TECNO24

HIGHER TECHNICIAN FOR THE CREATION OF SYSTEMS FOR THE VALIDATION OF INNOVATIVE COMPONENTS AND PRODUCTS FOR THE ENERGY TRANSITION

https://www.itsprime.it/corsi-itsprime/tecno24/

The course is fully funded under Mission 4 - Component 1 Investment 1.5 of PNRR - Strengthening the training offer of the "ITS Academy".

Free for participants.

The ITS Prime Foundation has also provided for the award of **Scholarships** on the basis of merit and income. The terms and criteria for allocation and disbursement will be defined and communicated to students attending with appropriate notices and regulations.

Type of course:
Two-year course in higher education.

Teaching location:
the course will take place mainly at the ITS PRIME locations in **Florence**. Some 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 structures of educational or scientific interest located elsewhere. The internships may take place in companies located in any part of the regional, national and/or European territory.

Registration deadline: 26th September 2024, 11pm.

Type of final Diploma:
Diploma in " HIGHER TECHNICIAN FOR DESIGN AND ADVANCED MECHATRONIC PRODUCTION" (Ambito 6.1 - Sviluppo e innovazione del processo e del prodotto - Figura 6.1.1 dell'allegato 1 – DM 203 del 20.10.2023) with indication of specialization of the course in **"HIGHER TECHNICIAN FOR THE CREATION OF SYSTEMS FOR THE VALIDATION OF INNOVATIVE COMPONENTS AND PRODUCTS FOR THE ENERGY TRANSITION"** with the certification of the competences corresponding to the **European Qualifications Framework for lifelong learning (EQF) level 5** and constitutes a qualification for access to public competitions pursuant to Art. 5, paragraph 7, of the D.P.C.M 25 January 2008.

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 old (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:
classes can be made up of a **minimum number of 20 students** as required by current national regulations on the matter and a **maximum of 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-itsprime/tecno24/

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 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.

Course Objectives.
The course “TECNO24 - Higher Technician for the Construction of Plants for the Validation of Innovative Components and Products for the Energy Transition” trains professionals

specialized in the design, installation, and supervision of mechanical systems. Acquired competentions include specific knowledge in welding technologies, nondestructive testing, and design of metal layouts and structures.

Main job opportunities
Plant designer
Welding and controls specialist
Safety and ergonomics consultant
Sensor specialist

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: Monday to Friday with a weekly commitment of 35-40 hours. Interruptions in teaching activities will be planned for holidays, summer and winter vacations.
The entire training course is carried out in close connection with the mechanic sector companies. The teaching team is composed of at least 70% 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 the final exam. The exam consists of technical-practical tests and an interview.

ITS PRIME Tech Academy

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 - WORK AND BUSINESS ORIENTATION

2.1 The company and the employment relationship (contracts)
2.2 Company organization and organizational 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 - QUALITY, SAFETY AND ENVIRONMENT

4.1 Quality policies in the use of processes (ISO 9001)
4.2 Safety and prevention of accidents in the workplace (high risk)
4.3 Ecological company; iso 14000 and eco-compatibility of industrial production

UFC 5 - MECHANICAL DESIGN

5.1 Basics of mechanical design
5.2 Design of mechanical equipment
5.3 Automatic machines
5.4 Regulations for mechanical technical drawing
5.5 Materials technology
5.6 Basic mechanical measurement laboratory
5.7 Basic mechanics laboratory (manual machines)
5.8 Advanced mechanics laboratory (numerical control machines)

UFC 6 - TOOLS FOR MECHANICAL DESIGN

6.1 Computer Aided Design
6.2 Parametric Solid Modeling
6.3 3D scanning and reverse engineering

6.4 Fundamentals of Finite Element Analysis (FEA)

UFC 7 - INDUSTRIALIZATION OF THE PROCESS AND THE PRODUCT

7.1 Production processes and costs of company structures
7.2 Production technologies and mechanical processing
7.3 New Machinery Directive (2006/42/EC)
7.4 Design for production
7.5 Technical documentation and manuals
7.6 Product Lifecycle Management (PLM)
7.7 Lean Manufacturing (Six Sigma)
7.8 Digitalization of industrial production (Industry 4.0)

UFC 8 - SYSTEMS OPERATION AND MAINTENANCE

8.1 Organization of installation and maintenance service
8.2 Failure mode prediction techniques
8.3 Installation and maintenance of mechanical, pneumatic and electrical devices

UFC 9 - INTRODUCTION TO PLANT ENGINEERING

9.1 Plant solutions for energy production and energy transition
9.2 Basic principles of hydraulics (pressure drops in ducts and pipes, concept of prevalence)
9.3 Basic principles of thermodynamics/heat exchange (specific heat, enthalpy; conduz./convez./irragg.)

