

SmarTech23

Course for Higher technician for the design and production management of mechatronic systems

<https://www.itsprime.it/corsi/nuovi-corsi/smartech23-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 (IFTTS) course.

Teaching location:

the course will take place mainly at **the headquarters of the ITS PRIME Foundation, Via Panciatichi, 29 – Florence**, in the classrooms located inside **the Baker Hughes Nuovo Pignone factory in via Felice Matteucci, 2 Florence** and in the classrooms of **UNISER Srl in Via Sandro Pertini 358, Pistoia**. 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 30, 2023

Type of final Diploma:

Diploma in " HIGHER TECHNICIAN FOR THE INNOVATION OF MECHANICAL PROCESSES AND PRODUCTS " (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 THE DESIGN AND PRODUCTION MANAGEMENT OF MECHATRONIC SYSTEMS” 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 (IFTTS) course;

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

basic skills in English and ICT.



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/smartech23-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 THE DESIGN AND PRODUCTION MANAGEMENT OF MECHATRONIC SYSTEMS” has the ability to use innovative materials and cutting-edge technologies to improve the quality, productivity, flexibility, and competitiveness of mechanical and mechatronic companies in the development of industrial products and the maintenance of machines and plants.

The course aims to train highly qualified figures to carry out the activities of production process management in manufacturing industries according to the emerging trends of Industry 4.0.

Main expected learning outcomes

The **SmarTech23** graduate has the competence to

- combine different technologies, from mechanics to electronics to information technology, enabling him/her to intervene in the entire production chain: from the study of the project, to the use of representation and simulation software, to techniques for processing materials;



- know the design, prototyping and industrialisation techniques for mechanical products (CAD, CAD 3D, CAM, FEM, etc.). Act in the construction, testing and documentation of production processes;
- be familiar with innovative materials and their processing procedures;
- being able to manage the production of mechanical components using additive manufacturing (AM) techniques;
- be able to programme industrial automation systems (PLC, CNC numerical control machines, etc.) and apply methods of testing, commissioning and fault prevention;
- manage production flows in their planning, control and cost-effectiveness (LEAN);
- researching and applying technical and safety regulations in the electrical, electronic and mechanical fields;
- intervene in the marketing phase by managing after-sales requirements and system maintenance.

Didactic plan

The two-year course, of 2000 hours in total, takes place in 4 semesters with a didactic articulation that provides:

classroom lessons and laboratory activities (1200 hours), internship, in Italy and abroad (800 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 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 5th level of the European Qualifications Framework EQF



Course structure

Training Units and Teaching 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)
- 2.2 Company organisation and organisation charts
- 2.3 Order management techniques
- 2.4 Supply Chain Management

UFC 3 - LANGUAGE SKILLS

- 3.1 English Theory
- 3.2 English Laboratory
- 3.3 Technical English

UFC 4 - MECHANICAL DESIGN

- 4.1 Basics of mechanical design
- 4.2 Machine design
- 4.3 Machine installation techniques
- 4.4 Mechanical technical drawing standards
- 4.5 Materials technology and treatments
- 4.6 Component coupling techniques (bonding and welding)
- 4.7 Basic mechanical measurements workshop
- 4.8 Basic mechanical workshop (manual machines)

UFC 5 - TOOLS FOR MECHANICAL DESIGN

- 5.1 Computer Aided Design
- 5.2 Parametric Solid Modelling
- 5.3 3D scanning and reverse engineering

UFC 6 - TOOLS FOR PRODUCT DEVELOPMENT

- 6.1 Topological optimisation of structures (Additive manufacturing)
- 6.2 Additive manufacturing (Printers and processes)
- 6.3 Advanced parametric solid modelling
- 6.4 ISO Programming
- 6.5 CAM
- 6.6 Static and dynamic structural analysis using FEM methodology
- 6.7 Advanced mechanical measurement laboratory (CT, CMM, Optical Scanning, etc.)
- 6.8 Advanced mechanical laboratory (numerical control machines)



