

Máster online 100%

Master in Mechatronic Engineering

Structuralia

Máster online 100%

Master in Mechatronic Engineering

Modality
Online

Languages
Español

Duration
1500 hours (60 ECTS)

No Limit
AI Assistant

Does it include practices?
NO

Educational Institutions

Structuralia Engineering eLearning

Universidad Nebrija

Summary

The Master in Mechatronics Engineering is a high-level specialization for engineering professionals and technicians who seek to delve deeper into the fusion of mechanics, electronics, computing and control, allowing you to lead innovation in the industrial sector. This program positions you at the forefront of Mechatronics Engineering, providing you with the capabilities to design, implement and optimize complex systems in various industrial environments. You will acquire a robust technical foundation, from the in-depth analysis of sensors and transducers, essential for accurate measurement, to the design of signal conditioning circuits, including amplification and filtering for specific applications. You will delve into the management of digital signals, multiplexers and digital logic, critical elements in any advanced control system. Additionally, you will explore synergies with artificial intelligence, implementing path-finding algorithms and becoming familiar with expert systems, fuzzy logic, genetic algorithms and neural networks for solving complex problems. This training prepares you to assume leadership in Industrial Automation and robotics projects, where strategic decision making is essential, allowing you to differentiate yourself in a market that

demands highly qualified and updated professionals. You will develop a comprehensive understanding of how to integrate these disciplines to create innovative and efficient solutions.

Agenda

MODULE 1. MECHATRONICS. SENSORS AND SIGNAL CONDITIONING

1. DIDACTIC UNIT 1. INTRODUCTION TO MECHATRONICS

1. What is mechatronics?
2. Mechatronics: advantages vs disadvantages
3. The figure of the mechatronics professional
4. The design process
5. The importance of systems in mechatronics

2. DIDACTIC UNIT 2. SENSORS

1. Sensors and transducers: introduction
2. Displacement, position and proximity
3. Speed and movement
4. Strength
5. fluid pressure
6. Liquid flow
7. Liquid level
8. Temperature
9. light

3. DIDACTIC UNIT 3. SIGNAL CONDITIONING

1. Introduction to signal conditioning
2. Operational amplifier
3. Signal filtering
4. Wheatstone Bridge
5. Pulse modulation

4. DIDACTIC UNIT 4. DIGITAL SIGNALS

1. Introduction to digital signals
2. analog signal
3. digital signal
4. Analog signals vs. Digital signs
5. Signal converters
6. Data acquisition
7. Digital signal processing

5. DIDACTIC UNIT 5. MULTIPLEXERS

1. Multiplexers: introduction

6. DIDACTIC UNIT 6. DIGITAL LOGIC

1. The concept of digital logic
2. Logic gates
3. Basic logic gates

4. Combined logic gates

MODULE 2. ARTIFICIAL AND MECHATRONICS INTELLIGENCE

1. DIDACTIC UNIT 1. MECHATRONICS AND ARTIFICIAL INTELLIGENCE: POSSIBILITIES

1. Artificial Intelligence: introduction
2. Intelligence of living beings
3. Artificial Intelligence
4. Application domains
5. The field of mechatronics
6. The possibilities of Artificial Intelligence
7. Mechatronics and Artificial Intelligence

2. DIDACTIC UNIT 2. EXPERT SYSTEMS

1. What is a polygon expert system?
2. Structure of an expert system
3. Inference: types
4. Construction of expert systems

3. DIDACTIC UNIT 3. FUSE LOGIC

1. Introduction to fuzzy logic
2. Fuzzy sets and degrees of membership
3. Operators on fuzzy sets
4. Rule creation
5. Fuzzification and defuzzification

4. DIDACTIC UNIT 4. ROUTE SEARCH

1. Introduction to route finding
2. Routes and graphs
3. Comprehensive and "smart" route finding algorithms
4. Implementation

5. DIDACTIC UNIT 5. GENETIC ALGORITHMS

1. What are genetic algorithms?
2. Biological and artificial evolution
3. Choice of representation
4. Evaluation, selection and survival
5. Reproduction: crossover and mutation
6. Application domains

6. DIDACTIC UNIT 6. NEURAL NETWORKS

1. Introduction to neural networks
2. biological origin
3. The formal neuron
4. Perceptron
5. Feed-forward networks

6. Learning
7. Other networks

MODULE 3. INDUSTRIAL AUTOMATION APPLIED TO MECHATRONICS

1. DIDACTIC UNIT 1. AUTOMATION PRINCIPLES

1. Automation Concept
2. Types of automation
3. Main application areas
4. Types of industrial processes
5. Sequential controllers

