Course title

ADVANCED TECHNICIAN FOR INTERNATIONAL COMMERCIAL MANAGEMENT OF PRODUCTS AND SERVICES

Course profile

Advanced technicians for international commercial management of products and services develop a personalized estimate to meet customer demand, draw up technical-commercial offers for the acquisition of an order and provide technical advice on the service contents associated with the product during its life cycle.

Technicians interpret the customer's requests for the supply of goods based on specific needs (also by trying to anticipate them) and take care of the management of contacts with the client for the feasibility analysis and the definition of the technical specifications, according to the customer's needs.

They manage the database for the configuration of the company product, based on standard design options from which they will develop product customization solutions. Technicians elaborate the preliminary project (forerunner) for the customer, configuring it in relation to the modularity of the product and its feasibility and establish relative costs; apply estimation and cost estimates, interfacing with suppliers and the logistic-production chain to evaluate alternatives of materials and components with quotations that are more functional to the cost objectives; conclude the commercial offer by integrating it with the accessory information useful for the definition of the purchase contract (delivery, installation, maintenance cycles, technical specifications, etc.); follow relationships with manufacturing, monitoring and supporting the progress of the production order in compliance with the product customization specifications; manage the after-sales phase (customer care), from installation to product testing; plan assistance services on the machine/plant, also during its life cycle and any functional updates/additions.

Organization (main teaching, training and verification methodologies)

The main learning activities include:

- General courses in linguistic, communicative, relational, scientific, technological, legal, economic, organizational and managerial fields;
- Teachings of a technical-professional nature both common to the reference area (Made in Italy Technologies - Mechanical System) and specialist/distinctive of the profile.

The course is carried out in 2 full-time annuities, which constitute a student workload total of 1,500 hours.

The workload includes all the training methods:

- In the classroom;
- In didactic laboratories in offices equipped with software, systems and tools for exercises and checks, also installed at member companies/partners;
- Project Work/Research Project;
- Internship;
- Individual study.

Most of the teaching hours are entrusted to member companies or partners, who provide experts and/or in the company setting with related technological equipment, laboratories, plants and technical documentation.

40% of the work takes place in the company through an internship and establishing a strong link in the production fields.

Guided visits are also provided to leading companies and to laboratories and research centres both in and outside the Region. Visits to events or fairs abroad may also be possible.

Methodologies and verification criteria

At the end of the course there will be a final exam for the release of the Advanced Technician diploma.

The assessment of learning outcomes is also carried out at the end of each training unit, with the following criterion:

- Practical exercises to verify and evaluate the learning outcomes of the training units which provide for the prevalence of active and laboratory teaching methodologies and/or learning focused on the technologies in use;
- Written exercises to verify and evaluate the learning outcomes in theoretical training units which involve the use of traditional teaching methods.

Disciplinary area of reference (ISCED - F)

0715 Mechanics and metal trades

Job title (national classification/standard)

Advanced technician for marketing and internationalization of companies

Level

QF - EHEA: short cycle qualification

EQF: level 5

Total ECTS credits

120

Learning outcomes of the study course

At the end of the training path the student will be able to:

- Manage communication and relational processes within and outside the organization both in Italian and in English;
- Master the linguistic tools and information and communication technologies to interact in the workplace;
- Prepare technical and regulatory documentation that can be managed through telematic networks;
- Evaluate the implications of information flows with respect to the effectiveness and efficiency of the management of production or service processes;
- Use statistical tools and modelling as well as tools and methodologies specific to experimental research;
- Locate sources and apply the regulations regarding the company and its external relations at national, European and international level;
- Know and contribute to manage the quality organizational models that encourage innovation for the companies in their specific sector;
- Analyse, monitor and control production processes with a view to progressive continuous improvement;
- Implement strategic contacts in the markets and to the target audience;
- Apply laws and regulations to protect 'Made in Italy' brand and industrial property;
- Define brand and product/service positioning with particular reference to international markets;
- Prepare marketing plans and check their implementation;
- Collaborate in the definition of the overall technical project and its components;
- Analyse the needs of the incoming customer, proposing updated technological solutions, directing the personalization throughout the range of company products and promoting the integration of innovative services with high added value;
- Analyse competitor's offers and the company's portfolio of solutions to establish the best solution for the customer;

- Define the product customization solutions according to the customer's needs, starting from standard design solutions and from the database for the configuration of the company product;
- Formulate technical-commercial offers in relation to the defined budget, applying estimates and costs techniques for the realization of the order;
- Organize after-sales service solutions, monitoring the progress of the order up to installation, testing and validation of the product, planning customer service services for assistance and flexible reconfiguration of the machine/plant;
- Manage the after-sales service during the product lifecycle, planning updates and continuous training of the customer's staff and providing services for performance analysis, diagnostics and prognostics of the system even remotely.

Year I

Area/ Range	Competence objectives for national classification/standard	Module	Main contents	Learning outcomes of the unit	Methods and criteria for verifying results	Learning methodologies, contexts and related workload (hours)	ECTS credits
General Linguistic, communicative and relational field	Use technical English (micro language), related to the technological area of reference, to communicate correctly and effectively in the contexts in which is required.	Technical English	Communication in English (written, oral) on technical-specialist subjects relating to the professional domain and the workplace. Reading and treatment of specialized texts with particular attention to the idioms of the micro-language of the mechanical and plant engineering sector. Reading of articles in sectoral language and learning of the specific glossary Listening to audio tracks and / or viewing video tracks and/or simulating meetings related to the mechanical and plant engineering sector.	Communicate in English in the micro-language of the mechanical and plant engineering sector.	Method: Written test multiple choice and oral interview in a foreign language. Criteria: The student will have to correctly demonstrate technical terminology, grammatical and syntactic knowledge, as well as fluency in language conversation.	Classroom / laboratory: 40 hours Individual study: 60 hours	4
	Manage the communication and relational processes inside and outside the organization both in Italian and in English.	Effective communication	Communication factors: a) issuer (produces the message); b) message (information transmitted); c) recipient (receives and interprets the message); d) context (socio-linguistic reference framework); e) code (linguistic or extralinguistic system of reference); f) channel (physical environmental medium for the transmission of the message: verbal or non-verbal). Communication skills: 1) linguistics and grammar (formulate sentences, produce and interpret verbal signs); 2) sociolinguistics (knowing how to speak/keep silent, recognize situations and roles); 3) paralinguistic (emphasis, pronunciation, laughter, exclamations); 4) kinesics (control over gestural signs: expressions, movement of the face, hands and body, postures); 5)	Manages interpersonal communication processes.	Method: Evaluation through observation grids. Criteria: The student will have to demonstrate an ability to communicate effectively within a negotiating situation.	Classroom: 24 hours Individual study: 36 hours	2,5