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 Production technologies and machining
- 8.3 New machinery directive (2006/42/EC)
- 8.4 Design for production
- 8.5 Technical documentation and manuals
- 8.6 Product Lifecycle Management (PLM)
- 8.7 Lean Manufacturing
- 8.8 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 mechanical, pneumatic and electrical devices

UFC 10 - INDUSTRIAL AUTOMATION

- 10.1 Actuators, motors and sensors for industrial automation
- 10.2 Control systems and industrial automation
- 10.3 Programming of industrial automation systems (Ladder)
- 10.4 Industrial automation laboratory
- 10.5 Robotic systems
- 10.6 Industrial robotics laboratory

UF 11 - INTERNSHIP

- 11.1 Company internship

Timetable and credits for teaching modules

Acronym	SmarTech23					
Title	Higher Technician for the design and production management of mechatronic systems					
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	Second year	First year	Second year
1.1	Outdoor Training (in ambiente esterno)		8		2	
1.2	Laboratorio di Self Empowerment e Team Building		16			
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	4	
2.2	Company organisation and organisation charts			12		
2.3	Order management techniques			8		
2.4	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		1	
	UFC 4 - MECHANICAL DESIGN	220	First year			
4.1	Basics of mechanical design		40		3	
4.2	Machine design		40		3	
4.3	Machine installation techniques		20		2	
4.4	Mechanical technical drawing standards		16		1	
4.5	Materials technology and treatments		24		2	
4.6	Component coupling techniques (bonding and welding)		20		2	
4.7	Basic mechanical measurements workshop		28		1	
4.8	Basic mechanical workshop (manual machines)		32		1	
	UFC 5 - TOOLS FOR MECHANICAL DESIGN	140	First year			
5.1	Computer Aided Design		40		2	
5.2	Parametric Solid Modelling		80		5	
5.3	3D scanning and reverse engineering		20		2	
	UFC 6 - TOOLS FOR PRODUCT DEVELOPMENT	308		Second year		
6.1	Topological optimisation of structures (Additive manufacturing)			20		2
6.2	Additive manufacturing (Printers and processes)			32		3
6.3	Advanced parametric solid modelling			40		2
6.4	ISO Programming			40		2
6.5	CAM			60		4
6.6	Static and dynamic structural analysis using FEM methodology			24		2
6.7	Advanced mechanical measurement laboratory (CT, CMM, Optical Scanning, etc.)			32		2
6.8	Advanced mechanical laboratory (numerical control machines)			60		4
	UFC 7 - QUALITY, SAFETY AND ENVIRONMENT	40	First year			
7.1	Quality policies in the use of processes (ISO 9001)		16		1	
7.2	Safety and accident prevention in the workplace (high risk)		16		2	
7.3	Green enterprise; iso 14000 and eco-compatibility of industrial production		8			
	UFC 8 - PROCESS AND PRODUCT INDUSTRIALISATION	144	First year			
8.1	Production processes and costs of company structures		24		2	
8.2	Production technologies and machining		20		2	
8.3	New machinery directive (2006/42/EC)		12		1	
8.4	Design for production		20		2	
8.5	Technical documentation and manuals		8		1	
8.6	Product Lifecycle Management (PLM)		20		2	
8.7	Lean Manufacturing		32		2	
8.8	Digitalisation of industrial production (Industry 4.0)		8		1	
	UFC 9 - SYSTEM OPERATION AND MAINTENANCE	44	First year			
9.1	Organisation of installation and maintenance service		12		2	
9.2	Failure mode prediction techniques		8			
9.3	Installation and maintenance of mechanical, pneumatic and electrical devices		24			2
	UFC 10 - INDUSTRIAL AUTOMATION	156	First year			
10.1	Actuators, motors and sensors for industrial automation		24		2	
10.2	Control systems and industrial automation		12		1	
10.3	Programming of industrial automation systems (Ladder)		40		2	
10.4	Industrial automation laboratory		32		1	
10.5	Robotic systems		24		1	
10.6	Industrial robotics laboratory		24		1	
	UF 11 - INTERNSHIP	800		Second year		
11.1	Company internship			800		35
	TOTAL HOURS	2000	852	1148	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 understanding 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:



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

