure Operating Principle
 - 1.5.2. Flow Rate: Operating Principle
 - 1.5.3. Level: Operating Principle
 - 1.5.4. Sensors for Other Physical Variables
 - 1.5.5. Selection Criteria
 - 1.5.6. Application Examples
- 1.6. Actuators
 - 1.6.1. Actuator Selection
 - 1.6.2. Actuators in Mechatronic Systems
 - 1.6.3. Application Examples
- 1.7. Electric Actuators
 - 1.7.1. Relays and Contactors: Principle of Operation and Technical Characteristics
 - 1.7.2. Rotary Motors: Principle of Operation and Technical Characteristics
 - 1.7.3. Stepper Motors: Operating Principle and Technical Characteristics
 - 1.7.4. Servomotors: Principle of Operation, Technical Characteristics
 - 1.7.5. Selection Criteria
 - 1.7.6. Application Examples
- 1.8. Pneumatic Actuators
 - 1.8.1. Valves and Servovalves Principle of Operation and Technical Characteristics
 - 1.8.2. Pneumatic Cylinders: Principle of Operation and Technical Characteristics
 - 1.8.3. Pneumatic Motors: Operating Principle and Technical Characteristics
 - 1.8.4. Vacuum Clamping: Working Principle and Technical Characteristics
 - 1.8.5. Selection Criteria
 - 1.8.6. Application Examples
- 1.9. Hydraulic Actuators
 - 1.9.1. Valves and Servovalves Principle of Operation and Technical Characteristics
 - 1.9.2. Hydraulic Cylinders: Principle of Operation and Technical Characteristics
 - 1.9.3. Hydraulic Motors: Principle of Operation and Technical Characteristics
 - 1.9.4. Selection Criteria
 - 1.9.5. Application Examples
- 1.10. Example of Application of Sensor and Actuator Selection in Machine Design
 - 1.10.1. Description of the Machine to be Designed
 - 1.10.2. Sensor Selection
 - 1.10.3. Actuator Selection

Module 2. Axis Control, Mechatronic Systems and Automation

- 2.1. Automation of Production Processes
 - 2.1.1. Automation of production processes
 - 2.1.2. Classification of Control Systems
 - 2.1.3. Technologies Used
 - 2.1.4. Machine Automation and/or Process Automation
- 2.2. Mechatronic Systems: Elements
 - 2.2.1. Mechatronic Systems
 - 2.2.2. The Programmable Logic Controller as a Discrete Process Control Element
 - 2.2.3. The Controller as a Control Element for Continuous Process Control
 - 2.2.4. Axis and Robot Controllers as Position Control Elements
- 2.3. Discrete Control with Programmable Logic Controllers (PLC's)
 - 2.3.1. Hardwired Logic vs. Programmed Logic
 - 2.3.2. Control with PLC's
 - 2.3.3. Field of Application of PLCs
 - 2.3.4. Classification of PLCs
 - 2.3.5. Selection Criteria
 - 2.3.6. Application Examples
- 2.4. PLC Programming
 - 2.4.1. Representation of Control Systems
 - 2.4.2. Cycle of Operation
 - 2.4.3. Configuration Possibilities
 - 2.4.4. Variable Identification and Address Assignment
 - 2.4.5. Programming Languages
 - 2.4.6. Instruction Set and Programming Software
 - 2.4.7. Programming Example
- 2.5. Methods of Describing Sequential Drives
 - 2.5.1. Design of Sequential Drives
 - 2.5.2. GRAFCET as a Method for Describing Sequential Drives
 - 2.5.3. Types of GRAFCET
 - 2.5.4. GRAFCET Elements
 - 2.5.5. Standard Symbolology
 - 2.5.6. Application Examples