			proxemics (spatial attitudes and interpersonal distances, contacts); 6) pragmatic (use of signs and codes); 7) performative (ability to formulate personal communicative intentions). Contents and functions of the message: a) referential or denotative (connected to the content); b) conative or persuasive (recipient oriented); c) metalinguistic (referring to the code and clarification of the message); d) stylistic or poetic (connected to the message and image of the issuer); e) emotional or expressive (moods of the issuer); f) facials or contact persons (pleasant, channel-oriented); g) referential (content-oriented); h) interpersonal (connected to the relationship between communicants); i) self and hetero regulation (control and strategy); l) coordination of interactive sequences (feedback); m) metacommunication (referring to the code and clarification of the message).				
	Arrange, negotiate and develop activities in working groups to face problems, propose solutions, help produce, order and evaluate results.	Working in a team	The fundamental components for result-oriented collaborative work: direct commitment, result orientation, effective communication, mutual trust. Commitment to activities (cognitive, relational, performative) directly/personally manageable for a direct impact on current situations. Orientation and motivation to the common result, with understanding of the specific responsibility assigned according to the role/task in the team. Effective communication (choice of the best medium/channel, code and message based on context) to ask, listen, find out what the team members actually mean, avoiding misunderstandings (coding of intentionality and decoding of ambiguities). Trust as a complex and multidimensional construct to cope with risk: tacit (emotional	Communicate and interact within working groups.	Method: Practice Test. Criteria: Placed in a team working situation, the student will have to demonstrate the exercise of collaborative skills, listening and proposing solutions.	Classroom: 16 hours Individual study: 24 hours	1,5

			and intuitive) trust and trust, organizational interdependence/reciprocity and rational trust (informed and based on experience or agreement).				
	Master the linguistic tools and information and communication technologies to interact in daily activities and work contexts.	Personal productivity software	Creation of text documents: a) inserting, selecting and modifying a text; b) formatting: formatting text, formatting a paragraph, using styles; c) objects: create a table, format a table, graphic objects; d) setting and control of printing and mail merging. Spreadsheet management: a) rows, columns and worksheets; b) insert, select, modify, reorder, copy, move, delete cells; c) arithmetic formulas and functions; d) graphics: creation and modification. Database management: a) organization of a database, correlation of data and operations; b) records and organization of a table; c) search for information: main operations, queries; d) export of data, reports and prints. Presentation development: a) presentation views, slides and slide shows; b) texts: management of texts, formatting, lists, tables; c) use of the pages and their organization; d) Drawing, insertion and modification of graphic objects.	Use applications for personal productivity	Method: PC practice test. Criteria: The student will have to demonstrate an ability to use Microsoft Office applications.	Classroom / laboratory: 32 hours Individual study: 8 hours	1,5

		Digital tools for collaborative work, presentation and communication	Fundamental assets of collaborative work tools: speed, accessibility, usability, sharing and security E-mail as a contact and repository tool (risks and opportunities). Mobile and multi-channel work (access to content from PC, notebook, smartphone or tablet). Collaborative exchange applications (video collaboration platforms, Whatsapp, WeTransfer and Skype). Transparent and traceable management tools for company workflows: technological solutions for the convergence of office automation, document management and management systems (co-editing, self-service analytics, personal archiving). Platforms and web promotion tools (Facebook Ads, Google AdWords) and organic positioning and search engine optimization (SEO).	Know how to use online collaboration tools. Know how to use presentation and communication tools. Know how to intervene in digital communication activities: digital marketing, positioning and optimization on search engines (SEO).	Method: PC practice test. Criteria: The student must demonstrate the use of online collaboration tools and/or presentation and communication.	Classroom / laboratory: 16 hours Individual study: 14 hours	1

General Scientific and technological field	Use statistical tools and models in the description and simulation of the different phenomenologies of the reference area, in the application and development of appropriate technologies	Data analysis techniques	Matrix of data and constituent elements of a variable: modality (argumentative values) and numerosity (absolute frequencies), frequency calculation. Metric, non-metric, dichotomous, observed and latent variables. Unvaried analysis: mode; median; deciles, quartiles, percentiles; arithmetic average; mean square deviation; variability coefficient; indices of asymmetry or kurtosis. Bivariate analysis: stochastic independence between variables, calculation of chi square and contingencies of the real distribution, linear relationship between variables, correlation and regression indices. Multivariate analysis: standardized variables, similarity coefficients and cluster analysis. Inferential statistics: sample distribution of a universe, sample error estimate. Applied statistics: introduction to methodologies for the analysis of preferences, opinions and categorical information of customers, consumers, etc. (latent variable models).	Describe physical and social phenomena with statistical methods.	Method: Written tests of applied statistics. Criteria: The student will have to demonstrate an ability to solve problems through applied statistics.	Classroom / laboratory: 24 hours Individual study: 26 hours	2

General Legal and economic environment	Use negotiation strategies and techniques with reference to the market in which companies in the sector also operate to strengthen their image and competitiveness.	International negotiation	Cultural dimensions and negotiation: the 4P model: preparation, process, power, people and the economic-legal and psychological interrelationships of negotiation. Preparation for negotiation and the negotiation process: persuasion techniques and effective influence; management of emotions and conflict; negotiation starting from a weak position. Intercultural communication and negotiation: the definition of objectives and the conduct of an international negotiation. Interaction with different negotiating styles and decision-making authorities: divergences, escalation of emotions, diversity of points of view, misunder-standings, wrong assumptions, stereotyping and generalizations, lack of value creation. Different forms of conceptualization and logical and cognitive organization in the world: the importance of silence, the different concept of time (polychronic time and monochronic time), different propensities to risk, the management of concessions in different cultures.	Strategically analyse the legal, commercial and psychological aspects involved in negotiation in an international context.	Method: Practice Test. Criteria: Placed in an international negotiation simulation, the student will have to demonstrate the ability to negotiate with other parties.	Classroom: 24 hours Individual study: 36 hours	2,5
General Organizational and managerial environment	Manage external relationships and collaborations - interpersonal and institutional - evaluating their effectiveness.	International trade and supply of products from origin to destiny.	Origin of goods: Made in and preferential origins (Italy, Europe, rest of the world). Global digital market: digital platforms for Supply Chain Technology and customer services. Management of the supply cycle of origin to destiny; customs, taxes, insurance and certification logistic aspects of transferred goods. Economic and financial aspects of international trade: technical instruments and banking and insurance procedures for international payments.	Manage the relationships involved in the supply cycle of goods from origin to destiny.	Method: multiple choice and/or open questionnaire. Criteria: The student must demonstrate knowledge of the customs, tax and insurance aspects of the goods transferred.	Classroom: 24 hours Individual study: 36 hours	2,5

