

# AUTOMA21

## Course for Higher Technician for Mechatronic Systems Management and Industrial Production Automation

<http://www.itsprime.it/corsi/nuovi-corsi/automa21/>

### Type of course:

two-year course after secondary school diploma.

**Teaching location:** Florence

**Registration deadline:** 1st October 2021

### Type of final Diploma:

Diploma in "HIGHER TECHNICIAN FOR AUTOMATION AND MECHATRONIC SYSTEMS" (Area 4.3 Mechanical system - Figure 4.3.2 of Annex D - Interministerial Decree 07/09/2011) **with indication of specialization of the course in "HIGHER TECHNICIAN FOR MECHATRONIC SYSTEMS MANAGEMENT AND AUTOMATION OF INDUSTRIAL PRODUCTION", with the certification of skills corresponding to the fifth level of the European Qualifications Framework - EQF.**

In order to facilitate circulation at national and European level, the certificate shall be supplemented by the EUROPASS certification.

### Entry requirements:

possession of secondary school diploma;

age between 18 to 30 years (not completed on the call deadline date).

### Type of access:

programmed number: 25 students

### Selection mode:

The selection of participants includes:

curricular evaluation by qualifications and experiences,

a written test,

a motivational interview.



**Method of enrollment:**

see link: <http://www.itsprime.it/corsi/nuovi-corsi/automa21/>

**Methods of recognition of previous training courses:**

The student at the time of enrollment may request the recognition of training courses, formal or non-formal, producing the documentation that attests them. The request is submitted to the evaluation of the Evaluation Commission that assesses the coherence of the previous training courses with the Training Units and the modules of the course that the student will have to attend. On this basis the Commission indicates which modules can be recognized as already learned by the student.

**Profile of the course**

The "HIGHER TECHNICIAN FOR MECHATRONIC SYSTEMS MANAGEMENT AND INDUSTRIAL PRODUCTION AUTOMATION" designs, develops, programs and manages mechatronic systems for flexible production (FMS) and industrial automation systems, identifying the mechanical, electromechanical, electronic, pneumatic and hydraulic components constitutive of the system in relation to the cycle of planned activities.

**Main expected learning outcomes**

The graduate of AUTOMA20 has the competence:

1. to perform the design of the automation model for the execution of the sequences of activities provided by the system, selecting the mechanical, electromechanical, electronic, pneumatic and hydraulic components;
2. to define the configuration of the integrated mechatronic system by identifying its hardware components, setting the architecture of the automatic control and establishing the topology, protocols and operating parameters of the industrial telecommunications network;
3. to define the configuration of the robotic system, choosing the type of End Effector to maximize functional performance and implementing the programming of the controllers;
4. to program the logic of the automation system based on PLC, setting the parameters of drive and control within specific development environments and realizing the descriptive diagram (Ladder Diagram);
5. to manage the technical representation of the mechatronic product, realizing 2D CAD drawing, 3D parametric CAD modeling of components and assemblies and integrating specific tools for electrical and electronic design;
6. to manage the operation of the integrated mechatronic system for production with different technological solutions (additive and subtractive) and the dimensional verification of mechatronic components, controlling the correct operation of the

machines and intervening with maintenance procedures of the system in case of failure.

### **Possibility of access to further studies**

The diploma can be integrated with a subsequent university course, with recognition of university training credits (CFU) on the basis of the didactic regulations of the individual universities. In this regard, reference should be made to the current legislation.

### **Regulations for the conduct of examinations and other forms of school profit assessment**

Each ITS PRIME course is biennial and consists of Training Units, divided into Didactic Modules.

At the end of each Didactic module, a 100-scale assessment is planned. For the modules with many hours of lessons, intermediate verifications are foreseen.

Students, after having attended the course for at least 80% of the 1040 hours of lessons and at least 50% of the 760 hours of internship in the company, and having obtained in all the Didactic modules at least 60/100, are admitted to take the final exam. The exam consists of a written test with multiple choice tests, a technical-practical test, an interview. The fundamental part of interview is the discussion of a work experience, designed and prepared during the internship period. By passing the exam, students acquire the Diploma of Higher Technician, a qualification corresponding to the 5th level of the European Qualifications Framework EQF.

