Course title

ADVANCED TECHNICIAN FOR ENDOTHERMIC, HYBRID AND ELECTRIC MOTORS

Course profile

Advanced technicians for endothermic, hybrid and electric engines start from an overview of the vehicle and its various components. They must be able to check its overall functioning and to analyse in particular the performance related to energy efficiency. They apply experimentation, simulation and prototyping methodologies to develop a continuous improvement in efficiency through the development of thermal engines and complementary technologies for hybrid and electric traction.

The technician will work in the automotive sector, component manufacturing companies or even within distribution companies of the supply chain. Technicians carry out activities of diagnosis, testing, control and calibration of engine performance (torque/power, polluting emissions and consumption), management of measuring instruments, testing of innovative propulsion technologies.

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)

0716 Motor vehicles, ships and aircraft

Job title (national classification/standard)

Advanced technician for the innovation of processes and mechanical products

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;
- Arrange, negotiate and develop activities in working groups to tackle problems, propose solutions, help in production, order and evaluate collective results;
- Organize and use information, data and their aggregations;
- Use statistical tools and models in the description and simulation of the different scenarios of the reference area;
- Develop and implement design, prototyping and industrialization techniques;
- Intervene in all segments of the supply chain from production to marketing;
- Manage production flows in programming, control and cost-effectiveness, also in relation to the methods of industrialization and continuous improvement;
- Configure, calibrate, document and maintain automatic systems of different types;
- Configure the development of the vehicle system for components and layout for integration;
- Analyse the performances of endothermic, electric and hybrid systems to improve their efficiency;
- Perform tests, checks and remote diagnostics on the behaviour of the engine;
- Apply emission reduction technologies and engine performance optimization.

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. Manage the communication and relational processes inside and outside the organization both in Italian and in English. Prepare technical and regulatory documentation that can be managed through telematic networks.	Technical English I	Communication in English (written, oral) on technical-specialist subjects relating to the professional domain and the workplace.	Be able to communicate in English at both written and oral level using a specific language and terminology specific to the sector of reference.	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: 60 hours Individual study: 90 hours	6
	Master the linguistic tools and information and communication technologies to interact in daily activities and work contexts.	Communication	Communication styles, negotiation.	Use effective communication techniques.	Method: Evaluation through observation grids. Criteria: The student will have to demonstrate an ability to communicate effectively within a negotiating situation.	Classroom / laboratory: 20 hours Individual study: 30 hours	2

		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 an ability to use online collaboration tools and/or presentation and communication.	Classroom / laboratory: 16 hours Individual study: 14 hours	1
	Arrange, negotiate and develop activities in working groups to face problems, propose solutions, help produce, order and evaluate results.	Team work	Teamwork, cooperation (outdoor methodology at IAL Campus of Cervia - Team building in the kitchen and in the dining room, orienteering in the city).	Identify leadership style and interpret the main motivational dynamics that favour the active participation of the members in a working group.	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 / laboratory: 16 hours Individual study: 24 hours	1,5

General organizational and management area	Organize and manage, with a good level of autonomy and responsibility, the working environment, personnel and the specific technological system in order to achieve the expected production results. Know, analyse, apply and monitor, in specific contexts, management models of the production processes of goods and services.	HSE - Safety	The company's HSE (Health Safety Environment) structure to safeguard workers' health and safety and environmental protection. Integrated risk management; integrated management of plant safety and protection of the working environment. Technical and managerial governance of business continuity. Risk assessment for the user of machines and ISO/TR 14121-2 Safety of machinery.	Apply company regulations and procedures for the prevention of accidents and the safeguarding of health and safety conditions in the workplace, effectively managing general and specific risks.	Method: Multiple choice test. Criteria: The student must demonstrate knowledge of the HSE model of integrated risk management.	Classroom / laboratory: 16 hours Individual study: 24 hours	1,5
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 the appropriate technologies. Use tools and methodologies specific to experimental research for the applications of the technologies of the reference area.	Statistics	Fundamentals of descriptive statistics and statistical distributions – Statistical distributions – Representation of data: tables and graphs – Central indices of a distribution (average, mode, median) – Dispersion indices – Range and range of variation – Concept of optimization; (also called what-is-best approach) – Mean Absolute deviation (MAD) – Variance and standard deviation – Probability calculation – Logic of events – Schematic diagrams – Repeated tests – Regression correlation and linear programming – Correlation – The technique of linear regression – Linear programming	Know the basics of statistics	Method: Written tests of applied statistics. Criteria: The student will have to demonstrate an ability to solve problems through applied statistics.	Classroom / laboratory: 12 hours Individual study: 18 hours	1

