

DIDACTIC REGULATIONS OF THE MASTER DEGREE PROGRAM ELECTRICAL ENGINEERING

LM-28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

ACRONYMS

CCD	[Commissione di Coordinamento Didattico]	Didactic Coordination Commission
CdS	[Corso/i di Studio]	Degree Program
CPDS	[Commissione Paritetica Docenti-Studenti]	Joint Teachers-Students Committee
OFA	[Obblighi Formativi Aggiuntivi]	Additional Training Obligations
SUA-CdS	[Scheda Unica Annuale del Corso di Studio]	Annual single form of the Degree Program
RDA	[Regolamento Didattico di Ateneo]	University Didactic Regulations

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Art. 1

Object

1. These Didactic Regulations govern the organisational aspects of the CdS in Electrical Engineering (class LM-28). The CdS in Electrical Engineering is hinged in Department of Electrical Engineering and Information Technologies.

Università:	Università degli Studi di Napoli Federico II
Nome del corso in italiano:	Ingegneria elettrica
Nome del corso in inglese:	electrical engineering
Classe	LM-28 - Ingegneria elettrica

Lingua in cui si tiene il corso:	italiano
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Eventuale indirizzo internet

del corso di laurea:	http://ingegneria-elettrica.dieti.unina.it
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Modalità di svolgimento	a. Corso di studio convenzionale
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2. The CdS is governed by the Didactic Coordination Commission (CCD), pursuant to Art. 4 of the RDA.
3. The Didactic Regulations are issued in compliance with the relevant legislation in force, the Statute of the University of Naples Federico II, and the RDA.

Art. 2

Training objectives

The training of the master's graduate in Electrical Engineering is aimed at the acquisition of skills in disciplinary fields ranging from the production, transmission and distribution of electrical energy, to the transformation, conversion and regulation of the same in systems, including largely automated ones, to its effective use in the field of production of goods and services in industrial, civil and public and private transport environments. In addition to covering the various sectors of Electrical Engineering and, more generally, the entire industrial field, the course of study also represents an effective connection between the mechanical-industrial culture and that of the information and electronics.

In addition to deepening and updating the specific preparation in the field of electrical engineering, the organization of the Master's Degree course in Electrical Engineering aims to provide students with a sufficiently broad spectrum of training, in order to ensure a prompt and conscious insertion of the graduate in the world of work and to enable him to face the rapid technological transformations that characterize modern societies.

The teaching offer relating to the Master's Degree is based on a teaching approach, based on a generalized rationalization of training plans, capable of achieving on the one hand an easier impact of the student with the study and on the other a level of more solid and concrete preparation, capable of maintaining the electrical engineer's cultural and professional completeness that has traditionally distinguished him in the job market.

To this end, the course of study is set up in such a way as to favor the following training priorities:

1. integration, rationalization and finalization of the contents of the disciplines defined as preparatory, necessary to deepen the basic methodological and calculation tools. This training area aims to strengthen basic preparation and at the same time make it more operational, also for the purposes of any subsequent studies (Doctorate, Master);
2. rational expansion of technological and methodological training in the area of disciplines defined as 'characterising' of electrical engineering, through closer coordination with the disciplinarily similar contents of electronics, automation, mechanics and telecommunications, now simultaneously present in the electricity system, irreversibly oriented towards ever-increasing technological integration;
3. maintenance of a clear interdisciplinary value to general professional training, capable of guaranteeing the master's graduate to enter the professional market first and foremost as an 'Engineer'.

The educational offer is, therefore, aimed at achieving a valid and flexible qualification within the scheduled times, corresponding to a preparation capable of enabling future master's graduates to seize all the possible opportunities offered by the job market, also with a view to growing demand for mobility from the market itself, both in Italy and abroad. This is also because the flexibility inherent in broad-spectrum training can allow the master's electrical engineer to update his cultural and professional background with extreme ease, in the face of constant technological and cognitive evolution in the various branches of engineering and therefore to maintain competitive own technical and methodological preparation in the professional areas of expertise.

The specific training objectives can be broken down into the following paths, divided into learning areas:

- a) Common "characterizing" training activities;
- b) "similar and integrative" training activities;

- c) Training activities of the "Electric mobility" path;
- d) Training activities of the "Electricity and smart grids" path,
- e) Training activities of the "Industrial and Design" path.

The training course is structured as follows:

In the first year of the course, a common, broad and balanced methodological training is offered, which involves all the characterizing scientific sectors and related ones. The contents provided in this phase concern methodologies for the analysis, design and control of electric machines and actuators, electric drives and power electronic converters; analysis methodologies regarding electromagnetic devices with concentrated and distributed parameters as well as methodological bases for the use of electromagnetic field analysis tools; analysis of electroenergy systems and electromechanical systems with an integrated interdisciplinary approach; methodologies for the analysis, design and control of low, medium and high voltage electrical networks; components and protection devices for electricity production systems operating independently or connected to a network; knowledge and use of automatic measuring instruments.

