

# PAPERGEAR22

## Course for Higher Technician for the development of machines and plants for paper production

<http://www.itsprime.it/corsi/nuovi-corsi/papergear22/>

### 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:** Lucca

**Registration deadline:** 25th Genuary 2023

### Type of final Diploma:

Diploma in "HIGHER TECHNICIAN FOR THE INNOVATION OF MECHANICAL PROCESSES AND PRODUCTS" (Area 4.3 Mechanical System - Figure 4.3.1 of Annex D - Interministerial Decree 07/09/2011) **with indication of specialization of the course in "HIGHER TECHNICIAN FOR THE DEVELOPMENT OF MACHINES AND PLANTS FOR PAPER 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 EUROPASS certification.

### Entry requirements:

holding a secondary school diploma or of 4-year Diploma of Vocational Education and Training (IeFP) integrated by a one-year Higher Technical Education and Training (IFTTS) course;

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

basic skills in English and ICT.

### 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/papergear22/>



### **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 THE DEVELOPMENT OF MACHINES AND PLANTS FOR PAPER PRODUCTION " is specialized in the design, industrialization, construction, testing and maintenance of machines and plants, with particular reference to the paper industry. He is a figure who, despite having as reference the companies producing machinery for the paper industry, can spend his skills also in the technical fields of plant development and maintenance at paper companies or sub-suppliers of the supply chain.

### **Main expected learning outcomes**

The PIPERGEAR22 Graduate has the competence to:

1. know the production system of the paper and paper industry and its production facilities, contextualizing them in the production chain,
2. making mechanical drawings by CAD and designing mechanical parts/assemblies, taking into account technical, economic and production systems constraints, using knowledge of mechanical technological solutions and of the components of the sector trade,
3. to interact with suppliers of semi-finished products or components for the definition and optimisation of machining processes,
4. to define, plan and carry out controls on the production process and the finished product,
5. draw up the final plant documentation in accordance with CE regulations,
6. to organize and manage the production process, in terms of machinery, equipment, timing and sequences of product processing,
7. manage the tasks of the assembly order of components and semi-finished products finalized to the realization of machines or machine parts, adapting the configuration of specific operating means to better perform the required operations, monitoring its progress and recording deviations from design standards and set tolerances,
8. to use the technologies of industrial internet (iot) for the multidirectional communication between productive processes and products and the integration of the information along the logistic-productive chain,
9. to install, develop and use the main components dedicated to industrial automation, ensuring both compliance with technical specifications and their configurability according to production needs,
10. assist specialists in the testing of machines and their computer interconnections, thanks to the knowledge of industrial programming systems (PLC, DCS),



11. to organize and carry out ordinary and extraordinary maintenance activities, thanks to the knowledge of the typical problems of the components and the techniques of diagnosis and prevention,
12. manage advanced maintenance processes (e-maintenance), using diagnostic and prognostic intelligent tools and integrating the new interfaces based on augmented reality with the different information management systems (iot and cloud computing)
13. managing after-sales service issues

### **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 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 1000 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 Qualifications Framework EQF.

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

### UFC 1 - EMPOWERMENT AND TEAM BUILDING

- 1.1 Team Building Workshop
- 1.2 Self Empowerment Workshop
- 1.3 Problem Setting and Solving - Decision Making - Time Management

### UFC 2 - WORK AND ENTERPRISE ORIENTATION

- 2.1 The Company and the Employment Relationship (Contracts)
- 2.2 The Company Organisational System
- 2.3 Gender Reconciliation and Equality
- 2.4 Sector Analysis
- 2.5 The Iso9001:2015 Quality System
- 2.6 Workplace Safety and Hygiene



### UFC 3 - LANGUAGE SKILLS

- 3.1 Business Language
- 3.2 Writing Tecnic Logistic Documents
- 3.3 Translating Tecnic Documents

### UFC 4 - DIGITAL SKILLS

- 4.1 Using Excel, Basic Functions
- 4.2 Using Excel, Advanced Functions
- 4.3 Overview of Visual Basic Programming for Excel
- 4.4 Ket Industry 4.0 Enabling Technologies

### UFC 5 - TECHNICAL SKILLS

- 5.1 Recalls of Infinitesimal Calculation
- 5.2 Thermal and Thermodynamic Processes
- 5.3 Recalls of Mechanical Physics

### UFC 6 PRODUCTION PROCESSES AND PLANTS - PAPER MILL

- 6.1 Overview of the Complete Production Process
- 6.2 Papermaking Plants
- 6.3 Inlet and Process Water Treatment
- 6.4 Paper Machine
- 6.5 Construction and Operation of Paper Mill Machinery
- 6.6 Paper Mill Machinery Maintenance