	Recognize, evaluate and resolve conflict situations and work problems of different natures: technical, operational, relational and organizational.	Problem solving techniques	Logical sequence of problem solving (problem finding-problem setting-problem solving-decision making): from identification, description of the problem, analysis of the causes, identification of alternative solutions, verification of the validity of the various alternatives, choice of a solution (with the development of an implementation plan and monitoring of the plan until the desired result is obtained). Problem solving tools: Pareto diagram and problem choice. Flow chart and polar chart for the problem setting. Cause-effect diagram, correlation diagram and stratification for the research and analysis of the causes (diagnosis). Affinity diagram, schematic diagram and multi-criteria matrix for the choice of solutions (solving). Statistical and managerial tools for process control: control cards for attributes and variables, control cards for R and for the average. A possible alternative approach: is problem finding equivalent to creating a problem that was not there? "Thinking negatively": suspend the problem and build positively in terms of a practical ideal to aim for in the context of action and on the basis of which to evaluate existing problems.	Apply structured methods of analysis and troubleshooting.	Method: Case analysis. Criteria: Faced with a given problem, the student will have to demonstrate an ability to solve it using the techniques studied.	Classroom: 24 hours Individual study: 36 hours	2,5
	Organize and manage, with a good level of autonomy and responsibility, the working environment, personnel and the reference technological system in order to achieve expected production results.	The HSE model of workplace management.	General concepts on workplace prevention and safety: risk, damage, prevention, protection, organization of corporate prevention, rights, duties and sanctions for the various corporate subjects, supervisory bodies, control and assistance. Risks related to duties, possible damages and consequent prevention and protection measures and procedures characteristic in the automotive and machinery and plant production sectors (C28 and C29). The company's HSE (Health Safety Environment) structure to safeguard workers' health and safety and environmental	Apply the regulations and organizational procedures relating to the management of safety in the workplace.	Method: Multiple choice test. Criteria: The student must demonstrate knowledge of the HSE model of integrated risk management.	Classroom: 16 hours Individual study: 24 hours	1,5

			protection. Integrated risk management; integrated management of plant safety and protection of the working environment. Technical and managerial governance of business continuities.				
	Know, analyse, apply and monitor, in specific contexts, management models of production processes of goods and services	Models of organization of work and production	Types of industrial organization and market structure in the industrial plant engineering sector. Supply chain organization, concentration and market competition. Evolution of demand. Main types of industrial production served according to the variety/volume matrix: work shop, discrete (lots), continuous (line). Planned production of goods (commodity systems and service systems). Production systems: rigid/flexible automation and integrated production process. Production management as an integrated logistics component. Aggregate production planning. Requirements planning: MRP and JiT.	Distinguish the building blocks and the functional articulation of a logistic-production chain	Method: Multiple choice test Criteria: The student must demonstrate knowledge of the main industrial production management systems	Classroom: 16 hours Individual study: 24 hours	1,5
	Analyse and monitor the production processes in order to formulate proposals/identify solutions and alternatives to improve the efficiency and performance of the technological and human resources used with a view to progressive continuous improvement	Project management techniques and order management	Elements characterizing professional project management according to the PMBOK standard (activity framework, groups of processes and areas of knowledge). Understanding the project context. Creating results/products through project work in its life cycle (Start-up, Planning, Execution, Monitoring/control, Closing processes). Project approach for coordinated deliverables and uncertainty management through recursive planning, execution and control (Integration). Project finalization (Scope) and management of the dimension of change and the state of evolution of the project work. Temporal (Time) and financial (Cost) planning of the project work. Planning, insurance and quality control of the project work. Code of ethics and professional conduct of the	Apply project management techniques when planning a job	Method: Case analysis Criteria: Faced with the resolution of a business case, the student will have to demonstrate an ability to apply Project Management techniques	Classroom: 24 hours Individual study: 36 hours	2,5

			project team (HR). Interaction and networking in the project work (Communications). Accountability (performance) and probabilistic management (forecast) of the events with negative and positive impact on the project work based on the risk tolerance levels present in the context (Risk). Customer-supplier relations for the realization of the project work (Procurement). Identification and involvement of stakeholders in the project work (Stakeholders).				

Common professional technical skills	Implement strategic contacts on the markets and on the target audience.	Reading technical drawings	Basic elements of industrial technical drawing (sheets; lines; stairs; normal numbers) and related UNI and ISO standards (paper formats, definitions and principles concerning technical drawings, types of lines, units of measurement, dimensional scales; axonometries, orthogonal projections, sections, crosshatching, dimensioning, tolerances). Unified designations for the univocal identification of elements/ objects: materials, unified mechanical components (screws, nuts, plugs, pins, profiles, etc.), electrical/electronic components (resistors, capacitors, transistors, etc.), elements and symbols graphics. Representation and application rules based on the types and thicknesses of lines according to ISO 128-20: Line element and segment; Thickness of extra-large, thick and fine lines; Variations of the basic types; Priority rules. Drawing sheets (EN ISO 5457): Unified sheet sizes, Inscription box (UNI EN ISO 7200), Folding of sheets and orientation (UNI 938), Coordinate system and centering marks (UNI EN ISO 7200). Scales (UNI EN ISO 5455): natural, enlargement, reduction, recommended. Normal numbers (Renard's numbers) and their meaning; geometric progression and arithmetic progression. Classification of technical drawings on the basis of the life cycle of the mechanical product: a) Conception drawing (or preliminary drawing, or forerunner drawing); b) Construction drawing (or definition of the geometry and functional prescriptions of the component); c) Manufacturing drawing according to standard; d) Assembly drawing (or assembly drawing of the units in assembly conditions up to the complete machine; e) Group/subgroup drawing; f) Detail drawing of single components.	Apply the conventions of technical drawings to the design needs of the customer.	Method: Laboratory tests. Criteria: The student will have to demonstrate an ability to read and interpret mechanical technical drawings.	Classroom / laboratory: 40 hours Individual study: 22 hours	2,5

		CAD systems for 2D/3D graphic representation	Creating a 2D drawing: lines, points, circles and arcs. The drawing of a mechanical detail: dimensioning, general manufacturing tolerances, surface, shape and position tolerances, couplings. 2D views of how products are manufactured and assembled. Dimensioning methods, tolerance and annotations based on ANSI, ISO, GD&T standards. Materials manual and parts list. Standards checks and revisions. 3D modelling of solids and surfaces: basic primitives, construction by extrusion and revolution. Advanced constructions: sweep extrusion, loft construction, track revolution. Boolean operations; chamfers and fillets. Parametric solid modelling based on features of the machining applied on the solid model and construction schematics. File management, libraries; rendering; simulation, control and validation of projects.	Use 2D and 3D representations of the product to analyse the needs of the customer.	Method: Simulation tests related to hypothetical company orders. Criteria: The student will have to demonstrate an ability to make drawings using CAD systems.	Classroom / laboratory: 32 hours Individual study: 8 hours	1,5
		Layout configuration and technology sizing	The size of MIX (variety of products / parts) and production volumes to identify the optimal manufacturing solutions (department, cell, line) Layout types: 1. fixed point layout; 2. layout by product; 3. layout per process; 4. layout for group technology. Examples of fixed-point layouts (for the production of ships, planes and artisan; productions); variant by project or a construction site. Examples of layouts according to the work cycle of a specific product and related fixed transport systems (transfer lines, conveyor belts, overhead conveyors, etc.) for semi-finished products. Examples of process layout (functional layout) with grouping in the department or work centre of all similar processes and the machinery intended for them. Examples of layout for group technology (group technology layout) with a set of	Analyse the needs of the customer, proposing updated technological solutions.	Method: Simulation tests related to hypothetical company orders. Criteria: The student will have to demonstrate an ability to configure layouts and dimension production technologies.	Classroom / laboratory: 28 hours Individual study: 11 hours	1,5