2. DIDACTIC UNIT 2. BOOLE ALGEBRA

1. Introduction to Boolean Algebra
2. Digital operation of a System
3. Basic logic operations
4. Operations in Boolean Algebra
5. Important theorems of Boolean Algebra
6. Functions in Boolean Algebra
7. Truth table of a logical function
8. Realization of Logical Functions

3. DIDACTIC UNIT 3. COMBINATIONAL CIRCUITS

1. Introduction to combinational circuits
2. Decoders
3. Encoders
4. Multiplexers
5. Demultiplexers
6. Binary Comparators
7. Semi-adding circuit

4. DIDACTIC UNIT 4. PROGRAMMABLE PLANTS

1. Definition of Programmable PLC
2. Programmed systems. Basic programming
3. Representation of Inputs and Outputs
4. Programming opening and closing contacts
5. STEP 7 basic instructions and in LAD
6. Programming in FUP format

5. DIDACTIC UNIT 5. PROGRAMMING WIRING SCHEMES

1. Creation of LAD programs from the wiring diagram
2. Programming with timers
3. Programming with Counters

6. DIDACTIC UNIT 6. INDUSTRIAL AUTOMATION TECHNOLOGIES AND SYSTEMS

1. Analysis of pneumatic, hydraulic, mechanical, electrical, electronic automation systems
2. Elements and their functions: mechanical, electrical, hydraulic, pneumatic
3. Manipulators

4. Tools
5. Flexible Manufacturing Systems (CIM)

MODULE 4. MODELS OF SYSTEMS IN MECHATRONICS

1. DIDACTIC UNIT 1. BASIC SYSTEMS MODELS

1. Mathematical models
2. mechanical systems
3. Electrical systems
4. fluid systems
5. Thermal systems

2. DIDACTIC UNIT 2. SYSTEMS IN MECHATRONICS: DYNAMIC RESPONSES

1. Introduction to dynamic systems modeling
2. Answers
3. Ticket forms
4. First order systems
5. Second order systems
6. Systems in mechatronics: identification

3. DIDACTIC UNIT 3. SYSTEMS TRANSFER FUNCTIONS

1. Introduction to the transfer function
2. Laplace transform
3. First order systems
4. Second order systems
5. Other systems

4. DIDACTIC UNIT 4. FREQUENCY RESPONSE

1. LTI systems: frequency analysis
2. Determination of frequency response
3. Bode plots
4. Performance and stability

5. DIDACTIC UNIT 5. CLOSED LOOP CONTROLLERS

1. Process typologies: continuous and discrete
2. Concepts of interest
3. Control modes
4. Process controllability

6. DIDACTIC UNIT 6. SIMULATION AND OPTIMIZATION OF MECHATRONIC SYSTEMS

MODULE 5. ACTION SYSTEMS APPLIED TO MECHATRONICS

1. DIDACTIC UNIT 1. PNEUMATIC AND HYDRAULIC ACTION SYSTEMS I

1. Introduction to action systems
2. Pneumatic and hydraulic systems

3. Compressed air preparation
4. energy sources

2. DIDACTIC UNIT 2. PNEUMATIC AND HYDRAULIC ACTION SYSTEMS II

1. Valves: fundamental concepts
2. Cylinders
3. Servovalves and proportional control valves
4. Valves for process control
5. Rotary actuators

3. DIDACTIC UNIT 3. MECHANICAL ACTUATION SYSTEMS

1. mechanical systems
2. Types of movement
3. kinematic chains
4. Cams
5. Gears
6. Ratchet
7. Transmission belts and chains
8. Bearings

4. DIDACTIC UNIT 4. ELECTRICAL ACTUATION SYSTEMS

1. Electrical systems
2. mechanical switches
3. Solid State Switches
4. Solenoids
5. dc motors
6. ac motors
7. Stepper motors