Common professional technical skills - Made in Italy Technologies Area - Mechanical system	Identify the materials, the relative processes and the treatments suitable for the various uses. Choose processing technologies and the relative machines on the basis of the technical-economic characteristics required.	The materials: properties and treatments	Characteristics, processes, treatments of metallic materials, alloys, plastics, composites and bio-based applied to vehicles.	Select materials and work cycles for vehicle functional applications.	Method: Written test. Criteria: The student must demonstrate knowledge of the characteristics of materials and their properties being processed	Classroom / laboratory: 56 hours Individual study: 38 hours	4
	Develop and implement design, manufacturing and prototyping techniques.	Mechanics applied to traction I	Speed, acceleration, forces, torques and kinematics applied to traction (suspension, pistons, steering).	Analyse, configure and optimize power transmission from engine to road/field.	Method: Technical test Criteria: The student must demonstrate recognition of the principles of mechanics applied to traction	Classroom / laboratory: 60 hours Individual study: 36 hours	4
		Machine building and FEM	Stresses and deformations in engine parts, fatigue and resistance, loads varying over time with the FEM methodology.	Analyse the structural design of an engine with finite elements.	Method: Technical test. Criteria: The student will have to demonstrate an ability to analyse the structural design of an engine with finite elements.	Classroom / laboratory: 42 hours Individual study: 20 hours	2,5
		Vehicle system and construction	Structural calculation and mass distribution; engine, systems, packaging in classic and electrical systems. Technical construction features of the internal combustion engine components: disassembly, analysis and verification of any wear. Analysis and resolution of the mechanical causes of engine malfunction. Mechanical and electrical reassembly and commissioning.	Configure vehicle system development for components and integration architecture.	Method: Technical test. Criteria: The student will have to demonstrate how to configure the development of the vehicle system for components and integration architecture.	Classroom / laboratory: 64 hours Individual study: 32 hours	4

		Dynamic vehicle simulation (advanced 3D CAD systems)	Dynamic, directional behaviour and stability; distribution of loads and forces of the moving vehicle.	Simulate and validate 3D prototypes of complete vehicles and subsystems with 3D CAD.	Method: Technical exercise. Criteria: The student will have to demonstrate an ability to simulate and validate virtual prototypes of complete vehicles and subsystems with 3D CAD.	Classroom / laboratory: 72 hours Individual study: 40 hours	4,5
	Research and apply the technical and safety regulations of the electrical, electronic and mechanical sector in the design and use of components.	Reading and interpretation of technical drawings	Details and assemblies: understanding drawings and manufacturing and assembly cycles.	Fill in production and assembly cycles on technical drawing data.	Method: Practice Test Criteria: The student will have to demonstrate an ability to read and interpret a mechanical technical drawing	Classroom / laboratory: 32 hours Individual study: 20 hours	2
		Electronics, electromagnetism and electrical engineering	Electric and magnetic fields and circuits; electricity generation, storage and transformation; power electronics.	Understand the operation of the main electrical components of the vehicle.	Method: Written test. Criteria: The student must demonstrate an ability to distinguish the operation of the main electrical components of the vehicle.	Classroom / laboratory: 18 hours Individual study: 12 hours	1
	Programming industrial automation systems (PLC, robots, CNC machines, communication networks, monitoring and diagnostics systems, etc). Configure, calibrate, document and maintain automatic systems of different types.	Control units - controls - sensors	Electric propulsion control; management of endothermic injection and combustion; hybridization management for full, minimal, range extender configurations.	Select the components for the electronic management of the motors in different systems.	Method: Technical test. Criteria: The student will have to demonstrate that he can recognize electronic engine management.	Classroom / laboratory: 42 hours Individual study: 24 hours	2,5