UFC 10 - EXPERIMENTAL VALIDATION OF MACHINES AND PLANT SOLUTIONS FOR THE ENERGY SECTOR

10.1 Industrial validation: types of validation and their impacts in terms of costs and resources
10.2 Phases of experimental validation: from design to execution, a targeted approach to reducing risks
10.3 Types of measurements possible in the validation of machines and components
10.4 Measurements on systems under test: basic principles and possible critical issues / Effect of installation methods on measurement
10.5 Fundamentals of metrology / Calibration of instruments
10.6 Mechanical (Pressure, Temperature) and electrical measurement laboratory

10.7 Advanced mechanical measurement laboratory (TAC, CMM, Optical Scanning, etc.)

UFC 11 - DESIGN AND SETUP OF TEST BENCHES

11.1 Flow Diagrams and P&ID of plant fluid systems - Creation process and reading guide
11.2 Notes on the sizing of pressure systems (thin wall cylinders, flanges, etc...)
11.3 Pressure Piping ASME B31 - Design, Components, Materials, Fabrication, Assembly, Inspection & Testing
11.4 Pressure Vessels & Heat Exchangers Overview - Design Standards, Installation & Maintenance Needs
11.5 PED Directive
11.6 Construction Actions - Overview and Features
11.7 Notes on the sizing of metal structures (tensile/compressive, shear, bending of beams and columns)
11.8 Metal carpentry for industrial use - Functional principles, execution and installation
11.9 Application of ergonomics and safety principles in the design of plant infrastructures
11.10 Lifting operations and equipment
11.11 Operational Risks (HAZID/HAZOP) and HSE (Risk Assessment based on FMEA)
11.12 Welding of metal structures and pipes
11.13 Non-destructive testing of metal structures and pipes
11.14 Atmospheric corrosion and protective systems: galvanizing and painting

UFC 12 - FUNDAMENTALS OF TECHNOLOGY APPLIED TO MEASUREMENT AND SENSOR INSTALLATION

12.1 Notes on brazing and printed sensors
12.2 Experimental validation in the field: "Experiment Design", "PoC Report" and "Operative Instruction"

UFC 13 - FUNDAMENTALS OF ELECTRICAL ENGINEERING AND ELECTRONICS APPLIED TO MEASUREMENT SYSTEMS

13.1 Recall of electrical engineering
13.2 Notes on the operation and control of electrical machines
13.3 ATEX Directive
13.4 Notes on signal theory and error theory
13.5 Measurement chains and "Loop checks"