5. DIDACTIC UNIT 5. CONTROL SYSTEMS AND SENSORS

6. DIDACTIC UNIT 6. ADVANCED PERFORMANCE SYSTEMS

MODULE 6. MICROPROCESSOR SYSTEM APPLIED TO MECHATRONICS

1. DIDACTIC UNIT 1. MICROPROCESSORS

1. Control
2. IS microprocessor systems
3. Microcontrollers
4. Applications in Mechatronics
5. Programming

2. DIDACTIC UNIT 2. ASSEMBLY LANGUAGE

1. Languages
2. Instruction Sets
3. Assembly language programs
4. Subroutines

5. Lookup tables
6. Embedded systems

3. DIDACTIC UNIT 3. C LANGUAGE

1. Mechatronics, why the C language?
2. Structure of a program
3. Flow and cycle control
4. Arrangements
5. Pointers
6. Program development

4. DIDACTIC UNIT 4. INPUT/OUTPUT SYSTEMS

1. Introduction to interfaces
2. Input/output addressing
3. Interface requirements
4. Interface adapters for peripheral devices
5. Interface for serial communications
6. Examples of coupling via interface

5. DIDACTIC UNIT 5. PROGRAMMABLE LOGIC CONTROLLERS

1. Programmable logic controllers
2. PLC basic structure
3. Input/output processing
4. Ladder programming
5. Instruction List
6. Interlocking and internal relays
7. Sequencing
8. Timers and counters
9. Run records
10. Master and jump controls
11. Data management
12. Analog input/output

MODULE 7. ROBOTICS AND ITS DIFFERENT APPLICATIONS

1. DIDACTIC UNIT 1. MOBILE AND HUMANOID ROBOTICS

1. History of robotics
2. Mobile Robotics
3. Humanoid Robotics

2. DIDACTIC UNIT 2. ROBOTICS AND AUTOMATION IN CONSTRUCTION

1. State of the art in robotic constructions.
2. Software and IT technology in robotic construction
3. The future of robotics and automation in construction.

3. DIDACTIC UNIT 3. SPACE ROBOTS

1. What is space robotics?
2. Problems in space robotics

3. Main research areas

4. DIDACTIC UNIT 4. INTELLIGENT TRANSPORTATION SYSTEMS

1. What are Intelligent Transportation Systems?
2. Related technologies
3. Applications
4. Intelligent transportation technologies

5. DIDACTIC UNIT 5. UNMANNED AIR VEHICLES. DRONES

1. Aircraft knowledge (generic)
2. Classification of RPAs
3. Airworthiness
4. Registration
5. Aircraft cell
6. Powertrain
7. Onboard equipment
8. aircraft control system
9. Control station instruments.
10. Security systems

6. DIDACTIC UNIT 6. PLANNING TASKS AND MOVEMENTS OF ROBOTS

1. Concepts
2. Algorithms

7. DIDACTIC UNIT 7. INTELLIGENT AUTONOMOUS ROBOTS

1. Tasks that can be performed independently
2. Problems in autonomous robotics

8. DIDACTIC UNIT 8. PERSONAL AND ASSISTANCE ROBOTS

1. History
2. Domestic Robots in Science Fiction
3. Personal robots today
4. Market

MODULE 8. TREND AND FUTURE OF ROBOTICS

1. DIDACTIC UNIT 1. BASES AND BACKGROUND OF ROBOTICS

1. Concept and history
2. Bases of current robotics
3. Mobile platforms
4. Expected growth in the robotics industry
5. Limits of current robotics

2. DIDACTIC UNIT 2. ROBOTICS AND ARTIFICIAL INTELLIGENCE

1. Robotics
2. Artificial intelligence
3. Goals of artificial intelligence

4. History of artificial intelligence
5. Programming language: the language of robots
6. Research and development in areas of artificial intelligence
7. Robotics and artificial intelligence

3. DIDACTIC UNIT 3. USE OF ROBOTS

1. Introduction
2. Robotics and benefits
3. industrial robotics
4. Future of robotics
5. Robotics and new technologies
6. Trends

4. DIDACTIC UNIT 4. EVOLUTION OF ROBOTS. ROBOTIST

1. Evolution of robotics
2. Future of robotics
3. Robotics in engineering and industry

5. DIDACTIC UNIT 5. EVOLUTION OF ARTIFICIAL INTELLIGENCE. ROBOTIC NEURAL NETWORK DESIGNER

1. Natural and artificial intelligence
2. Artificial intelligence and cybernetics
3. Autonomy in robotics
4. Expert systems
5. Virtual agents with computer facial animation
6. News

6. DIDACTIC UNIT 6. ROBOTIC PROSTHESES

1. Robotics applied to humans: bionics
2. Historical review of prostheses
3. Prosthesis design in the 20th century
4. Recent research and development in hand design
5. Prosthetic systems
6. Use of smart materials in prostheses