Specific technical professional skills for the job		Fundamentals of an internal combustion engine.	Otto and Diesel cycles, efficiency and layout, supercharging.	Analyse components, operation and performance of an internal combustion engine.	Method: Practice Test. criteria: The student will have to demonstrate an ability to analyse components, functioning and performance of an internal combustion engine.	Classroom / laboratory: 48 hours Individual study: 40 hours	3,5
		Electric motors	Power supply and recharge, electronic power regulation, direct coupling to the differential, reversibility in braking. Environmental focus: eco-design solutions, to favour the electrification and/or hybridization of the propulsion systems.	Analyse the basic technical connotation of electric motors in the vehicle system	Method: Practice Test. Criteria: The student will have to demonstrate an ability to analyse the basic technical connotation of electric motors in the vehicle system.	Classroom / laboratory: 20 hours Individual study: 16 hours	1,5
		Efficiency technologies for thermal engines	Injection technologies (direct, water), HCCI ignition, intake and exhaust fluid dynamics, turbocharging. New materials and coatings for engine components. Environmental focus: eco-design solutions, to encourage the reduction of emissions and the consumption of non-renewable raw materials.	Apply emission reduction technologies and engine performance optimization.	Method: Practice Test. Criteria: The student will have to demonstrate an ability to apply heat engine efficiency technologies.	Classroom / laboratory: 22 hours Individual study: 16 hours	1,5

INTERNSHIP I	The first year internship is divided into a single application part with curricular objectives in areas: a) material and mechanical characterization applied to traction; b) vehicle structural design, architecture, development configuration; c) endothermic and electric motors, control units; d) vehicle dynamics.	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: 320 hours Individual study: 70 hours	16

Total hours in classroom/laboratory hours in year I: 616
Total internship hours in year I: 320
Total sum of hours in year I: 936

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. Manage the communication and relational processes inside and outside the organization both in Italian and in English. Prepare technical and regulatory documentation that can be managed through telematic networks.	Technical English II	Communication in English (written, oral) on technical-specialist subjects relating to the professional domain and the workplace.	Being able to communicate in English at both written and oral level using a specific language and terminology specific to the sector.	Method: Written test multiple choice and oral interview in a foreign languages. 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

	Assess the implications of information flows with respect to the effectiveness and efficiency of the management of production or service processes, also identifying alternative solutions to ensure their quality.	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. 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 plan: device configuration, backup and cybersecurity processes against the dangers of device theft and cryptolocker virus.	Analyse, manage, interpret big data and open data. Know and apply 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.	Method: Open-ended questionnaire. Criteria: The student must describe the application potential of complex predictive models based on large amounts of non-linear data and the use function of data protection systems in the company.	Classroom / laboratory: 16 hours Individual study: 14 hours	1
General Legal and economic field	Know the relevant rules governing the company and the impact for the company in a territorial context, also work to strengthen its image and competitiveness.	Entrepreneurship	From idea to action, entrepreneur profile. Entrepreneurship concept: starting and managing your own business. Entrepreneurship concept: the completion of entrepreneurial skills in non-owned work environments. The "Five C's" model in an entrepreneurial key: knowledge (knowing), ability (knowing how to do), behaviours (knowing be), personal characteristics, context of entrepreneurs/ entrepreneurial life.	Develop spirit of initiative and experiment with ideas transforming them into action with the entrepreneurial/ entrepreneurial activity.	Method: Simulation (Role play). Criteria: The student must correctly demonstrate an ability to interpret entrepreneurial action with reference to the skills acted in the simulation.	Classroom / laboratory: 8 hours Individual study: 12 hours	1

	Find the sources and apply the regulations that regulate the life of the company and its external relations at national, European and international level. Use negotiation strategies and techniques with reference to the market in which companies in the sector also operate to strengthen their image and competitiveness.	Marketing and Innovation	Drivers of the innovation market; innovation adoption curve; exponential technologies and disruptive innovation.	Use the main marketing concepts.	Method: Exercise. Criteria: Starting from the analysis of a business case, the student will have to demonstrate to apply the interpretative models on the adoption of innovation by the market.	Classroom / laboratory: 12 hours Individual study: 18 hours	1
	Know the relevant rules governing the company and the impact for the company in a territorial context.	The company: laws and regulatory factors	Definition of business, company and society with reference to economics, organizational and legal disciplines. Machinery Directive, labour law, patents, certifications.	Participate in daily activities of the company as regulated by national, European and international regulations.	Method: Written multiple choice test. Criteria: The student will have to correctly demonstrate an ability to interpret the definition of enterprise, company and society in the light of economic, organizational and legal disciplines.	Classroom / laboratory: 14 hours Individual study: 21 hours	1,5
General organizational and management area	Organize and manage, with a good level of autonomy and responsibility, the working environment, personnel and the specific technological system in order to achieve the expected production results.	Leadership in corporate organizations	Leadership styles (visionary, democratic, motivator/coach, demanding, harmonizing, authoritarian) in relation to the various organizational contingencies) and group management and management techniques.	Use adequate leadership techniques within the company context in relation to the role held Promote the achievement of objectives with your participation in working groups.	Method: Simulation (Role play). Criteria: The student will have to correctly demonstrate an ability to interpret leadership style required to promote the achievement of objectives within working groups.	Classroom / laboratory: 12 hours Individual study: 18 hours	1