- 2.6. Structured GRAFCET
 - 2.6.1. Structured Design and Programming of Control Systems
 - 2.6.2. Modes of Operation
 - 2.6.3. Security/Safety
 - 2.6.4. Hierarchical GRAFCET Diagrams
 - 2.6.5. Structured Design Examples
- 2.7. Continuous Control by Means of Controllers
 - 2.7.1. Industrial Controllers
 - 2.7.2. Scope of Application of the Regulators. Classification
 - 2.7.4. Selection Criteria
 - 2.7.5. Application Examples
- 2.8. Machine Automation
 - 2.8.1. Machine Automation
 - 2.8.3. Speed and Position Control
 - 2.8.4. Safety Systems
 - 2.8.5. Application Examples
- 2.9. Position Control by Axis Control
 - 2.9.1. Position Control
 - 2.9.2. Field of Application of Axis Controllers. Classification
 - 2.9.3. Selection Criteria
 - 2.9.4. Application Examples
- 2.10. Example of Application of Equipment Selection in Machine Design
 - 2.10.1. Description of the Machine to be Designed
 - 2.10.2. Equipment Selection
 - 2.10.3. Resolved Application

Module 3. Robotics Applied to Mechatronic Engineering

- 3.1. The Robot
 - 3.1.1. The Robot
 - 3.1.2. Robot Applications
 - 3.1.3. Classification of Robots
 - 3.1.4. Mechanical Structure of a Robot
 - 3.1.5. Specifications of a Robot

- 3.2. Technological Components
 - 3.2.1. Electric, Pneumatic and Hydraulic Actuators
 - 3.2.2. Sensors Internal and External to the Robot
 - 3.2.3. Vision Systems
 - 3.2.4. Selection of Motors and Sensors
 - 3.2.5. Terminal Elements and Grippers
- 3.3. Transformations
 - 3.3.1. Robot Architecture
 - 3.3.2. Position and Orientation of a Solid
 - 3.3.3. Euler Orientation Angles
 - 3.3.4. Homogeneous Transformation Matrices
- 3.4. Kinematics of Position and Orientation
 - 3.4.1. Denavit-Hartenberg Formulation
 - 3.4.2. Direct Kinematic Problem
 - 3.4.3. Inverse Kinematic Problem
- 3.5. Kinematics of Velocities and Accelerations
 - 3.5.1. Velocity and Acceleration of a Solid
 - 3.5.2. Jacobian Matrix
 - 3.5.3. Singular Configurations
- 3.6. Statics
 - 3.6.1. Force and Moment Equilibrium Equations
 - 3.6.2. Calculation of Statics. Recursive Method
 - 3.6.3. Static Analysis Using the Jacobian Matrix
- 3.7. Dynamics
 - 3.7.1. Dynamic Properties of a Solid
 - 3.7.2. Newton-Euler Formulation
 - 3.7.3. Lagrange-Euler Formulation
- 3.8. Kinematic Control
 - 3.8.1. Trajectory Planning
 - 3.8.2. Interpolators in Joint Space
 - 3.8.3. Trajectory Planning in Cartesian Space



- 3.9. Monoarticular Linear Dynamic Control
 - 3.9.1. Control Techniques
 - 3.9.2. Dynamic Systems
 - 3.9.3. Transfer Function Model and State Space Representation
 - 3.9.4. Dynamic Model of a DC Motor
 - 3.9.5. Control of a d.c. Motor
- 3.10. Programming
 - 3.10.1. Programming Systems
 - 3.10.2. Programming Languages
 - 3.10.3. Programming Techniques



Enroll now in this Postgraduate Diploma and develop a successful career in the world of Industrial Robotics"

05

Methodology

This program offers students a different way of learning. Our methodology follows a cyclical learning process: **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.





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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 method of skills and knowledge development. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

“

At TECH, you will experience a way of learning 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.



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 student will learn to solve complex situations in real business environments through collaborative activities and real cases.

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 prepare 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 prepared 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 education, 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 adapted in 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.



Practicing Skills and Abilities

They will carry out activities to develop specific competencies and skills in each thematic field. 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 assess and re-assess 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 Industrial Robotics guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Diploma issued by TECH Global University.



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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 Diploma in Industrial 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 Diploma in Industrial Robotics**

Modality: **online**

Duration: **6 months**

Accreditation: **18 ECTS**



*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.

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



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