7. DIDACTIC UNIT 7. INFLUENCE OF ROBOTICS

1. Introduction
2. Current situation and trends for the future
3. Objectives
4. Methodology and structure

MODULE 9. FINAL PROJECT

Qualification

University Degree in Master's Degree in Lifelong Learning in Mechatronics Engineering issued by the Antonio de Nebrija University with 60 ECTS University Credits. Courses not leading to an official qualification

Objectives

- • Analyze the functionality of sensors and transducers for accurate data acquisition in mechatronic systems. • Design signal conditioning architectures, optimizing amplification and filtering for industrial applications. • Integrate digital logic and multiplexing principles for efficient signal management in advanced control environments. • Implement artificial intelligence algorithms, including route search and fuzzy logic, for the optimization of autonomous systems. • Develop solutions based on genetic algorithms and neural networks to solve complex problems in engineering and robotics. • Lead the conception and implementation of automation and industrial control projects, applying a comprehensive vision of mechatronics. • Evaluate and select advanced mechatronic technologies for the improvement of production processes and industrial innovation. • Manage the integration of mechanical, electronic and computer subsystems for the development of intelligent products and solutions.

What does it prepare you for?

This program prepares you to lead the technological transformation in the industry, providing you with a strategic vision and advanced technical capabilities in mechatronic engineering. You will develop the ability to design and manage complex mechatronic systems, optimally integrating sensors, actuators and controllers. You will learn to implement industrial automation solutions, from automata programming to the application of route search algorithms. You will master the analysis and simulation of systems, using artificial intelligence tools such as fuzzy logic, genetic algorithms and neural networks to optimize their performance. You will make informed decisions in digital signal processing and signal conditioning, increasing efficiency and innovation in your projects. This program trains engineering professionals in the integration of complex systems to lead industrial technological transformation. You will position yourself as an expert capable of addressing the most sophisticated challenges in the sector, boosting competitiveness and operational efficiency.

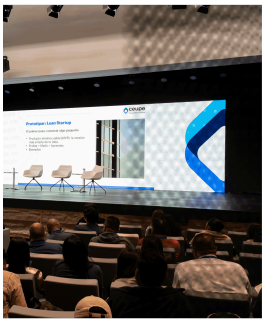
Who is it addressed to?

This master's degree is aimed at engineering professionals and technicians who already work in the industrial, robotic or automation sector, and have a solid foundation in electronics, mechanics or control. If you are looking for a high-level specialization to delve deeper into the design and optimization of complex mechatronic systems, this program offers you the necessary tools. It is ideal for those interested in mastering areas such as sensor integration and signal conditioning, the application of artificial intelligence in mechatronic systems, or the management of industrial automation projects. It will allow you to update your knowledge and consolidate your position in the market, promoting your professional development in industrial control and technological innovation.

Professional Outings

- Completion of this master's degree positions you to assume leadership roles and technical responsibility in the industrial and technological sector. You will consolidate your career as Industrial Automation Project Director, designing and implementing advanced solutions that integrate sensors, actuators and control systems. You will profile yourself as a Senior Robotics Engineer, developing and optimizing the behavior of autonomous robots using genetic algorithms and neural networks. You will be a Specialist in Artificial Intelligence applied to Mechatronics, applying fuzzy logic and expert systems for decision making in complex environments. Additionally, you will be able to act as a Control Systems Integration Consultant, advising on the optimization of industrial processes and the implementation of new mechatronic technologies. Your mastery of automation and robotics will allow you to drive innovation and efficiency in various sectors, assuming a key role in the digital transformation of the industry.







Live Madrid

Live the International Week

As an additional complement to your training, you can be part of the SIM: Week International in Madrid. A unique meeting that brings together students from all over the world. For seven days you can live an academic and cultural experience in the heart of Europe, culminating with the graduation ceremony in Madrid.

- Conferences and workshops with international experts
- Visits to companies and reference organizations
- Networking with students from different countries
- Cultural activities and discovery of Madrid
- graduation ceremony

Structural

Structuralia is a leading educational institution in postgraduate and highly specialized online training, focused on the fields of engineering, architecture, construction, energy, technology and digital transformation.

Founded in 2001 with a strong industrial DNA, the result of collaboration between large companies in the sector and the Universitat Politècnica de Catalunya (UPC), for more than 25 years we have accompanied technical professionals in their academic and professional development through practical, flexible training aligned with the reality of the labor market.

