RoboMatic23

Course for Higher technician for automation of production systems and industrial robotics

https://www.itsprime.it/corsi/nuovi-corsi/robomatic23-firenze/

Type of course:
two-year course after secondary school Diploma or after the 4-year Diploma of Vocational Education and Training (VET) integrated by a one-year Higher Technical Education and Training (IFTS) course.

Teaching location:
the course will take place mainly in the classrooms at **Pont-Tech, Viale Rinaldo Piaggio, 32 Pontedera (PI) and at the laboratories of ITI 'G.Marconi' and IPSIA 'Pacinotti' in Pontedera.** Part of the activities may be held in the technological laboratories of the universities, companies and entities that collaborate with the ITS Prime Foundation. They may also be held occasionally in facilities of educational or scientific interest located elsewhere. The internships can take place in companies located in any part of the regional, national and/or European territory.

Registration deadline: November 10, 2023

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 **"COURSE FOR HIGHER TECHNICIAN FOR AUTOMATION OF PRODUCTION SYSTEMS AND INDUSTRIAL ROBOTICS" 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 is accompanied by EUROPASS certification**.**

Entry requirements:
possession of secondary school diploma or after the 4-year Diploma of Vocational Education and Training (VET) integrated by a one-year Higher Technical Education and Training (IFTS) course;

age between 18 to 35 years (not completed on the call deadline date);

basic skills in English and ICT.

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Female candidates and/or candidates belonging to disadvantaged categories who have been successful in the selection process will be automatically admitted to participate in the course as trainees, up to the limit of the number of places allocated to them (50% of places to women, 7% to disadvantaged categories in accordance with the provisions of Law 68/1999).

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: https://www.itsprime.it/corsi/nuovi-corsi/robomatic23-firenze/

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 judgement of the Scientific Technical Committee that evaluates the coherence of the previous training courses with the Training Units and the modules of the course that the student is going to attend. On this basis the Scientific Technical Committee indicates which modules can be recognized as already learned by the student. Requests for recognition of training credits received after the selection date will not be evaluated.

Profile of the course
The "HIGHER TECHNICIAN FOR AUTOMATION OF PRODUCTION SYSTEMS AND INDUSTRIAL ROBOTICS" designs, develops, programmes and operates mechatronic systems for flexible manufacturing (FMS) and industrial automation systems, identifying the mechanical, electromechanical, electronic, pneumatic and hydraulic components constituting the system in relation to the planned cycle of activities.

Main expected learning outcomes
The **RoboMatic23** graduate has the competence to:
- perform the design of the automation model for executing the sequences of activities foreseen by the system, selecting the mechanical, electromechanical, electronic, pneumatic and hydraulic components
- define the configuration of the integrated mechatronic system by identifying its hardware components, setting the automatic control architecture and establishing the topology, protocols and operating parameters of the industrial telecommunications network;

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- defining the configuration of the robotic system, choosing the type of End Effector to maximise functional performance and carrying out controller programming;
- programming the logic of the PLC-based automation system, setting the drive and control parameters within specific development environments and producing the descriptive diagram (Ladder Diagram);
- manage the technical representation of the mechatronic product, producing the 2D CAD drawing, the parametric 3D CAD modelling of components and assemblies and integrating specific tools for electrical and electronic design;
- manage the operation of the integrated mechatronic system for production with dierent technological solutions (additive and subtractive) and the dimensional inspection of mechatronic com- ponents, checking the correct operation of machines and intervening with system maintenance procedures in the event of faults.

In the company, the graduate is mainly placed
- in technical departments for the design of automation systems and for the integration of robotic systems for the efficiency of industrial production;
- in production lines for the programming of automatic machines and the management of complex component processing;
- in the field of maintenance of automatic machines and industrial plants;
- in the area of programming and Lean optimisation of production processes.

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 (1100 hours),
internship, in Italy and abroad (700 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.

Possibility of access to further studies
The diploma may be integrated into a subsequent university course, with recognition of university credits (CFU) on the basis of the didactic regulations of the individual universities. In this regard, please refer to the regulations in force.