			different operating machines gathered in work centres designed to work product families with similar processing cycles. Arrangement of machines in line: U-shaped zigzag straight. Facility Layout Problem (FLP) and waste reduction (excessive warehouse stocks, overproduction, unnecessary transport, delays, unnecessary processes, defects and handling): block layout (arrangement of areas/ departments) and detailed layout (handling system). Motivating factors for the layout study: partial or total redesign of the product; putting online a new product; significant variations in the volume of demand; obsolescence of existing equipment; excessive frequency of accidents at work; unsatisfactory working atmosphere; need to reduce costs.				
	Research and apply laws and regulations to protect Made in Italy and industrial property. Research and apply the legislation on prevention, safety, environmental protection.	Machinery directive (2006/42/CE) and manufac-turer's obligations	Application of Machinery Directive 2006/42/EC: machine, partly completed machine, sets of machines. Modifications to sets of existing machines. The EC declaration of conformity and incorporation. The technical file of a machine in reference to Annex VII of the Dir. 2006/42/EC. The user manual: essential safety requirements and the content of the instructions for use pursuant to Annex I of the Dir. 2006/42/EC. Risk assessment for the user of machines in compliance with UNI EN ISO 12100 and practical guide based on the technical report ISO / TR 14121-2 Safety of machinery for use by designers, installers and users.	Research and apply the reference legislation relating to the manufacture's obligations.	Method: Written test. Criteria: The student must demonstrate knowledge of the Machinery Directive.	Classroom: 24 hours Individual study: 16 hours	1,5
	Carry out a strategic analysis of a specific market segment. Research and use	Benchmarking analysis	Benchmarking as a continuous process of measuring products-services-processes through comparison with the best competitors or leading companies. Company positioning as a result of	Analyse the competitors' offers and the company's portfolio of solutions to	Method: Case analysis Criteria: Faced with the resolution of a	Classroom: 32 hours Individual study: 18 hours	2

	marketing-oriented web applications.		comparison with excellence: performance standards formulated according to the needs of the end customer and bringing processes closer to best operating practices. Benchmarking perimeter: sectoral and intersectoral. Types of benchmarking: a) competitive or strategic (to identify potentialities in the factors determining competitive advantage of the best competitors: product, after-sales services, cost structure, market share, etc.); b) functional or process (to identify the most efficient and effective management methodologies among comparable areas); c) internal (to identify the contribution to profitability/value creation between different areas/production units of the same company); d) generic (to identify best management practices). Phases of the benchmarking project: a) identification of the object to be compared and selection of the type of benchmarking; b) identification/selection of the benchmark; c) definition of the comparison criteria, of the indicators and of instruments for measurement/comparative evaluation; d) determination of the characteristics of excellence; e) analysis of the positioning with respect to the benchmark and change decisions.	establish the best solution for the customer	business case, the student will have to demonstrate an ability to apply benchmarking techniques in the analysis of competition		
	Collaborate in the definition of the overall technical project and its components.	Standard, semi-custom and custom product configurations	Standardization of products and machines: high volumes and reduced variety; economies of scale (decrease in the average unit cost of production and large plant size); economies of specialization (reduction of costs due to increased experience, fewer errors and greater production speed); undifferentiated marketing and mass production. Ex-ante customization: large aggregate production volumes, with many models in a few predefined variants (non-adhocratic). Ex-post customization: small production	Configure the company product starting from standard design solutions and from a database.	Method: Case analysis. Criteria: Faced with the resolution of a business case, the student will have to demonstrate an ability to configure the product.	Classroom / laboratory: 32 hours Individual study: 18 hours	2

			volumes, limited number of models with a large number of customized variants decided directly by the customer (adhocratic). Mass customization: basic attributes (required standard) of the product, definition of the production range and attribute-based differentiation (desired level for each of the product attributes) and alternative-based (predefined combinations of product alternatives); costs for the customer (budget limits, time dedicated to personalization, insecurity deriving from uniqueness).				
		Order estimate and costing	Elementary production costs for the formulation of sales prices: durable fixed capital factors (fixed technical assets - machinery and plants - and intangible - trademarks and patents - with participation in the production cycle estimated in amortization quotas) and non-durable factors (materials raw materials, personnel, energy, third party works, etc.). Allocation of common costs (general industrial, commercial, administrative and managerial) on a company basis and on a cost centre basis (production, auxiliary and common). Full costing: first cost, industrial cost, full cost and technical economic cost corresponding to the minimum selling price. Direct costing, distinction between fixed and variable costs and cost configurations: first variable cost by product, variable industrial cost by product, total variable cost by product, unit contribution margin by product, contribution margin by product, company net result. Specific product fixed costs, double level of contribution margin, definition of the best mix of products to cover common fixed costs and break-even analysis (advanced direct costing) Fiscal and managerial foundations for the control of contract costs: work schedules,	Apply budgeting and costing techniques for the realization of an order.	Method: Case analysis. Criteria: Faced with the resolution of a business case, the student will have to demonstrate an ability to formulate the offer quote by applying contract cost techniques.	Classroom / laboratory: 36 hours Individual study: 16 hours	2

			evaluation of inventories, elements and control process (estimate, concomitant, final). Cost budget for the formulation of the offer estimate: composition and calculation of standard costs (materials, labour, industrial indirect costs). Profit and loss account statement, analysis and types of variances and summary indicators with the earned value model. Pricing policies: minimum selling price; price as a competitive factor; margins; contribution margin price list. Determinants of the price level based on positioning (market share) and competitive forces (competitors, new entrants, replacement products). Price range: fork, minimum price and maximum price. Cost plus pricing VS target pricing (relative target costing in the offer design/development).				
		Financial calculation for the sale of technology	Methods to estimate the economic value of a technology: Cost Approach, Income Approach, Market Approach. Cost-based methods: technology value equal to its replacement or reproduction cost net of depreciation and obsolescence. Intrinsic limits: failure to assess the amount of economic benefits associated with owning the technology during its residual useful economic life and the level of risk associated with obtaining benefits. Financial flow-based methods: estimate of the value of technology based on its ability to create future income (expected cash flows generated by its use) against factors of economic and competitive contexts (structure of the market and the company in which it is used or will be used). Calculation of the discount factor of the uncertainty of achieving the actual level of income in the future with reference to the average cost of capital	Plan customer service for assistance in purchasing the machine-plant.	Method: Written test. Criteria: The student will have to demonstrate an ability to apply methods to estimate the economic value of a technology.	Classroom / laboratory: 36 hours Individual study: 22 hours	2,5

			invested (Weighted Average Cost of Capital). Estimating the financial value of the individual technology: differential analysis of business income with and without technology. Market-based methods: value of a technology equal to the price that the market is willing to pay for its use (with reference to the transaction value of a similar technology, which has been sold or whose value can be inferred through royalties). The constraint of a significant number of comparable transactions. The use of licensing as a strategy to develop market potential of a process/product technology, as an alternative to its sale or co-ownership. Right of ownership and control over technology by the licensor and the right of use of the licensee in the license agreement. Factors that influence the transfer of licenses: 1) achieve revenues commensurate with the actual value of the technology; 2) exploit scales of production processes, or access to capital markets; 3) enter new geographic markets or product markets that would otherwise be unreachable. Factors that influence the acquisition of licenses: 1) improve production processes, production or margins through the use of technology; 2) expand turnover or break into new markets in a short time and/or with more contained investments and risks; 3) cooperation between companies with mutual benefits from an industrial, market and internal growth point of view.				