Our training proposal connects advanced technical knowledge, real employability and international projection, acting as key support in the professional evolution of those seeking to specialize, grow professionally and generate impact in their sector, with a firm commitment to the democratization of access to technical excellence.



+350.000

Students have gone through our virtual classrooms



+20 years

Experience in the training sector



5 stars

QS ranking in online education

EDUCA EDTECH
Group

Educa Edtech GROUP

When you enroll in a course or master's degree, you will get a free subscription to MyLXP while your training lasts. You will have access to more than 400 key courses (soft skills, languages, digital skills, etc.) and other surprises. Sign up and see how MyLXP improves your learning.

EDUCA LXP Methodology

The comprehensive tailored online education experience

EDUCA LXP is more than a methodology, it is a completely educational experience personalized thanks to all the possibilities offered by artificial intelligence. Now the content adapts to you, your needs and preferences, while offering you access to updated and practical content that really makes a difference in the labor market.

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Human empathy and academic guidance from a specialized teaching team.

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You will have access to more than 400 key courses (soft skills, languages, competencies digital, etc.) and other surprises. Sign up and see how MyLXP improves your learning.

Meet PHIA, your personalized learning assistant

Use all the possibilities of artificial intelligence to get the most out of it match to your training

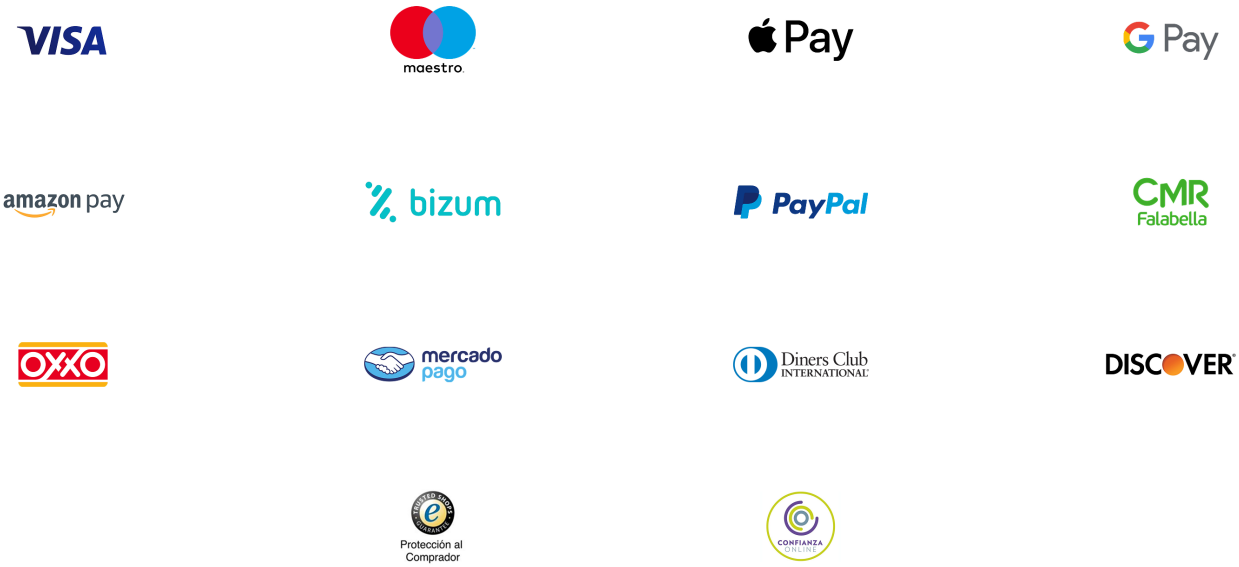
EDUCA EDTECH Group leads the digital revolution in education, promoting the continuous learning and technological transformation. The group is made up of recognized training institutions and its mission is to democratize access to education, promote the transfer of knowledge, technological development and research.

With the experience accumulated over more than 20 years, we have perfected our learning platform EDUCA LXP (Learning Experience Platform), the basis of our educational methodology, which provides students with online training practical and meaningful.



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Funding and scholarships

Finance your course or master's degree and enjoy the available scholarships. Contact our expert team to know which one best suits your profile.

25%
Alumni Scholarship

15%
Scholarship recommended

20%
Functional Diversity Scholarship

20%
Unemployment scholarship

15%
GROUP Scholarship

20%
Scholarship for Professionals, Healthcare, members

15%
Entrepreneurship Scholarship

20%
Large Family Scholarship