Regulations for the conduct of exams 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

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attended the course for at least 80% of the total hours of lessons, 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 5st level of the European Qualifications Framework EQF

Course structure
Training Units and Didactic Modules

UFC 1 - EMPOWERMENT E TEAM BUILDING
1.1   Outdoor Training (in ambiente esterno)
1.2   Laboratorio di Self Empowerment e Team Building
1.3   Problemsetting and solving - decision making - time management

UFC 2- ORIENTATION TOWARDS WORK AND ENTERPRISE
2.1   The enterprise and the employment relationship (contracts)
2.3   Company organisation and organisation charts
2.4   Order management techniques
2.5   Supply Chain Management

UFC 3 - LANGUAGE SKILLS
3.1   English Theory
3.2   English Laboratory
3.3   Technical English

UFC 4 - TECHNICAL DRAWING AND 3D MODELLING
4.1   Technical Mechanical Drawing Standards
4.2   Computer Aided Design (AutoCAD)
4.3   Parametric solid modelling (SolidWorks)

UFC 5 - MECHANICAL TECHNOLOGIES
5.1   Materials technology
5.2   Mechanical technology and design fundamentals
5.3   Mechanical measurement laboratory
5.4   Mechanical laboratory

UFC 6 - ELECTRONICS AND ELECTRICAL ENGINEERING
6.1   Basics of electrical engineering and electromagnetism
6.2   Analogue electronics
6.3   Digital electronics
6.4   Electrical Measurements
6.5   Electrical installations
6.6   Electronics laboratory

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UFC 7 - QUALITY, SAFETY AND ENVIRONMENT
7.1   Quality policies in the use of processes (ISO 9001)
7.2   Safety and accident prevention in the workplace (high risk)
7.3   Green enterprise; iso 14000 and eco-compatibility of industrial production

UFC 8 - PROCESS AND PRODUCT INDUSTRIALISATION
8.1   Production processes and costs of company structures
8.2   Lean Manufacturing
8.3   Digitalisation of industrial production (Industry 4.0)

UFC 9 - SYSTEM OPERATION AND MAINTENANCE
9.1   Organisation of installation and maintenance service
9.2   Failure mode prediction techniques
9.3   Installation and maintenance of automated lines

UFC 10 - APPLIED COMPUTING AND IOT
10.1   Programming languages (C/C++)
10.3   IOT(Arduino)
10.4   Augmented reality (AR) systems
10.5   Applied computing laboratory

UFC 11 - INDUSTRIAL AUTOMATION
11.1   Electric motors
11.2   Electropneumatic and electrohydraulic actuators
11.3   Control systems and industrial automation
11.4   Programming of industrial automation systems (PLC)
11.5   Industrial automation laboratory

UFC 12 - INDUSTRIAL ROBOTICS
12.1   Classification of industrial robots
12.2   Mechanics of industrial robots
12.3   Robotic transport systems
12.4   Programming and control of robotic systems
12.5   Robotics workshop

UFC 13 - INTERNSHIP
13.1   Company internship

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Timetable and credits for teaching modules