### UFC 7 PRODUCTION PROCESSES AND EQUIPMENT - TISSUE PAPERMAKING

- 7.1 View of the Complete Production Process - Tissue
- 7.2 Plants for Converting and Packaging Tissue Products
- 7.3 Construction Operation and Maintenance of Tissue Machinery
- 7.4 Vision of the Complete Manufacturing Process - Packaging
- 7.5 Plants for the Processing of Packaging Products
- 7.6 Construction Operation and Maintenance of Packaging Machinery

### UFC 8 PRODUCTION PROCESSES AND PLANTS - CORRUGATED BOARD

- 8.1 Paper and Box Characteristics
- 8.2 Paperboard Paper Machine
- 8.3 Corrugator Line
- 8.4 Box Making

### UFC 9 PRODUCTION PROCESSES AND PLANTS - NONWOVEN

- 9.1 Airlaid Technology
- 9.2 Production Plant (Fiber Selection, Web Formation, Bonding, And Finishing Techniques)



#### UFC 10 ELECTROTECHNICS, PLANT AND MACHINERY

- 10.1 Fundamentals of Electrotechnics
- 10.2 Power Electronics and Converters
- 10.3 Electrical Machines
- 10.4 Industrial Electrical Systems
- 10.5 Electrical Engineering and Measurement Laboratory

#### UFC 11 INDUSTRIAL TECHNICAL DRAWING

- 11.1 Introduction to Mechanical Drawing
- 11.2 Dimensional and Geometric Tolerances, Surface Finishes
- 11.3 Threaded, Unthreaded and Permanent Connections
- 11.4 Motion Transmission Parts
- 11.5 Pneumatics and Hydraulics
- 11.6 Materials for Machine Construction
- 11.7 Cad-2D Drawing
- 11.8 Cad-3D Drawing
- 11.9 Rapid Prototyping, Additive Manufacturing
- 11.10 CNC Programming Language
- 11.11 Project Work

#### UFC 12 MECHANICS FOR THE PAPER AND PAPERMAKING INDUSTRY

- 12.1 Dynamics Recalls Mechanism Composition
- 12.2 Forces Acting on Machines
- 12.3 Lubricated Kinematic Torques
- 12.4 Rigid Body Kinematics and Application to Mechanisms
- 12.5 Gear Wheels
- 12.6 Transmission of Motion by Flexible Organs
- 12.7 Oscillatory Motions
- 12.8 Balancing and Critical Speeds of Rotating Shafts
- 12.9 Mechanical Solutions for the Paper Industry
- 12.10 Mechanical Measurement Laboratory
- 12.11 Project Work

#### UFC 13 MECHANICAL ENGINEERING

- 13.1 Statics of Structures
- 13.2 Mechanics of Solids
- 13.3 Mechanics of One-Dimensional Elements
- 13.4 Project Development Workshop
- 13.5 Project Work

#### UFC 14 INDUSTRY 4.0 AUTOMATION

- 14.1 Plant Supervision
- 14.2 Digital Electronics
- 14.3 Industrial Instrumentation



- 14.4 Automatic Controls
- 14.5 Pid Controllers
- 14.6 Plc Programming
- 14.7 Functional Safety of Electrical Systems
- 14.8 Control and Data Analysis
- 14.9 Project Work

#### UFC 15 MANAGEMENT, TECHNOLOGICAL AND REGULATORY TOOLS

- 15.1 European Directives Applicable to the Sector
- 15.2 Statistical Tools for Mechanical Quality
- 15.3 Project Management of a Job Order
- 15.4 Mechanical Production Planning
- 15.5 Mechanical Processing Technology
- 15.6 Plant Maintenance Management
- 15.7 Business Case Presentation
- 15.8 Project Work