## **Course structure** **Training Units and Didactic Modules**

### **First year**

#### UFC 1 - EMPOWERMENT AND TEAM BUILDING

- A1.1 Outdoor Training (in outdoor environment)
- A1.2 Self Empowerment and Team Building Workshop
- A1.3 Problem setting and solving - decision making - time management

#### UFC 2 - JOB ORIENTATION AND SELF-EMPLOYMENT

- A2.1 The enterprise and the employment relationship (contracts)
- A2.2 Business organization and organization charts
- A2.3 Order management techniques
- A2.4 Supply Chain Management

#### UFC 3 - LANGUAGE SKILLS

- A3.1 English theory

- A3.2 English workshop
- A3.3 Technical English

#### UFC 4 - 3D TECHNICAL DRAWING AND MODELLING

- A4.1 Regulations for mechanical technical drawing
- A4.2 Computer Aided Design (Autocad)
- A4.3 Parametric Solid Modeling (Solidworks)

#### UFC 5 - MECHANICAL TECHNOLOGIES

- A5.1 Material technology
- A5.2 Laboratory of mechanical measurements
- A5.3 Basic mechanical laboratory (manual machines)

#### UFC 7 - QUALITY, SAFETY AND ENVIRONMENT

- A7.1 Quality policies in the use of processes (ISO 9001)
- A7.2 Safety and prevention of workplace accidents (high risk)
- A7.3 Ecological enterprise; iso 14000 and environmental compatibility of industrial production

#### UFC 8 - INDUSTRIALIZATION OF PROCESS AND PRODUCT

- A8.1 Production processes and costs of company structures
- A8.2 Lean Manufacturing
- A8.3 Digitization of industrial production (Industry 4.0)

#### UFC 9 - SYSTEM OPERATION AND MAINTENANCE

- A9.1 Organisation of installation and maintenance services
- A9.2 Techniques for predicting failure modes
- A9.3 Installation and maintenance of automated lines

#### UFC 10 - APPLIED INFORMATICS AND IOT

- A10.1 Programming languages (C/C++)
- A10.2 IOT (Arduino)
- A10.3 Augmented reality systems (AR)
- A10.4 Laboratory of applied computer science

#### UFC 11 - INDUSTRIAL AUTOMATION

- A11.1 Electrical, pneumatic and hydraulic actuators
- A11.2 Industrial control and automation systems
- A11.3 Programming of industrial automation systems
- A11.4 Industrial automation laboratory

## ***Second year***

### UFC 6 - PRODUCT DEVELOPMENT TOOLS

- A6.1 ISO programming
- A6.2 CAM (Esprit)
- A6.3 Rapid prototyping and reverse engineering
- A6.4 Advanced mechanics laboratory (numerical control machines)

### UFC 12 - INDUSTRIAL ROBOTICS

- A12.1 Classification of industrial robots
- A12.2 Mechanics of industrial robots
- A12.3 Robotic transport systems
- A12.4 Programming and control of robotic systems
- A12.5 Laboratory of robotics

### UFC 13 - STAGE

- A13.1 Internship in the company

## Diagram of the structure of the course with the relative credits

Automa21						
Acronym						
Title	Higher Technician for Mechatronic Systems Management and Industrial Production Automation					
Modules code	Teaching	Hours UFC	Hours First year Modules	Hours Second year Modules	Credits First year	Credits Second year
	<b>UFC 1 - EMPOWERMENT E TEAM BUILDING</b>	<b>40</b>	First year	Second year	First year	Second year
A1.1	Outdoor Training (in outdoor environment)		8		2	
A1.2	Self Empowerment and Team Building Workshop		16			
A1.3	Problem setting and solving - decision making - time management		16			
	<b>UFC 2 - JOB ORIENTATION AND SELF-EMPLOYMENT</b>	<b>40</b>	First year			
A2.1	The enterprise and the employment relationship (contracts)		8		1	
A2.2	Business organization and organization charts		12		1	
A2.3	Order management techniques		8		1	
A2.4	Supply Chain Management		12		1	
	<b>UFC 3 - LANGUAGE SKILLS</b>	<b>68</b>	First year			
A3.1	English theory		40		3	
A3.2	English workshop		20		1	
A3.3	Technical English		8		1	
	<b>UFC 4 - 3D TECHNICAL DRAWING AND MODELLING</b>	<b>104</b>	First year			
A4.1	Regulations for mechanical technical drawing		12		2	
A4.2	Computer Aided Design (Autocad)		32		2	
A4.3	Parametric Solid Modeling (Solidworks)		60		5	
	<b>UFC 5 - MECHANICAL TECHNOLOGIES</b>	<b>88</b>	First year			
A5.1	Material technology		24		3	
A5.2	Laboratory of mechanical measurements		24		1	
A5.3	Basic mechanical laboratory (manual machines)		40		2	
	<b>UFC 6 - PRODUCT DEVELOPMENT TOOLS</b>	<b>140</b>		Second year		
A6.1	ISO programming			20		3
A6.2	CAM (Esprit)			60		5
A6.3	Rapid prototyping and reverse engineering			20		3
A6.4	Advanced mechanics laboratory (numerical control machines)			40		3
	<b>UFC 7 - QUALITY, SAFETY AND ENVIRONMENT</b>	<b>40</b>	First year			
A7.1	Quality policies in the use of processes (ISO 9001)		16		2	
A7.2	Safety and prevention of workplace accidents (high risk)		16		2	
A7.3	Ecological enterprise; iso 14000 and environmental compatibility of industrial production		8		1	
	<b>UFC 8 - INDUSTRIALIZATION OF PROCESS AND PRODUCT</b>	<b>72</b>	First year			
A8.1	Production processes and costs of company structures		32		3	
A8.2	Lean Manufacturing		32		3	
A8.3	Digitization of industrial production (Industry 4.0)		8		1	
	<b>UFC 9 - SYSTEM OPERATION AND MAINTENANCE</b>	<b>44</b>	First year			
A9.1	Organisation of installation and maintenance services		12		2	
A9.2	Techniques for predicting failure modes		8		1	
A9.3	Installation and maintenance of automated lines		24		2	
	<b>UFC 10 - APPLIED INFORMATICS AND IOT</b>	<b>128</b>	First year			
A10.1	Programming languages (C/C++)		40		2	
A10.2	IOT (Arduino)		32		3	
A10.3	Augmented reality systems (AR)		16		1	
A10.4	Laboratory of applied computer science		40		2	
	<b>UFC 11 - INDUSTRIAL AUTOMATION</b>	<b>180</b>	First year			
A11.1	Electrical, pneumatic and hydraulic actuators		40		2	
A11.2	Industrial control and automation systems		40		2	
A11.3	Programming of industrial automation systems		60		3	
A11.4	Industrial automation laboratory		40		2	
	<b>UFC 12 - INDUSTRIAL ROBOTICS</b>	<b>96</b>		Second year		
A12.1	Classification of industrial robots			8		1
A12.2	Mechanics of industrial robots			16		2
A12.3	Robotic transport systems			8		1
A12.4	Programming and control of robotic systems			32		4
A12.5	Laboratory of robotics			32		2
	<b>UFC 13 - STAGE</b>	<b>760</b>		Second year		
A13.1	Internship in the company			760		36
	<b>TOTAL HOURS</b>	<b>1800</b>	<b>804</b>	<b>996</b>	<b>60</b>	<b>60</b>