Specific professional technical skills for the job	Develop custom product solutions with the use of composite and advanced materials.	Materials technology laboratory	Mechanical properties of metallic materials and types of tests (traction, resilience, hardness). Metallurgy of steels, alloys, main types of uses, processes and thermal and thermochemical surface treatments (metallographic specimen, acid attack, observation with microscope, evaluation and interpretation of the structure). Resistance to corrosion of metallic materials and coatings and suitability for their use. Phenomena of mechanical breakage (crash, fatigue) and damage (from wear and corrosion). Carbon fibre composite laminates: ply book, autoclave lamination and moulding process. Compression, cutting and bending tests. Plastic and thermoplastic materials: compounding, transformation and treatments.	Understand application uses including the main characteristics of metallic, composite and plastic materials	Method: Laboratory tests. Criteria: The student will have to demonstrate an ability to recognize the properties of metallic, composite and plastic materials.	Classroom / laboratory: 52 hours Individual study: 17 hours	3

INTERNSHIP I	The I year internship (400 hrs) has a purely exploratory and applicative character of the knowledge acquired in the classroom; configures an opportunity for learning in direct contact with the working environment, in which the student has the opportunity to observe 'in the field' applications of theoretical lessons carried out in the classroom. Each student is placed in a technical-commercial department with operational tasks under the guidance of a company tutor.	Develop a greater awareness of personal study path, consolidating the knowledge acquired in the classroom phase.	Method: Observation and verification of the intern's performance by evaluating their effective exercise of knowledge and skills. Self-evaluation and reworking of the experience by the student. Criteria: The chosen evaluation will include an evaluation judgment of the company tutor and subsequent feedback with the student's self-evaluation by the agency's educational. The result of the combination of hetero and self-evaluation constitutes the summary report of the experience, which will be one of the objects of the final exam.	Internship in the company: 400 hours Individual study: //	16

Total hours in classroom/laboratory hours in year I: 592
Total internship hours in year I: 400
Total sum of hours in year I: 992

Year II

Area/ Range	Competence objectives for national classification/ standard	Module	Main contents	Learning outcomes of the unit	Methods and criteria for verifying results	Learning methodologies, contexts and related workload (hours)	ECTS credits
General Linguistic, communicative and relational field	Use technical English (micro language), related to the technological area of reference, to communicate correctly and effectively in the contexts in which is required.	Business English	Terminology of contract legal and corporate English. The terminology of LOI (Letter of Intent), MoU (Memorandum of Understanding) and NDA (Non-Disclosure Agreement). The terminology of the main clauses of a Self-Regulating Contract (warranty, indemnity, termination, does not compete, exclusivity, no waiver, hardship, assignment, etc.). Terminology of principal commercial contracts (supply, agency, distribution, license and franchise, e-commerce).	Communicate in English in business relations.	Method: Written test multiple choice and oral interview in a foreign language. Criteria: The student will have to correctly demonstrate technical terminology, grammatical and syntactic knowledge, as well as fluency in language conversation.	Classroom: 40 hours Individual study: 60 hours	4
	Manage the communication and relational processes inside and outside the organization both in Italian and English.	Sales techniques	The seller as a resource for the customer: from the sale of goods and services to the sale of capacity. Operational steps of the SPIN method and types of questions. The SITUATION questions to try to understand the buyer's situation, define the field of action and collect as much data and information as possible about the potential customer. The PROBLEM questions to bring out the buyer's problems, difficulties and dissatisfactions and to stimulate the customer to a possible routine change thanks to the value proposal deriving from the sale of the product/service. The IMPLICATION questions to emphasize the perception of a customer's problem with respect to which the purchase of the product/service can represent an effective	Communicate and manage relationships aimed at sales.	Method: Evaluation through observation grids. Criteria: The student will have to demonstrate an ability to manage relationships aimed at sales.	Classroom: 24 hours Individual study: 36 hours	2,5

			solution, justifying the economic investment. The NEED-PAYOFF questions to increase the value of a solution to the problem and to be able to prevent any objections from the customer in the best possible way (focus on solutions and benefits deriving from the product/service).				
	Arrange, negotiate and develop activities in working groups to face problems, propose solutions, help produce, order and evaluate results.	Working towards goals	Criteria for the effective definition of objectives: a) specificity (clear, defined, limited) in relation to responsibility; b) measurability based on monitoring (pre-evaluation criteria and accountability); c) sustainability in relation to the capacity for action and activated through direct and concrete actions with the resources actually available; d) finalization in relation to the expected result; e) timed in relation to deadlines. Operational planning of objectives: a) required actions; b) necessary resources (skills, materials, information, economic, etc.); c) commitments assigned out of resources; d) alignment between individual and corporate objectives; e) planning and control techniques (activity network, GANTT) and applicability of the project approach. Monitoring of achievement of objectives: a) with learning function on activities that produce value with respect to the objective; b) with the function of accountability of achievement of objectives.	Plan and manage your work with objectives.	Method: Case analysis. Criteria: Faced with a hypothetical case, the student will have to demonstrate an ability to plan the work against assigned objectives.	Classroom: 16 hours Individual study: 24 hours	1,5
	Prepare technical and regulatory documentation that can be managed through telematic networks.	Technical-commercial offers.	Formal structure of the offer: logo/brand, formalization of sender and recipient, formulation/delivery date and progressive number, header (object and purpose), list of services, production and delivery times, price breakdown into subtotals (price , quantity and duration of the services offered, delivery and packaging costs, any accessory costs), general conditions of sale, conditions and place of payment, order process,	Prepare technical-commercial offers.	Method: Written test. Criteria: The student must demonstrate knowledge of the formal structure of a technical-commercial offer.	Classroom: 16 hours Individual study: 24 hours	1,5