#### UFC 16 ENVIRONMENTAL SUSTAINABILITY IN THE PAPER INDUSTRY

- 16.1 Energy Production and Energy Consumption Management
- 16.2 Lead Auditor

#### UFC 17 INTERNSHIP

- 17.1 Company Internship

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

Acronym		<b>PAPERGEAR22</b>				
Title		<b>Higher Technician for the Management of Production in the Paper Sector</b>				
Modules code	Teaching	Hours UFC	Hours First year Modules	Hours Second year Modules	Credits First year	Credits Second year
<b>UFC 1</b>	<b>UFC 1 - EMPOWERMENT E TEAM BUILDING</b>	<b>24</b>	<b>First year</b>	<b>Second year</b>		
1.1	Team Building Workshop		8		1	
1.2	Self Empowerment Workshop		8			
1.3	Problem Setting and Solving - Decision Making- Time Management		8			
<b>UFC 2</b>	<b>UFC 2 - WORK AND ENTERPRISE ORIENTATION</b>	<b>44</b>	<b>First year</b>			
2.1	The Company and the Employment Relationship (Contracts)		12		1	
2.2	The Company Organisational System		4		1	
2.3	Gender Reconciliation and Equality		2			
2.4	Sector Analysis		2			
2.5	The Iso9001:2015 Quality System		8			
2.6	Workplace Safety and Hygiene		16		1	
<b>UFC 3</b>	<b>UFC 3 - LANGUAGE SKILLS</b>	<b>60</b>	<b>First year</b>			
3.1	Business Language		20		2	
3.2	Writing Technic Logistic Documents		20		2	
3.3	Translating Technic Documents		20		1	
<b>UFC 4</b>	<b>UFC 4 - DIGITAL SKILLS</b>	<b>36</b>	<b>First year</b>			
4.1	Using Excel, Basic Functions		10		1	
4.2	Using Excel, Advanced Functions		8			
4.3	Overview of Visual Basic Programming for Excel		10		2	
4.4	Ket Industry 4.0 Enabling Technologies		8			
<b>UFC 5</b>	<b>UFC 5 - TECHNICAL SKILLS</b>	<b>30</b>	<b>First year</b>			
5.1	Recalls of Infinitesimal Calculation		10		1	
5.2	Thermal and Thermodynamic Processes		10		1	
5.3	Recalls of Mechanical Physics		10		1	
<b>UFC 6</b>	<b>UFC 6 PRODUCTION PROCESSES AND PLANTS - PAPER MILL</b>	<b>32</b>	<b>First year</b>			
6.1	Overview of the Complete Production Process		7		1	
6.2	Papermaking Plants		6		1	
6.3	Inlet and Process Water Treatment		4			
6.4	Paper Machine		5		1	
6.5	Construction and Operation of Paper Mill Machinery		5			
6.6	Paper Mill Machinery Maintenance		5			
<b>UFC 7</b>	<b>UFC 7 PRODUCTION PROCESSES AND EQUIPMENT - TISSUE PAPERMAKING</b>	<b>32</b>	<b>First year</b>			
7.1	View of the Complete Production Process - Tissue		6		1	
7.2	Plants for Converting and Packaging Tissue Products		6			
7.3	Construction Operation and Maintenance of Tissue Machinery		6			
7.4	View of the Complete Manufacturing Process - Packaging		4		1	
7.5	Plants for the Processing of Packaging Products		4			
7.6	Construction Operation and Maintenance of Packaging Machinery		6			
<b>UFC 8</b>	<b>UFC 8 PRODUCTION PROCESSES AND PLANTS - CORRUGATED BOARD</b>	<b>36</b>	<b>First year</b>			
8.1	Paper and Box Characteristics		4		1	
8.2	Paperboard Paper Machine		8			
8.3	Corrugator Line		16		1	
8.4	Box Making		8			
<b>UFC 9</b>	<b>UFC 9 PRODUCTION PROCESSES AND PLANTS - NONWOVEN</b>	<b>12</b>	<b>First year</b>			
9.1	Airlaid Technology		4		1	
9.2	Production Plant (Fiber Selection, Web Formation, Bonding, And Finishing Techniques)		8			
<b>UFC 10</b>	<b>UFC 10 ELECTROTECHNICS, PLANT AND MACHINERY</b>	<b>104</b>	<b>First year</b>			
10.1	Fundamentals of Electrotechnics		20		2	
10.2	Power Electronics and Converters		16		1	
10.3	Electrical Machines		20		2	
10.4	Industrial Electrical Systems		20		1	
10.5	Electrical Engineering and Measurement Laboratory		28		1	
<b>UFC 11</b>	<b>UFC 11 INDUSTRIAL TECHNICAL DRAWING</b>	<b>152</b>	<b>First year</b>	<b>Second year</b>		
11.1	Introduction to Mechanical Drawing		8		2	
11.2	Dimensional and Geometric Tolerances, Surface Finishes		8			
11.3	Threaded, Unthreaded and Permanent Connections		4			
11.4	Motion Transmission Parts		8			
11.5	Pneumatics and Hydraulics		20		2	
11.6	Materials for Machine Construction		4			
11.7	Cad-2D Drawing		20		2	
11.8	Cad-3D Drawing		20		2	
11.9	Rapid Prototyping, Additive Manufacturing			20		3
11.10	CNC Programming Language			20		3
11.11	Project Work			20		3