### ECTS credit system

For each course, ITS PRIME has adopted the credit calculation according to the credit system used in the European Higher Education Area ECTS (European Credit Transfer System). For one-year credits, 60 credits are provided, as for most Higher Education Institutions. For each Didactic Module, the workload required by the students to achieve the expected learning outcomes has been evaluated by evaluation experts and modules teachers. The hours of lessons were considered 30% or 50% of the hours of the workload according to the theoretical or theoretical-practical nature of the different modules. The time spent on the internship in the company and for the laboratory activities was considered 100% of the workload.

### Didactic plan

The two-year course, of 1800 hours in total, takes place in 4 semesters with a didactic articulation that provides:

classroom lessons and laboratory activities (1040 hours),  
internship, in Italy and abroad (760 hours). Any foreign internships are carried out with the European Erasmus+ Programme.

Lesson time: from a minimum of 4 to a maximum of 8 hours per day.

The entire training course is carried out in close connection with the mechanic sector companies. The teaching team is composed of at least 50% of experts from the world of production, professions and work with a specific professional experience in the field. In particular is involved the staff of the companies partners of ITS Prime Foundation.

Teachers from the School, University, Research Centres and Vocational Training will also be involved. Seminars, testimonies of key protagonists in the sector and visits to fairs, events, companies and installations of particular interest will complete the path of studies..

### Language of lessons

Italian

### Course calendar

<b>Start-up</b>	<b>october</b>	<b>2021</b>
<b>Preliminary Lessons on fundamental topics to the under-standing of the course</b>	<b>october</b>	<b>2021</b>
<b>End of first year</b>	<b>july</b>	<b>2022</b>
<b>Second-year start</b>	<b>september</b>	<b>2022</b>
<b>Start of internship in Italy</b>	<b>march</b>	<b>2023</b>
<b>Start of foreign internship (if any)</b>	<b>june</b>	<b>2023</b>
<b>End of the course</b>	<b>september</b>	<b>2023</b>
<b>Final examination</b>	<b>october</b>	<b>2023</b>

### Information on the organisation of mentoring and accompanying services

For each course a coordinator and a tutor will be appointed, who will follow and monitor the didactic activities and solve any collective or personal problems of the students.

Accompanying activities to achieve the best learning outcomes will be:

Accompanying activities	Individual hours	Group hours	Total hours
<b>Initials</b>			
Presentation and training agreement		2	2
Individual analysis	2		50
Preliminary Lessons on fundamental topics to the understanding of the course		48	48
<b>Additional training</b>			
English conversation	4		100
Laboratory of production synthesis		60	60
<b>Stage alignment</b>			
Collective orientation internship		4	4
Individual orientation internship	1		25
<b>Accompaniment</b>			
Collective accompaniment		16	16
Individual accompaniment	1		25
<b>Totale</b>	<b>8</b>	<b>130</b>	<b>330</b>

Calculation based on the number of students = 25

<b>Course manager</b>	Mirko Del Grande
<b>Tutor</b>	Anna Semeraro