	RoboMatic23				
Acronym					
Title	Higher technician for automation of production systems and industrial robotics				
Modules Code	**Teaching**	**Hours UFC**	**Hours First year**	**Hours Second year**	**Credits First year**	**Credits Second year**
	UFC 1 - EMPOWERMENT E TEAM BUILDING	40	First year			
1.1	Outdoor Training (in ambiente esterno)		8			
1.2	Laboratorio di Self Empowerment e Team Building		16		2	
1.3	Problemsetting and solving - decision making - time management		16			
	UFC 2- ORIENTATION TOWARDS WORK AND ENTERPRISE	40		Second year		
2.1	The enterprise and the employment relationship (contracts)			8		
2.3	Company organisation and organisation charts			12		4
2.4	Order management techniques			8		
2.5	Supply Chain Management			12		
	UFC 3 - LANGUAGE SKILLS	68	First year			
3.1	English Theory		40		3	
3.2	English Laboratory		20		2	
3.3	Technical English		8			
	UFC 4 - TECHNICAL DRAWING AND 3D MODELLING	124	First year			
4.1	Technical Mechanical Drawing Standards		12		1	
4.2	Computer Aided Design (AutoCAD)		32		2	
4.3	Parametric solid modelling (SolidWorks)		80		4	
	UFC 5 - MECHANICAL TECHNOLOGIES	120	First year			
5.1	Materials technology		24		2	
5.2	Mechanical technology and design fundamentals		32			
5.3	Mechanical measurement laboratory		24		1	
5.4	Mechanical laboratory		40		2	
	UFC 6 - ELECTRONICS AND ELECTRICAL ENGINEERING	140	First year			
6.1	Basics of electrical engineering and electromagnetism		16		2	
6.2	Analogue electronics		16		2	
6.3	Digital electronics		20		2	
6.4	Electrical Measurements		20		2	
6.5	Electrical installations		28		2	
6.6	Electronics laboratory		40		2	
	UFC 7 - QUALITY, SAFETY AND ENVIRONMENT	52	First year			
7.1	Quality policies in the use of processes (ISO 9001)		16			
7.2	Safety and accident prevention in the workplace (high risk)		20		6	
7.3	Green enterprise; iso 14000 and eco-compatibility of industrial production		16			
	UFC 8 - PROCESS AND PRODUCT INDUSTRIALISATION	72	First year			
8.1	Production processes and costs of company structures		32		4	
8.2	Lean Manufacturing		32		4	
8.3	Digitalisation of industrial production (Industry 4.0)		8			
	UFC 9 - SYSTEM OPERATION AND MAINTENANCE	44	First year			
9.1	Organisation of installation and maintenance service		12		1	
9.2	Failure mode prediction techniques		8		1	
9.3	Installation and maintenance of automated lines		24		3	
	UFC 10 - APPLIED COMPUTING AND IOT	124	First year			
10.1	Programming languages (C/C++)		40		3	
10.3	IOT(Arduino)		32		2	
10.4	Augmented reality (AR) systems		16		2	
10.5	Applied computing laboratory		36		3	
	UFC 11 - INDUSTRIAL AUTOMATION	184		Second year		
11.1	Electric motors			24		2
11.2	Electropneumatic and electrohydraulic actuators			24		2
11.3	Control systems and industrial automation			40		3
11.4	Programming of industrial automation systems (PLC)			60		3
11.5	Industrial automation laboratory			36		2
	UFC 12 - INDUSTRIAL ROBOTICS	92		Second year		
12.1	Classification of industrial robots			8		1
12.2	Mechanics of industrial robots			20		4
12.3	Robotic transport systems			8		1
12.4	Programming and control of robotic systems			24		4
12.5	Robotics workshop			32		4
	UFC 13 - INTERNSHIP	700		Second year		
13.1	Company internship			700		30
	TOTAL HOURS	**1800**	**784**	**1016**	**60**	**60**

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. Typically 1 credit is equivalent to 25 hours of work between classroom (or laboratory for practical activities) and individual study. 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.

Language of lessons
Italian

Course calendar

Start-up	September	2023
Preliminary Lessons on fundamental topics to the under-standing of the course	October	2023
End of first year	June	2024
Second-year start	September	2024
Early stage italia	February	2025
Start of foreign internship (if any)	May	2025
End of the course	September	2025
Final examination	October	2025

Information on the organisation of tutoring and mentoring 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:

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Accompanying activities	Individual hours	Group hours	Total hours
Initials			
Presentation and training agreement		2	2
Individual analysis	2		50
Preliminary Lessons on fundamental topics to the understanding of the course		32	32
Additional training			
English conversation	4		100
Laboratory of production synthesis		48	48
Stage alignment			
Collective orientation internship		4	4
Individual orientation internship	1		25
Accompaniment			
Collective accompaniment		20	20
Individual accompaniment	1		25
Totale	**8**	**106**	**306**

Calculation based on the number of students = 25