13.6 Characteristics of data acquisition systems and "Human Machine Interfaces"

UFC 14 - INTERNSHIP

14.1 Internship in the company

Timetable and credits for teaching modules

Acronym	TECNO24						
Title	Higher Technician for the creation of systems for the validation of innovative components and products for the energy transition						
Modules Code	Teaching	Hours Module	Hours UFC	Hours First year	Hours Second year	Credits First year	Credits Second year
	UFC 1 - EMPOWERMENT E TEAM BUILDING		**40**	**First year**		**Primo anno**	
1.1	Outdoor Training (in ambiente esterno)	8		8		2	
1.2	Laboratorio di Self Empowerment e Team Building	16		16			
1.3	Problemsetting and solving - decision making - time management	16		16			
	UFC 2 - WORK AND BUSINESS ORIENTATION		**40**	**First year**		**First year**	
2.1	The company and the employment relationship (contracts)	8		8		1	
2.2	Company organization and organizational charts	12		12		1	
2.3	Order management techniques	8		8		1	
2.4	Supply Chain Management	12		12		1	
	UFC 3 - LANGUAGE SKILLS		**60**	**First year**		**First year**	
3.1	English theory	32		32		2	
3.2	English laboratory	20		20		1	
3.3	Technical English	8		8		1	
	UFC 4 - QUALITY, SAFETY AND ENVIRONMENT		**40**	**First year**		**First year**	
4.1	Quality policies in the use of processes (ISO 9001)	16		16		1	
4.2	Safety and prevention of accidents in the workplace (high risk)	16		16		1	
4.3	Ecological company; iso 14000 and eco-compatibility of industrial production	8		8		1	
	UFC 5 - MECHANICAL DESIGN		**228**	**First year**		**First year**	
5.1	Basics of mechanical design	32		32		2	
5.2	Design of mechanical equipment	32		32		2	
5.3	Automatic machines	12		12		1	
5.4	Regulations for mechanical technical drawing	16		16		1	
5.5	Materials technology	32		32		2	
5.6	Basic mechanical measurement laboratory	32		32		2	
5.7	Basic mechanics laboratory (manual machines)	32		32		2	
5.8	Advanced mechanics laboratory (numerical control machines)	40		40		2	
	UFC 6 - TOOLS FOR MECHANICAL DESIGN		**156**	**First year**		**First year**	
6.1	Computer Aided Design	40		40		3	
6.2	Parametric Solid Modeling	80		80		4	
6.3	3D scanning and reverse engineering	20		20		2	
6.4	Fundamentals of Finite Element Analysis (FEA)	16		16		1	
	UFC 7 - INDUSTRIALIZATION OF THE PROCESS AND THE PRODUCT		**164**	**First year**		**First year**	
7.1	Production processes and costs of company structures	32		32		2	
7.2	Production technologies and mechanical processing	20		20		1	
7.3	New Machinery Directive (2006/42/EC)	12		12		1	
7.4	Design for production	20		20		2	
7.5	Technical documentation and manuals	20		20		1	
7.6	Product Lifecycle Management (PLM)	20		20		2	
7.7	Lean Manufacturing (Six Sigma)	32		32		2	
7.8	Digitalization of industrial production (Industry 4.0)	8		8		1	
	UFC 8 - SYSTEMS OPERATION AND MAINTENANCE		**44**	**First year**		**First year**	
8.1	Organization of installation and maintenance service	12		12		2	
8.2	Failure mode prediction techniques	8		8		2	
8.3	Installation and maintenance of mechanical, pneumatic and electrical devices	24		24		2	
	UFC 9 - INTRODUCTION TO PLANT ENGINEERING		**40**	**First year**		**First year**	
9.1	Plant solutions for energy production and energy transition	8		8		1	
9.2	Basic principles of hydraulics (pressure drops in ducts and pipes, concept of prevalence)	16		16		2	
9.3	Basic principles of thermodynamics/heat exchange (specific heat, enthalpy; conduz./convez./irragg.)	16		16		2	
	UFC 10 - EXPERIMENTAL VALIDATION OF MACHINES AND PLANT SOLUTIONS FOR THE ENERGY SECTOR		**48**	**First year**		**First year**	
10.1	Industrial validation: types of validation and their impacts in terms of costs and resources	2		2			
10.2	Phases of experimental validation: from design to execution, a targeted approach to reducing risks	2		2			
10.3	Types of measurements possible in the validation of machines and components	4		4			
10.4	Measurements on systems under test: basic principles and possible critical issues / Effect of installation methods on measurement	4		4			
10.5	Fundamentals of metrology / Calibration of instruments	12		12			
10.6	Mechanical (Pressure, Temperature) and electrical measurement laboratory	12		12			
10.7	Advanced mechanical measurement laboratory (TAC, CMM, Optical Scanning, etc.)	12		12			
	UFC 11 - DESIGN AND SETUP OF TEST BENCHES		**108**		**Second year**		**Second year**
11.1	Flow Diagrams and P&ID of plant fluid systems - Creation process and reading guide	16			16		1
11.2	Notes on the sizing of pressure systems (thin wall cylinders, flanges, etc...)	4			4		1
11.3	Pressure Piping ASME B31 - Design, Components, Materials, Fabrication, Assembly, Inspection & Testing	12			12		1
11.4	Pressure Vessels & Heat Exchangers Overview - Design Standards, Installation & Maintenance Needs	4			4		1
11.5	PED Directive	8			8		1
11.6	Construction Actions - Overview and Features	4			4		1
11.7	Notes on the sizing of metal structures (tensile/compressive, shear, bending of beams and columns)	12			12		1
11.8	Metal carpentry for industrial use - Functional principles, execution and installation	4			4		1
11.9	Application of ergonomics and safety principles in the design of plant infrastructures	4			4		1
11.10	Lifting operations and equipment	4			4		1
11.11	Operational Risks (HAZID/HAZOP) and HSE (Risk Assessment based on FMEA)	12			12		1
11.12	Welding of metal structures and pipes	8			8		1
11.13	Non-destructive testing of metal structures and pipes	8			8		1
11.14	Atmospheric corrosion and protective systems: galvanizing and painting	8			8		1
	UFC 12 - FUNDAMENTALS OF TECHNOLOGY APPLIED TO MEASUREMENT AND SENSOR INSTALLATION		**8**		**Second year**		**Second year**
12.1	Notes on brazing and printed sensors	4			4		1
12.2	Experimental validation in the field: "Experiment Design", "PoC Report" and "Operative Instruction"	4			4		1
	UFC 13 - FUNDAMENTALS OF ELECTRICAL ENGINEERING AND ELECTRONICS APPLIED TO MEASUREMENT SYSTEMS		**64**		**Second year**		**Second year**
13.1	Recall of electrical engineering	12			12		2
13.2	Notes on the operation and control of electrical machines	12			12		2
13.3	ATEX Directive	8			8		1
13.4	Notes on signal theory and error theory	16			16		2
13.5	Measurement chains and "Loop checks"	8			8		1
13.6	Characteristics of data acquisition systems and "Human Machine Interfaces"	8			8		1
	UFC 14 - INTERNSHIP		**760**		**Second year**		**Second year**
14.1	Internship in the company	760			760		35
	TOTALE ORE		**1800**	**860**	**940**	**60**	**60**

ECTS credit system

For each course, ITS PRIME has adopted the calculation of credits according to the credit system used in the European Higher Education space ECTS (European Credit Tranfert Sy-stem). For the credits of an annuity there are, as for most Higher Education annuities, 60 credits. 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 necessary for students to achieve the intended learning outcomes was assessed by assessment experts and module teachers. Lecture hours were considered 30% or 50% of the total workload hours according to the theoretical or theoretical-practical nature of the different modules. Time spent on company internship and laboratory activities was considered 100% of the workload.

Language of lessons

Italian

Course calendar

The course will start by October 30, 2024 and will end by June 2026. The actual start date of the course will be communicated via the ITS Prime Foundation website (www.itsprime.it).