Innova20

Course for Higher Technician for Mechanical Design and industrialization of processes and products
http://www.itsprime.it/corsi/nuovi-corsi/innova20/

Type of course:
two-year course after secondary school diploma

Teaching location:
Florence

Type of final Diploma:
Diploma in "HIGHER TECHNICIAN FOR DESIGN AND ADVANCED MECHANICAL PRODUCTION " (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 MECHANICAL DESIGN AND INDUSTRIALISATION OF PROCESSES AND PRODUCTS", with certification of the competencies corresponding to level V 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;
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 a written test and a motivational interview.

Method of enrollment:
see link: http://www.itsprime.it/corsi/preiscriviti-ai-corsi/

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 will have to attend. On this basis the Scientific Technical Committee indicates which modules can be recognized as already learned by the student.

Profile of the course

The "HIGHER TECHNICIAN FOR MECHANICAL DESIGN AND INDUSTRIALIZATION OF PROCESSES AND PRODUCTS" specializes in the design of machines and systems and in the industrialization of their production, in compliance with the design standards required, using the main enabling technologies of Enterprise 4.0 .

Main expected learning outcomes

The graduate of INNOVA20 has the competence:

1. to carry out the design development of the mechanical product using methods and tech-niques for inventive design, integrated and adaptive, based on the business needs of customization of the product and cost containment;
2. to realize the 2D CAD representation and the 3D CAD modeling of the mechanical product to develop technical tables of description of the project, to set up analysis of static type and kinematic and fluid dynamic simulations;
3. to support the simulation of the production process, in order to choose the materials most suitable for the realization of the components and to optimize the topology for the functional prototyping, the additive and/or subtractive production and the reverse engineering;
4. to manage the manufacturing technologies of the components, programming at CAM the machining paths of the part with subtractive technology and developing the code for their execution (CNC) or implementing the procedures for industrial 3D printing (Additive manufacturing);
5. to define maintenance procedures for production technologies to limit downtime;
6. to manage the production and assembly of mechanical components and products, adapting the configuration of specific operating equipment to better perform the required operations;
7. to collaborate in the definition of a plan of continuous improvement on the business processes (LEAN), realizing interventions of constant refinement of the productive cycle in order to optimize the quality of the products (TQM)

Possibility of access to further studies

The diploma can be integrated into a subsequent university course, with recognition of university credits.

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 1200 hours of lessons and at least 50% of the 800 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 5st level of the European Qualifi-

cations 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 3 - THE COMPANY SYSTEM
A3.1 Company organization and organization charts
A3.2 Techniques for managing orders
A3.3 Supply Chain Management
A3.4 Digitisation of industrial production (Industry 4.0)

UFC 4 - LANGUAGE SKILLS
A4.1 English theory
A4.2 English workshop
A4.3 Technical English

UFC 5 - MECHANICAL DESIGN
A5.1 Bases of mechanical design
A5.2 Machine design
A5.3 Regulations for mechanical technical drawing
A5.4 Material technology
A5.5 Laboratory of basic mechanical measurements
A5.6 Basic mechanical laboratory (manual machines)

UFC 6 - MECHANICAL DESIGN TOOLS
A6.1 Computer Aided Design (Autocad)
A6.2 Basic Parametric Solid Modeling (Solidworks)
A6.3 Laser scanning and reverse engineering

UFC 8 - QUALITY, SAFETY AND ENVIRONMENT
A8.1 Quality policies in the use of processes (ISO 9001)
A8.2 Safety and prevention of workplace accidents (high risk)
A8.3 Ecological enterprise; iso 14000 and environmental compatibility of industrial production

UFC 9 - INDUSTRIALIZATION OF PROCESS AND PRODUCT

A9.1 Production processes and costs of company structures
A9.2 Production technologies and mechanical processing
A9.3 New machinery directive (2006/42/EC)
A9.4 Design for the production
A9.5 Documentation and technical manuals
A9.6 Product Lifecycle Management (PLM)
A9.7 Lean Manufacturing (Six Sigma)

UFC 10 - SYSTEM OPERATION AND MAINTENANCE
A10.1 Organisation of installation and maintenance services
A10.2 Techniques for predicting failure modes
A10.3 Installation and maintenance of mechanical, pneumatic and electrical equipment

UFC 11 - INDUSTRIAL AUTOMATION AND ROBOTICS
A11.1 Industrial control and automation systems
A11.2 Electric, pneumatic and hydraulic actuators
A11.3 Programming of industrial automation systems
A11.4 Industrial Robotics Systems
A11.5 Industrial automation and robotics laboratory

Second year

UFC 2 - JOB ORIENTATION AND SELF-EMPLOYMENT
A2.1 The enterprise and the employment relationship (contracts)
A2.2 Self-entrepreneurship
A2.3 Management of the profession (professional colleges)

CFU 7 - PRODUCT DEVELOPMENT TOOLS
A7.1 Topological optimization of structures (Additive manufacturing)
A7.2 Additive manufacturing (Printers and processes)
A7.3 Advanced Parametric Solid Modeling (Solidworks)
A7.4 ISO programming
A7.5 CAM (Esprit)
A7.6 Static and dynamic structural analysis with FEM methodology
A7.7 Advanced mechanical measurement laboratory (TAC, CMM, Optical Scanning, etc.)
A7.8 Advanced mechanics laboratory (numerical control machines)