			transfer/retention of title and right to use final product, procedure in case of delivery of damaged goods or problems related to delivery, reception or payment, offer period/expiry date.				
	Assess the implication of information flows with respect to the effectiveness and efficiency of management of production or service processes, also identify alternative solutions to ensure quality.	Intercultural management and communica-tion	National and regional cultural groups and influence of the behaviour of companies and organizations. The five-dimensional Hofstede model of cultural differences affecting organizations: 1. aversion to uncertainty; 2.distance of power; 3.individualism and collectivism; 4.masculinity and femininity; 5.mental schemes oriented to the long or short term. Individualist and collectivist cultures: measure of individual success in relation to the group and respective communication contexts of the Low (for individualist cultures) and High (for collectivist cultures) types. Cross cultural management for the strategic management of cultural differences: correct configuration of the communication-negotiation structure by analysing cultural distance and degree of difference (and similarity) between the cultural values of two or more countries. The ten clusters of the nine-dimensional GLOBE (Global Leadership and Organizational Behaviour Effectiveness) model: 1) aversion to uncertainty, 2) distance from power, 3) institutional collectivism, 4) social collectivism, 5) gender equality, 6) assertiveness , 7) orientation towards the future, 8) orientation towards performance, 9) orientation towards people.	Interact in international contexts by interpreting cultural differences.	Method: Role play with observation of the dynamics. Criteria: Placed in a hypothetical situation of intercultural relationship, the student will have to demonstrate an ability to positively interpret and manage cultural differences.	Classroom: 24 hours Individual study: 36 hours	2,5
		Analysis, use and protection of digital data	Introduction to complex predictive models (inferential statistics and nonlinear systems) based on nonlinear data sets, raw data and large amounts of data to reveal relationships and dependencies and make predictions of results and behaviours.	Analyse, manage, interpret big data and open data. Know and apply	Method: Written test. Criteria: The student must demonstrate knowledge of	Classroom / laboratory: 16 hours Individual study: 4 hours	1

			Presentation of analysis and data mining tools with emerging technologies based on cloud computing and distributed computing: Hadoop, MapReduce and NoSQL databases. Data protection: General regulation for the protection of personal data n. 2016/679 and the data protection organizational structure. Corporate network and data protection plans: device configuration, backup and cybersecurity processes against the dangers of device theft and cryptolocker virus	the right level of protection to the data (Reg. EU 679/2016 - GDPR). Know and adopt different copyright and license rules to apply to data, digital information and content. Apply different behavioural rules and know-how in the use of digital technologies and in the interaction with digital environments	the digital data protection legislation.		
General Scientific and technological field	Use tools and methodologies specific to experimental research for the applications of the technologies of the reference area.	Design thinking	The 5 phases of the DT process: 1) Empathize (identification of the problem and the objective); 2) Define (identification of the context, defining key data and actors); 3) Ideate (analysis, research and ideation of opportunities); 4) Prototype (prototyping and validation); 5) Test (product/service testing). DT tools: a) to approach the customer: ethnography (to define the context of use); empathy (to experience the customer journey); b) to encourage creativity and generate ideas: brain storming techniques; mind maps; c) to quickly experiment with ideas through the creation of prototypes: minimum viable product; fast prototyping.	Creatively manage the creation of new products/ services	Method: Practice Test. Criteria: Placed in a group simulation situation, the student will have to correctly demonstrate applying the steps of the Design Thinking method.	Classroom: 24 hours Individual study: 36 hours	2,5

General Legal and economic environment	Find sources and apply laws that regulate the life of the company and its external relations at national, European and international level.	Contractual rules for the international sale of goods	Basic aspects of international commercial contracts. Pre-contractual liability (break-up fees). Structure of Confidentiality Agreement (or NDA), LOI and MOU. Structure of a Self-Governing Agreement: importance of definitions, suppositions and purpose of the General Conditions (tailor made drafting), typical recurring clauses (exclusive, non-competition, guaranteed minimum, resolutive, criminal, abusive, vexatious, liquidated damages, force majeure, hardship, no waiver, assignment). Main international commercial contracts and the typical clauses: Supply Agreement and General Conditions of Sale/Purchase. International contracts and competition law. International contracts and know-how protection (IP contracts): transfer of IP law, research & development, invention, license, software development, marketing, advertising, co-branding, testimonial. Intellectual and Industrial Property and its protection: European and World-wide protection regulations and treaties, invention patents, trademarks, designs, utility models, copyright and software. International protection of the brand.	Know and apply contractual regulations for the international sale of goods.	Method: Written test. Criteria: The student will have to demonstrate knowledge of the structure and clauses typical of international contracts.	Classroom: 24 hours Individual study: 36 hours	2,5
	Know the relevant rules governing the company and the impact for the company in a territorial context.	Entrepreneurship and business project	Business Model Canvas as a strategic business design tool: the 9-block framework on the building blocks of the business (Key Partners, Key Activities, Key Resources, Value Proposals, Customer Relationships, Channels, Customer Segments, Cost Structure, Flows of revenues). Focus on the value proposition in relation to the real needs of customers through the Value Proposition Canvas: a) customer profile (job to be done) and related advantages and difficulties; b) value map, generators of advantages/reducers of difficulties inherent in products/services; testing of correspondence	Structure the development of new ideas or projects in the enterprise	Method: Case analysis. Criteria: Faced with a hypothetical business plan, the student will have to demonstrate an ability to build a Business Model Canvas.	Classroom: 16 hours Individual study: 24 hours	1,5

			to market needs; fine tuning of the value proposition. Business Model Innovation: tools of design thinking applied to the innovation of business models (customer centricity, design of services and digital first business models). Strategic and operational business planning tools (Business Plan): a) description of the business idea/project (strengths/weaknesses, objectives); b) description of the company (shareholder profile, legal form, structure); c) reference market (description, size, market share, development perspective); d) competition (main competitors, sector structure, barriers to entry, new entrants/replacement products); e) strategic suppliers (sources of supply, reliability, contractual strength); f) offer (price, distribution, marketing tools, value and production volumes); g) organizational structure (professional and skills system, organizational action logics, technological equipment); h) economic and financial forecasts (income statement, investments, cash flow, sources of financing).				
General Organizational and managerial environment	Manage relationships and collaboration within the organizational structure at work, evaluating their effectiveness	The cross-functional team methodology	The composition of a multi-functional team and the complementarity/redundancy of skills in the realization of a project/product development (product team) or a marketing campaign (marketing team). Cross-functional approaches for breaking silo logic between organizational functions: projec/order logic; part-time logic Advantages and benefits of the cross-functional logic: a) focus on the result; b) contamination of professionalism and flexibility with respect to the context; c) direct and immediate communication; d) accountability and responsibility for the project; e) perception of intelligence distributed to the creation of value; f) holistic	Manage relationships within multi-functional groups	Method: Role play with observation of the dynamics. Criteria: Placed in a cross-functional team simulation, the student will have to demonstrate an ability to manage relationships by finding shared solutions to different organizational problems.	Classroom: 24 hours Individual study: 36 hours	2,5

