SCHOOL OF INDUSTRIAL AND INFORMATION ENGINEERING

Laurea Magistrale
(equivalent to Master of Science)

Automation and Control Engineering
The World of Automation and Control Engineering

robotics

mechatronics

public utility and transport

vehicles

production plants

smart buildings, industries, grids and cities
Why enrolling in our MSc Programme?

The Master of Science (MSc) Programme in Automation and Control Engineering aims at training experts in the design, implementation, and management of automation systems characterized by a strong technological content, in inherently multidisciplinary contexts. During the MSc studies, students acquire

- skills to deal with integration problems arising from the use of components and technologies that are very different from each other, ranging from the technologies of traditional engineering areas (mechanics, electrical engineering, energy, aerospace) to the most advanced information technologies (control and automation, electronics, computer science, telecommunications)
- competences to increase functionality and value of equipment and machinery, to improve the efficiency of production processes, and to devise autonomous systems that can interactively learn from humans, overcome their performance, and perform strenuous and repetitive tasks, possibly in hostile environments, or even missions impossible for a human

The increasing automation in various domains, including industry, transport, energy, and society at large, makes the Automation Engineer a highly in-demand professional figure.

What are the prospects after graduation?

An Automation Engineer can find job opportunities in all those companies that produce, or incorporate in their products, tools and systems for the automation, in those companies characterized by flexible production processes at high levels of automation, and in consulting and engineering firms designing complex, technologically advanced automation systems.

The automation market covers increasingly all sectors of industrial production and services:

- process industries (chemical, petrochemical, energy, etc.)
- companies and institutions working in the field of transport (land, sea and air)
- the manufacturing industry of consumer goods (food, appliances, games, etc.)
- industries and companies producing and operating plants and systems for renewable energy generation and distribution
- the public utility networks (water, gas, energy, transport, etc.)
- manufacturers of automatic machines, robots, and mechatronic systems, deriving from the integrated design of the mechanics and of the measuring and control electronics
- bodies that oversee or participate in the management of resources (material, natural and human ones) of relevant economic and social interest

The MSc qualification also grants access to the Research Doctorate, and to second level Specialization Courses and University Masters.
What subjects are studied?

A single curriculum is available, taught in English, with a few complementary and optional courses taught in Italian.

Courses can be classified in the following categories:

- **methodological**, on transversal subjects such as learning from data, identification, modeling, simulation, optimization and control, including traditional and data-driven methods
- **technological**, on process instrumentation including advanced actuation and measurement systems for control applications
- **application-oriented**, to gain more focused knowledge on the application of control and automation to key areas such as industry, energy, and transport
- **experimental and professionalizing**, comprising an educational lab on automation and control and a project work in collaboration with a company, to improve soft skills through innovative training activities

**A final thesis completes the training.** During the thesis work, new methods and techniques for automation and control are developed with application in high-tech areas, often in collaboration with industries.

Some highlights

**Innovative and international-level courses**

- **Project work**, characterized by a strong innovative teaching and held in direct collaboration with a company, that proposes an innovation topic
- **Automation and Control Laboratory**, held in a lab and oriented towards an experimental activity where knowledge acquired in various courses is integrated
- **Advanced topics in automation and control engineering**, held by an internationally recognized Visiting Professor affiliated with a foreign institution

**Special opportunities**

- students with a creative and entrepreneurial attitude are stimulated to **develop innovative high-tech automation solutions**, and possibly **build a start-up company** with the support of PoliHub
- students oriented to a scientific research career can enroll in the **Honours Programme “Scientific Research in Information Technology”**
- international curricula are offered through agreements (Erasmus, extra-Eu bilateral, double degree) with numerous foreign institutions

**MSc thesis awards** to give a recognition to our best students for their thesis work

**Website** [www.ccsatm.polimi.it](http://www.ccsatm.polimi.it)
### 1° YEAR

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester</th>
<th>Credits</th>
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<tbody>
<tr>
<td>COMPUTER AIDED MANUFACTURING</td>
<td>1</td>
<td>10</td>
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<tr>
<td>DYNAMICS OF MECHANICAL SYSTEMS</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>MODEL IDENTIFICATION AND DATA ANALYSIS</td>
<td>1</td>
<td>10</td>
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<tr>
<td>ADVANCED AND MULTIVARIABLE CONTROL</td>
<td>2</td>
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<tr>
<td>DYNAMICS OF ELECTRICAL MACHINES AND DRIVES</td>
<td>2</td>
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<td>Complementary courses</td>
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### 2° YEAR

<table>
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<th>Course</th>
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<tr>
<td>AUTOMATION AND CONTROL LABORATORY</td>
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<td>5</td>
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<tr>
<td>SOFTWARE ENGINEERING (FOR AUTOMATION)</td>
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<td>5</td>
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<tr>
<td>Complementary courses</td>
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<tr>
<td>THESIS AND FINAL EXAM</td>
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### Some complementary courses

- ADVANCED MEASUREMENT SYSTEMS FOR CONTROL APPLICATIONS
- ADVANCED PROCESS CONTROL
- ADVANCED TOPICS IN AUTOMATION AND CONTROL ENGINEERING
- AUTOMATION AND CONTROL IN AUTONOMOUS VEHICLES
- AUTOMATION AND CONTROL IN ELECTRIC AND HYBRID VEHICLES
- AUTOMATION OF ENERGY SYSTEMS
- CONSTRAINED NUMERICAL OPTIMIZATION FOR ESTIMATION AND CONTROL
- CONTROL OF INDUSTRIAL ROBOTS
- CONTROL OF MOBILE ROBOTS
- DATA DRIVEN CONTROL SYSTEM DESIGN
- HIGH-TECH ENTREPRENEURSHIP
- NETWORKED CONTROL
- NONLINEAR CONTROL
- NUMERICAL ANALYSIS
- POWER ELECTRONICS AND SUPPLIES
- PRODUCTION SYSTEMS CONTROL
- PROJECT WORK
- ROBUST CONTROL
- SAFETY IN AUTOMATION SYSTEMS
- SIMULATION TECHNIQUES AND TOOLS
- SYSTEMS THEORY
- VIBRATION CONTROL AND DIAGNOSTICS OF MECHANICAL SYSTEMS