	Manage relationships and collaborations within the organizational structure within the work contexts, evaluating their effectiveness.						
	Manage external relationships and collaboration - interpersonal and institutional - evaluating their effectiveness.						
	Know, analyse, apply and monitor, in specific contexts, management models of production processes of goods and services.	HSE-Organization	Integrated Quality, Safety and Environment Management System (focus: Quality-Organization).	To participate consciously in the integrated management of health, safety and the environment.	Method: Written test. Criteria: The student must demonstrate knowledge of the principles, architecture and functioning mechanisms of an integrated management system.	Classroom / laboratory: 8 hours Individual study: 12 hours	1
	Recognize, evaluate and resolve conflict situations and work problems of different nature: technical-operational, relational, organizational.						
	Know and help to manage the quality organizational models that encourage innovation of companies in the sector.						

	Analyse, monitor and control 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 continuous improvement. Know, analyse, apply and monitor, in specific contexts, management models of production processes of goods and services.	Engines and emissions regulations	Motor legislation on polluting emissions: towards the legislative euro 7 level. Combination of engine control strategies and post-combustion emission abatement systems (particulate filter, AdBlue, Catalyst).	Apply European and international regulations on the control of exhaust gas emissions.	Method: Written test. Criteria: The student will have to demonstrate knowledge of the regulation on the control of exhaust emissions.	Classroom / laboratory: 28 hours Individual study: 42 hours	3
Common professional technical skills - Made in Italy Technologies Area - Mechanical system	Develop and implement design, manufacturing and prototyping techniques.	3D printing and additive manufacturing technologies	3D printing. Additive manufacturing technologies and materials characterization; stereolithography (SLA), modelling for deposition of molten material (FDM), selective laser sintering (SLS), selective laser fusion (SLM).	Know and use additive manufacturing technologies.	Method: Exercise with case analysis. Criteria: The student will have to correctly demonstrate an ability to select additive manufacturing technologies for the production of parts and components.	Classroom / laboratory: 24 hours Individual study: 13 hours	1,5
		Mechanics applied to traction II	Speed, acceleration, forces, torques and kinematics applied to traction (suspension, pistons, steering).	Analyse, configure and optimize power transmission from engine to road/field.	Method: Technical exercise. Criteria: The student will have to demonstrate an ability to recognize mechanical phenomena related to traction.	Classroom / laboratory: 24 hours Individual study: 13 hours	1,5

	Programming industrial automation systems (PLC, robots, CNC machines, communication networks, monitoring and diagnostics systems, etc.). Configure, calibrate, document and maintain automatic systems of different types.	Electric propulsion	Traction system configuration; component control and calibrating; charging, autonomy and performance. Environmental focus: eco-design solutions, to favour the electrification and/or hybridization of the propulsion systems.	Design and maintain electrical traction systems.	Method: Technical-practical exercise. Criteria: The student will have to demonstrate his ability to design and maintain electrical traction systems.	Classroom / laboratory: 32 hours Individual study: 19 hours	2
		Hybrid systems	Hybridization types (mild, mini, full, plug-in), configurations, controls and performances; diagnosis of Start & Stop and hybrid systems (Citroën C4, BMW 1 series, FIAT, Honda Civic Hybrid and Honda Insight "MiddleHybrid" system; Volkswagen Tuareg Hybrid). Environmental focus: eco-design solutions, to favour the electrification and/or hybridization of the propulsion systems.	Design and maintain hybrid traction systems; apply a correct diagnosis method of the Start & Stop system and the intelligent charging mode of the alternator.	Method: Technical exercise. Criteria: The student will have to demonstrate an ability to design and maintain hybrid traction systems.	Classroom / laboratory: 32 hours Individual study: 16 hours	2
		Automatic control technologies and on-board avionics	On-board systems for automatic control: telecommunication, data transmission, sensors and cybersecurity.	Perform remote diagnostics on motor behaviour.	Method: Practice Test. Criteria: The student will have to demonstrate an ability to perform diagnostics on motor behaviour remotely.	Classroom / laboratory: 24 hours Individual study: 14 hours	1,5