UFC 12	UFC 12 MECHANICS FOR THE PAPER AND PAPERMAKING INDUSTRY	100	First year	Second year		
12.1	Dynamics Recalls Mechanism Composition		8		2	
12.2	Forces Acting on Machines		6			
12.3	Lubricated Kinematic Torques		4			
12.4	Rigid Body Kinematics and Application to Mechanisms		4			
12.5	Gear Wheels		8		2	
12.6	Transmission of Motion by Flexible Organs		8			
12.7	Oscillatory Motions		4			
12.8	Balancing and Critical Speeds of Rotating Shafts		8			
12.9	Mechanical Solutions for the Paper Industry		18		1	
12.10	Mechanical Measurement Laboratory		12		1	
12.11	Project Work			20		3
<b>UFC 13</b>	<b>UFC 13 MECHANICAL ENGINEERING</b>	<b>80</b>	<b>First year</b>	<b>Second year</b>		
13.1	Statics of Structures		16		1	
13.2	Mechanics of Solids		16		1	
13.3	Mechanics of One-Dimensional Elements		20		2	
13.4	Project Development Workshop		8			
13.5	Project Work			20		3
<b>UFC 14</b>	<b>UFC 14 INDUSTRY 4.0 AUTOMATION</b>	<b>92</b>	<b>First year</b>	<b>Second year</b>		
14.1	Plant Supervision		4		2	
14.2	Digital Electronics		16			
14.3	Industrial Instrumentation		4			
14.4	Automatic Controls		12		1	
14.5	Pid Controllers		4			
14.6	Pic Programming		20		1	
14.7	Functional Safety of Electrical Systems		8		1	
14.8	Control and Data Analysis		4			
14.9	Project Work			20		3
<b>UFC 15</b>	<b>UFC 15 MANAGEMENT, TECHNOLOGICAL AND REGULATORY TOOLS</b>	<b>118</b>	<b>First year</b>	<b>Second year</b>		
15.1	European Directives Applicable to the Sector		16		1	
15.2	Statistical Tools for Mechanical Quality		16		1	
15.3	Project Management of a Job Order		14		1	
15.4	Mechanical Production Planning		8		1	
15.5	Mechanical Processing Technology		16		1	
15.6	Plant Maintenance Management		18		1	
15.7	Business Case Presentation		10		1	
15.8	Project Work			20		3
<b>UFC 16</b>	<b>UFC 16 ENVIRONMENTAL SUSTAINABILITY IN THE PAPER INDUSTRY</b>	<b>48</b>		<b>Second year</b>		
16.1	Energy Production and Energy Consumption Management			8		4
16.2	Lead Auditor			40		
<b>UFC 17</b>	<b>UFC 17 INTERNSHIP</b>	<b>800</b>		<b>Second year</b>		
17.1	Company Internship			800		35
	<b>Total hours</b>	<b>1800</b>	<b>812</b>	<b>988</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. 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.

## 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 (1000 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

<b>Start-up</b>	<b>January</b>	<b>2023</b>
<b>Preliminary Lessons on fundamental topics to the understanding of the course</b>	<b>January</b>	<b>2023</b>
<b>End of first year</b>	<b>June</b>	<b>2023</b>
<b>Second-year start</b>	<b>September</b>	<b>2023</b>
<b>Start of internship in Italy</b>	<b>February</b>	<b>2024</b>
<b>Start of foreign internship (if any)</b>	<b>May</b>	<b>2024</b>
<b>End of the course</b>	<b>September</b>	<b>2024</b>
<b>Final examination</b>	<b>October</b>	<b>2024</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:

<b>Accompanying activities</b>	<b>Individual hours</b>	<b>Group hours</b>	<b>Total hours</b>
<b>Initials</b>			
Presentation and training agreement		2	2
Individual analysis	2		50
Preliminary Lessons on fundamental topics to the understanding of the course		32	32
<b>Additional training</b>			
English conversation	4		100



Laboratory of production synthesis		48	48
<b>Stage alignment</b>			
Collective orientation internship		4	4
Individual orientation internship	1		25
<b>Accompaniment</b>			
Collective accompaniment		20	20
Individual accompaniment	1		25
<b>Totale</b>	<b>8</b>	<b>106</b>	<b>306</b>

Calculation based on the number of students = 25