UFC 12 - STAGE
A12.1 Internship in the company

Diagram of the structure of the course with the relative credits

Acronym	Innova20					
Title	"HIGHER TECHNICIAN FOR MECHANICAL DESIGN AND INDUSTRIALISATION OF PROCESSES AND PRODUCTS"					
Modules Code	**Teaching**	**Hours UFC**	**Hours modules**	**Hours modules**	**Credits**	**Credits**
	UFC 1 - EMPOWERMENT AND TEAM BUILDING	**40**	**First year**	**Second year**	**First year**	**Second year**
A1.1	Outdoor Training (in outdoor environment)		8			
A1.2	Self Empowerment and Team Building Workshop		16		2	
A1.3	Problemsetting and solving - decision making - time management		16			
	UFC 2 - JOB ORIENTATION AND SELF-EMPLOYMENT	**24**		**Second year**		
A2.1	The enterprise and the employment relationship (contracts)			8		1
A2.2	Self-entrepreneurship			12		2
A2.3	Management of the profession (professional colleges)			4		1
	UFC 3 - THE COMPANY SYSTEM	**44**	**First year**			
A3.1	Company organization and organization charts		16		1	
A3.2	Techniques for managing orders		8		1	
A3.3	Supply Chain Management		12		1	
A3.4	Digitisation of industrial production (Industry 4.0)		8		1	
	UFC 4 - LANGUAGE SKILLS	**72**	**First year**			
A4.1	English theory		40		3	
A4.2	English workshop		20		1	
A4.3	Technical English		12		1	
	UFC 5 - MECHANICAL DESIGN	**208**	**First year**			
A5.1	Bases of mechanical design		40		3	
A5.2	Machine design		40		3	
A5.3	Regulations for mechanical technical drawing		16		1	
A5.4	Material technology		40		3	
A5.5	Laboratory of basic mechanical measurements		32		1	
A5.6	Basic mechanical laboratory (manual machines)		40		2	
	UFC 6 - MECHANICAL DESIGN TOOLS	**140**	**First year**			
A6.1	Computer Aided Design (Autocad)		40		2	
A6.2	Basic Parametric Solid Modeling (Solidworks)		80		4	
A6.3	Laserscanning and reverse engineering		20		2	
	CFU 7 - PRODUCT DEVELOPMENT TOOLS	**276**		**Second year**		
A7.1	Topological optimization of structures (Additive manufacturing)			20		2
A7.2	Additive manufacturing (Printers and processes)			32		4
A7.3	Advanced Parametric Solid Modeling (Solidworks)			40		3
A7.4	ISO programming			40		5
A7.5	CAM (Esprit)			60		5
A7.6	Static and dynamic structural analysis with FEM methodology			20		2
A7.7	Advanced mechanical measurement laboratory (TAC, CMM, Optical Scanning, etc.)			24		1
A7.8	Advanced mechanics laboratory (numerical control machines)			40		2
	CFU 8 - QUALITY, SAFETY AND ENVIRONMENT	**44**	**First year**			
A8.1	Quality policies in the use of processes (ISO 9001)		16		1	
A8.2	Safety and prevention of workplace accidents (high risk)		20		2	
A8.3	Ecological enterprise; iso 14000 and environmental compatibility of industrial production		8		1	
	UFC 9 - INDUSTRIALIZATION OF PROCESS AND PRODUCT	**156**	**First year**			
A9.1	Production processes and costs of company structures		32		3	
A9.2	Production technologies and mechanical processing		20		2	
A9.3	New machinery directive (2006/42/EC)		12		1	
A9.4	Design for the production		20		2	
A9.5	Documentation and technical manuals		20		2	
A9.6	Product Lifecycle Management (PLM)		20		1	
A9.7	Lean Manufacturing (Six Sigma)		32		2	
	UFC 10 - SYSTEM OPERATION AND MAINTENANCE	**52**	**First year**			
A10.1	Organisation of installation and maintenance services		20		2	
A10.2	Techniques for predicting failure modes		8		1	
A10.3	Installation and maintenance of mechanical, pneumatic and electrical equipment		24		2	
	UFC 11 - INDUSTRIAL AUTOMATION AND ROBOTICS	**144**	**First year**			
A11.1	Industrial control and automation systems		24		1	
A11.2	Electric, pneumatic and hydraulic actuators		16		1	
A11.3	Programming of industrial automation systems		40		1	
A11.4	Industrial Robotics Systems		24		1	
A11.5	Industrial automation and robotics laboratory		40		2	
	UFC 12 - STAGE	**800**		**Second year**		
A12.1	Internship in the company			800		32
	TOTAL HOURS	**2000**	**900**	**1100**	**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. 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 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.

Language of lessons

Italian

Course calendar

Start-up	**october**	**2020**
Preliminary Lessons on fundamental topics to the understanding of the course	**october**	**2020**
End of first year	**july**	**2021**
Second-year start	**september**	**2021**
Early stage italia	**march**	**2022**
Start of foreign internship (if any)	**june**	**2022**
End of the course	**september**	**2022**
Final examination	**october**	**2022**

Course manager	Mirko Del Grande
Tutor	Anna Semeraro