	Intervene in all segments of the supply chain from production to marketing. Manage production flows in their programming, control and cost-effectiveness, also in relation to the logic of industrialization and continuous improvement.	Accumulators, batteries and storage systems	Electrochemical storage systems and endothermic engines; accumulators and batteries for types of traction. Innovative materials (graphene). Fuel cells. Control and management of storage systems. Thermal control of batteries and temperature timing. Environmental focus: eco-design solutions, to favour the electrification and/or hybridization of the propulsion systems.	Apply construction solutions and manage the performance of the storage systems in the various vehicles.	Method: Technical exercise. Criteria: The student will have to demonstrate an ability to manage the performance of the storage systems in different vehicles.	Classroom / laboratory: 76 hours Individual study: 32 hours	4
		Fuel technologies	Motor fuel: LPG, methane, hydrogen fuel cell, first and second generation biofuels. Environmental focus: eco-design solutions, to encourage the reduction of emissions and the consumption of non-renewable raw materials.	Apply constructive solutions and maintain power and storage technologies on board alternative fuels.	Method: Case analysis. Criteria: The student will have to demonstrate an ability to distinguish fuel supply technologies for engines.	Classroom / laboratory: 14 hours Individual study: 7 hours	1
		Regenerative recovery KERS - HERS	Kinetic energy (KERS) and heat recovery systems (HERS). Environmental focus: eco-design solutions, encourage reduction of emissions and the consumption of non-renewable raw materials.	Configure and maintain regeneration systems for dissipated energy.	Method: Technical exercise. Criteria: The student will have to demonstrate an ability to configure and maintain dissipated energy regeneration systems.	Classroom / laboratory: 40 hours Individual study: 24 hours	2,5
	Apply fault prevention, analysis and diagnostics methodologies on systems and plants and propose possible solutions.	System check and diagnosis	Control and diagnostics parameters of the performance of engines and hybrid systems and related reconfiguration options.	Analyse the performance of endothermic engines, electric and hybrid systems to improve efficiency.	Method: Technical-practical exercise. Criteria: The student will have to demonstrate an ability to analyse the performance of endothermic, electric and hybrid systems to make them more efficient.	Classroom / laboratory: 40 hours Individual study: 24 hours	2,5
	Manage post-sales and	Energy analysis	Vehicle energy performance and	Align energy		Classroom /	2,5

	maintenance needs.	and certification	certification standards. Environmental focus: eco-design solutions, to encourage the reduction of emissions and the consumption of non-renewable raw materials.	performance of the motor/system with the Certification standards.	Method: Case analysis. Criteria: The student must demonstrate knowledge of the certification rules relating to the energy performance of the vehicle.	laboratory: 40 hours Individual study: 24 hours	
Specific technical professional skills for the job		Engine calibration and propulsion	Configuration of motor control parameters in adaptation to the required effect of torque on the ground.	Perform engine calibration to optimize its performance.	Method: Technical-practical exercise. Criteria: The student will have to demonstrate an ability to calibrate the engine to optimize its performance.	Classroom / laboratory: 40 hours Individual study: 18 hours	2,5
		Motor testing - test bench for the realization of a project	Optimization by calibration on the test bench of hybrid engines/systems with interdisciplinary team work.	Develop and test a hybrid propulsion prototype, with specific eco-sustainability and efficiency performances.	Method: Debriefing of the products/results obtained. Criteria: The student will have to demonstrate how to develop a hybrid propulsion prototype.	Classroom / laboratory: 60 hours Individual study: 15 hours	3
INTERNSHIP II			The second year internship is divided into a single application part with curricular objectives in areas: a) configuration of electric propulsion; b) configuration of hybrid systems; c) analysis, design and optimization of components (accumulation and regeneration systems); d) alternative fuels supply; e) control, reconfiguration and calibration of motors/systems.	Develop a greater awareness of a personal study path, consolidating knowledge acquired in the classroom phase.	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	Internship in the company: 480 hours Individual study: 20 hours	20

			report of the experience, which will be one of the objects of the final exam.		

Total hours in classroom/laboratory in year: 584
Total internship hours in year II: 480
Total sum of hours in year II: 1,064

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 will be carried out to provide students with basic knowledge in: Applied Mechanics - Electrochemistry - Electromagnetism - English Language - Measures - Mathematics. 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