General Organizational and managerial environment			approach to research and problem solving; g) exercise of leadership distributed on the basis of the required expertise; h) self-management; i) conflict management in the absence of mediation; l) alignment and shared vision.				
	Organize and manage with a good level of autonomy and responsibility, the working environment, personnel and the specific technological system in order to achieve expected production results.	Configura-tion and management of services	User centred mapping of the service system using the service blueprinting flowcharts. Essential components of the service project: 1) customer actions; 2) onstage actions of the contact staff; 3) the backstage actions of the contact staff; 4) support processes. Interaction line, visibility line and internal interaction line. Customer actions: phases, choices, activities and interactions experienced by the customer in the purchase, consumption and service evaluation process (activities visible to the customer/onstage actions). Support processes: internal services, phases and interactions to support onstage and backstage actions in providing the service. Blueprint reading logics: to understand the customer's vision, map the role of the contact persons, analyse the degree of integration of the processes, train the collaborators. Identification by blueprint of the critical points of the service system and evaluation of costs, revenues and investments in the elements of the service.	Configure the essential components of a service project starting from interaction with the customer.	Method: Multiple choice and/or open questionnaire Criteria: The student will have to demonstrate competence in configuring a quality customer service.	Classroom: 24 hours Individual study: 36 hours	2,5
	Know and help to manage the quality organizational models that encourage innovation in companies in the sector.	Technical standardizati on and certification for the export of machines, systems and components	Legal provisions and technical regulations relating to construction/installation and certification required for the export of machines and systems to the main markets. Application of machine safety standards and certification procedures in the North American market; in the Customs Union (Russia, Belarus, Kazakhstan); Japan; China; Brazil; Korea; Saudi Arabia. Legislative and technical - regulatory aspects, technical and documentary rules envisaged	Research and apply the technical standards required for the export and certification of machines and systems.	Method: Written test. Criteria: The student must demonstrate knowledge of the technical standardization and of certification required for the export of machines, systems and components.	Classroom: 24 hours Individual study: 36 hours	2,5

			for machine imports, mandatory tests and reports, etc required within the main world export countries for machines, systems and components (e.g. electric motors) for the purpose of product compliance.				
Common professional technical skills	Define the positioning of the brand and the product/service with particular reference to international markets.	Study of a preliminary project	Collection of insights, analysis of the client's design idea and documentation of the specific technical parameters relevant in the proposed scenario/context. Technological and feasibility analysis of the project idea through the configuration of the project or first idea of medium-high complexity product: 1) product architecture (alternatives of form and type of constituent elements and their mutual location); 2) approximate definition of the most important characteristics of the product (weight, dimensions, performances, costs, etc.) Structure of a pre-project methodology: a) relations between product methodological components; b) technological level inputs and requirements, c) outputs (concept design objectives, functional design levels for the comparison of alternatives, alternative proposal or initial configuration of a new design). Traditional forefront methodologies: parametric analysis of the compatibility area and floor plans (carpet solutions) Classic methods of optimizing the initial solution (trial): advancing in orthogonal steps and advancing according to the best gradients. The optimization through genetic algorithms starting from two progenitors: binary coding of the technical characteristics and calculation of the fitness function of the parameters competing with the optimization; generation of new progenitors and next generation of code (evolution) through mutation and cross-over.	Verify the feasibility of the project hypotheses, prevent critical issues and optimize solutions both on the technical and economic front. Use parameterizable dynamic simulations to evaluate alternative product /service solutions for the customer and balance between costs and performance.	Method: Practice Test. Criteria: The student will have to demonstrate an ability to perform the technological and feasibility analysis of the project idea by configuring the project.	Classroom / laboratory: 32 hours Individual study: 14 hours	2

			Programs for the calculation of pre-projects integrated with parametric 3D CAD: creation of three-dimensional solid models, simulations, translations, enlargements and reductions of scale, dimensions, volumes, planning of sections (construction plans). Integration with aerodynamic computational modules (CFD) and structural calculation (FEM). Installation procedure of system systems using DMUCL (Digital Mock-Up at Conceptual Level).				
	Prepare marketing plans and check their implementation by identifying any corrective actions.	Commercial management of product data	Levels of customer/user involvement for the personalization of the offer: a) Product versioning and segmentation based on the availability of expenditure; b) Mass customization and choice among a wide variety of product-service options (customized according to optional); c) One-to-one personalization and ex-ante definition of preferences; d) Co-creation and joint product development; e) Reverse marketing and creation of the new product by the customer/user. Customization: combination of high production flexibility (mass customization) and high communication/interactive flexibility with the customer/user (one to one customization). Micromarketing: support the preferences of local groups of specific customers (local marketing or geo-marketing) and individual customers/users (individual marketing or on-to-one personalization). Platforms for Product Information Management (PIM): standardization of information for the management of catalogues; integration of product sheets with marketing data; classification of product information based on target customers/ markets; control and validation of the information to be provided to each sales channel or customer.	Define product customization solutions according to customer needs. Guide the personalization of the range of company products and promote the integration of innovative services with high added value.	Method: Case analysis. Criteria: Faced with a hypothetical order case, the student must demonstrate an ability to define product customization solutions according to the customer's requests.	Classroom / laboratory: 32 hours Individual study: 8 hours	1,5

	Collaborate in the definition of the overall technical project and its components.	Technical administra-tion of sales	An offer as the basis of the final sales contract. Legally binding acceptance and offer: assignment and order confirmation. Loss of the legal value of the offer: failure to comply with the order specifications and timing. Clauses relating to non-binding components of the offer: "while stocks last", "price with reserve" or "without guarantee". Formulation of the commercial proposal: value for the customer, advantage over the competition (unique selling proposition), delivery times and conditions, ancillary costs and forms of payment. Convention on the International Sale of Movable Goods (CISG): scope and general provisions; contract formation; sale of movable property and final provisions. Obligation of independent interpretation and principle of freedom of form of the contract Contract proposal conditions: identification of the goods being offered and setting of quantity and price. The conclusion of the contract for acceptance of the proposal, express acceptance by *facta concludentia*. Acceptance with additional non-substantial clauses and counter-proposal following substantial changes (price, payment, quality and quantity of goods, place and term of delivery, areas of responsibility of the parties) Obligations of the seller: delivery, transfer of ownership and release of documentation relating to the goods. Obligations of the buyer: acceptance on delivery and payment of the goods. Defaults and system of remedies: dispute of the lack of conformity of the goods, reasonable time to assert the lack of conformity, delivery of replacement goods, repair of spoiled goods, reduction of the price	Formulate the technical-commercial offers in relation to a defined budget.	Method: Case analysis. criteria: The student, faced with a hypothetical case, will have to demonstrate the ability to prepare a technical-commercial offer.	Classroom / laboratory: 36 hours Individual study: 9 hours	2

			of a non-compliant good. Termination of the contract for essential breach: principle of *favor contractus*, declaration of termination, compensation for damage.				
		Pay per use and technology licensing	The value of the license for the licensee: present value of the economic benefits of exploiting the technology minus the management costs of the agreement (including the payment of royalties or fixed or variable compensation on product sales). The value of the license for the licensor: present value of future remuneration minus the present value of the costs for managing the agreement (R&D, technology lifecycle maintenance and accounting administration). Definition of the economic conditions for the sale of the technology: a) at a fixed rate as consideration for the exploitation of the property on the asset over the period of time; b) in a variable portion (in addition to a guaranteed minimum sum) as a consideration in proportion to the volumes produced or the duration of use of the asset; c) royalties as consideration calculated as a percentage on a book value of the licensee (turnover, gross revenues, net revenues, contribution margin). The variable part of consideration as a source of data and information relating to the market of use of the technology, of extreme importance for the best economic exploitation of the same. Determining the correct rate of royalties: optimal royalty and fair rate of return on capital invested for technology. Analytical method: value of technology, rate of return on disposal and flow of operating profits net of the payment of royalties. Synthetic method: market values for comparable transactions, or sector average royalties. The rule of thumb of 25%: level of expected	Organize pre- and after-sales service solutions	Method: Case analysis. Criteria: Faced with a hypothetical case, the student will have to demonstrate an ability to organize pre- and after-sales service solutions.	Classroom / laboratory: 24 hours Individual study: 6 hours	1

			profits, profit rate in relation to net sales and royalties rate				
	Analyse the relationship between the product, environment and quality system.	Asset lifecycle management service	Purpose of the Asset Lifecycle Management service: to guarantee the reliability, availability and safe/quality operation of complex assets such as industrial systems (manufacturing or process production plants), service systems (e.g. air conditioning, lifting systems , energy generation) or infrastructure. Management of the entire asset life cycle to respond to the request for effectiveness and efficiency in their use: the criterion for minimizing the Total Cost of Ownership (total cost of ownership of the asset). The determination of the TCO = Initial cost + Maintenance - Remaining value Maintenance as a decisive factor for the reduction of hidden costs (lack of production, lack of service, poor quality). Preventive maintenance policies to reduce the probability of failure: programmed static (average component life), dynamic (based on the MTBF) and on condition (predictive and improvement based on the prognostic). Policy selection schematics based on: component criticality, monitoring of weak signals, availability of average life forecasts; Choice according to the severity/frequency of faults.	Manage the after-sales service during the product life cycle.	Method: Case analysis. criteria: The student, faced with a hypothetical case, will have to demonstrate the ability to manage the after-sales service according to the Asset Lifecycle Management model.	Classroom: 24 hours Individual study: 16 hours	1,5
		Remote monitoring technologies and product data management	Maintenance methodologies and approaches: a) probabilistic methodologies and parameters of reliability, availability, maintainability, safety (RAMS) of a component; b) RCM reliability approach: functional blocks and plate performance, predictive analysis (FMEA/FMECA) of the conditions (causes, effects) of failure and estimate of the reliability and availability of the system. Advanced ICT technologies that allow remote and automate parts of the maintenance activities (tele-maintenance, tele-assistance,	Configure services for performance analysis, diagnostics and prognostics of the system even remotely.	Method: Practice Test. Criteria: The student will have to demonstrate an ability to manage remote assistance.	Classroom / laboratory: 32 hours Individual study: 9 hours	1,5

			tele data transmission, etc.). New diagnostic and prognostic technologies that allow users to evaluate and predict the health of assets, increasing intelligent maintenance and allowing the optimization of planning of interventions. Remote technical support with direct interaction: forecast by design and availability of bi-directional data connection. Time lag effects. Remote assistance via internet on data processing systems and remote assistance on process controls through point-to-point connections. Indirect remote assistance with brokerage on the local side.				
Specific professional technical skills for the job	To develop the personalized project of a mechatronic system.	Mechatronic systems laboratory	Structure of mechatronic systems in their basic technological components: actuators and controllers. Hardware infrastructures of mechatronic systems: a) electrical machines and drives (DC electric machines, synchronous with rotor and permanent magnets, induction, stepper motor) b) mechanical drives and transmission parts (joints, brakes, gears and motor coupling-adapter); c) hydraulic components and circuits (cylinders, valves, pumps and hydraulic gear, vane, radial and axial piston motors); d) pneumatic components and circuits (cylinders, pistons and valves).	Understand application uses, including the main characteristics of technological components for the actuation and control of a mechatronic system.	Method: Laboratory tests. Criteria: The student will have to demonstrate an ability to recognize the main characteristics of the technological components for driving and controlling a mechatronic system.	Classroom / laboratory: 52 hours Individual study: 12 hours	2,5
	Develop the customized project of an automation system.	Automation systems laboratory	Control architectures and components in automation systems, PLC architectures, sensors and real-time and non-real-time communication networks. Industrial control software. The design of a computer and its operation. Motion Control and architecture of the control software of an automatic machine. Industrial manipulators, mechanical characteristics and their applications. Types of robots and related kinematics. Advanced automation and advanced robotics technologies.	Understand application uses, including the main designs and control components in modern industrial automation systems.	Method: Laboratory tests. Criteria: The student will have to demonstrate an ability to recognize the main designs and control components in modern industrial automation systems.	Classroom / laboratory: 52 hours Individual study: 12 hours	2,5

	Develop the customized project of a power unit system.	Power unit systems laboratory	Combustion technologies of the thermal engine (efficiency of the injection, ignition, intake and exhaust fluid dynamics, turbocharging) and power transmission from vehicle to road/off road. Characteristics of electric motors (continuous, asynchronous, step-by-step, brushless), static power converters and drives with electric motors and servomotors. Electrification-hybridization of powertrain systems (for off road motor propulsion) and for actuators of automation systems. Coupling mode between internal combustion engines and electric machines.	Understand application uses, including the main designs and control components in modern power unit systems.	Method: Laboratory tests. Criteria: The student will have to demonstrate an ability to recognize the main designs and control components in modern power unit systems.	Classroom / laboratory: 52 hours Individual study: 12 hours	2,5
INTERNSHIP II			The II year internship (400 h) consists of curricular objectives in areas: Technical standardization and certification for the export of machines, systems and components; Project study; Commercial management of product data; Technical administration of sales.	Develop a greater awareness of a personal study path, consolidating the knowledge acquired in the classroom phase.	Method: Observation and verification of the intern's performance by evaluating their effective exercise of knowledge and skills. Self-evaluation and reworking of the experience by the student. Criteria: The chosen evaluation will include an evaluation judgment of the company tutor and subsequent feedback with the student's self-evaluation by the agency's educational. The result of the combination of hetero and self-evaluation constitutes the summary report of the experience, which will be one of the objects of the final exam.	Internship in the company: 400 hours Individual study: 6	16

Total hours in classroom/laboratory in year II: 608
Total internship hours in year II: 400
Total sum of hours in year II: 1,008

Progression rules (prerequisites)

Successful completion of the first year is necessary to access the second year of the course and only upon obtaining 60 credits.

At the end of the course in year II, the diploma of Advanced Technician is obtained after passing a final test. The diploma stipulates the technological field and the national classification/standard, which allows access to public competitions and universities with the recognition of university credits. The EUROPASS certificate is also issued in Italian and English.

Internship abroad

Participants are given the opportunity to carry out part or the entire internship period in foreign companies. Credits are recognized without any further activity or learning verification being requested from the student.

Flexibility / customization

Extracurricular REALIGNMENT modules (modules of: Mechanical Technology; English; Mathematics; Studying Technical Drawings) are provided for all admitted students, which aim to provide all participants with a level of knowledge and preparatory skills in order to be able to face the course. Realignment is mandatory for all participants. These hours are to be considered in addition to the expected course hours.

Credit calculation criteria

The calculation criterion applied is the following:

1 credit = sum of classroom hours / laboratory / enterprise / internship + individual study hours / 25 hours (except for rounding up).

Course location

ITS MAKER Foundation

Modena office