The second year of the course consists of all optional curricular courses divided into 3 orientations called: "Electric mobility", "Electrical energy and smart grids", "Industrial and Design" which all concern only the second year of the course so that the methodologies common to all paths are provided in the first year and the various orientations are formed in the second year.

In the "Electric Mobility" path, content is provided that is highly applicative regarding powertrains for hybrid/electric vehicles with constrained driving and on rubber, storage devices and charging infrastructures, planning and management of transport systems, electric propulsion, railway propulsion, port and airport electrical systems.

In the "Electricity and smart grids" path, contents are provided regarding smart grids and distributed energy resources, photovoltaic and wind generation systems, planning and management systems for electrical systems, modeling of electricity markets, electrical reliability methodologies, development of converters and storage systems for smart grids.

In the "Industrial and Design" path, content is provided regarding electrical drives and generation systems for industry, design methodologies for electrical systems, converters, electrical machines and drives, industrial power electronics, sensors and smart metering.

The training concludes with courses freely chosen by the student with which the student can delve into specific contents in the characterizing SSD sectors, or alternatively, can diversify their training by inserting exams of their choice taken from other scientific, engineering or economic sectors. Finally, there are credits for further knowledge and the final test with which the student integrates their knowledge and makes use of their skills by dedicating themselves to a theoretical, applicative and/or experimental activity in which they will have to provide their contribution original. The thesis can be carried out at the University or at external public or private, national or international institutions.

Art. 3

Professional profile and work opportunities

The areas of activity and professional opportunities are the various sectors of the Processing Industry and Companies/Bodies providing goods and services, the private or Public Administration technical structures responsible for the management and control of the environment, energy and of safety, as well as a broader spectrum of professional positions for which aptitude for managing complex processes is required. Among the figures that the Course will train, the following are notable:

Name of the figure that the course will train:

1. Expert in the design of electrical equipment, machines and drives.

function in a work context:

It carries out tasks relating to the design of electrical equipment, machines and drives, including innovative electromechanical devices. May take on coordination roles

Skills associated with the function:

Knowledge, skills and competences are required that allow you to plan and/or coordinate the design activities of a work group. Define technical specifications of a specific machine or device; dimension an apparatus and/or device also with the aid of software tools for computer-aided design (Computer Aided Design, CAD); coordinate the execution of product verification activities to characterize the parameters and performance of electromechanical equipment.

Employment opportunities:

Companies in the electromechanical industry that produce electrical components, equipment and machines for industrial and civil applications, for transport, for electricity production, transport and distribution systems.

2. Expert in integrated design of electrical systems

function in a work context:

Performs tasks relating to the coordination of work groups in the context of the integrated design of electrical systems and/or as a designer in work groups in the context of the integrated design of electrical systems and other technological systems.

skills associated with the function:

Knowledge, skills and competences are required that allow the organization and management of work group activities, including interdisciplinary ones, for the design of electrical and technological systems in structures of any type and size operating in the industrial, commercial, transport and civil infrastructure sectors, also operating in synergy with experts with different skills in multifunctional integrated design studies.

employment opportunities:

Private companies or public bodies operating in the industrial, commercial, transport and civil infrastructure sectors.

3. Expert in the management of electrical and energy networks and systems and the free energy market

function in a work context:

Performs tasks relating to the planning, programming and management of complex systems also with roles of responsibility in operational structures such as the control centers of the national or international electricity transmission system.

skills associated with the function:

Knowledge, skills and competences are required that allow the construction of models of electrical systems for the production, transmission, distribution and use of electrical energy also with the aid of calculation programs for planning electrical networks. Skills aimed at identifying optimal control strategies for the operation of the electricity system. Ability to analyze and know how to interpret data on electricity and energy consumption.

Technical skills that allow you to promote actions and interventions to improve energy efficiency and the rational use of energy.

employment opportunities:

Electricity and energy companies, commercial companies, public or private companies or bodies for the management of the electricity service.

4. Expert in the design of electrical energy conversion systems

function in a work context:

Performs tasks relating to the design of systems for the electrical conversion of energy through the use of semiconductor devices, also acting as coordinator of the design and programming of the related control systems.

skills associated with the function:

Knowledge, skills and competences are required that allow the design, also through innovative solutions, of power electronic converters and the related digital microprocessor control; choose materials, components, sensors and transducers; define control schemes; carry out or coordinate the execution of testing operations; verifies the safety, quality and reliability of the creations.

Technical skills to codify, apply or coordinate the application of maintenance procedures, define and develop innovative applications.

employment opportunities:

Production companies and research and development centers in the electromechanical and industrial automation sectors.

5. Technical-commercial expert in the various sectors of electrical engineering

function in a work context:

It carries out tasks relating to industrial consultancy for even complex plant and system creations and the marketing of technical-commercial products and services.

skills associated with the function:

Knowledge, skills and competences are required that allow the proposal of plant solutions and/or products, including with innovative technologies, comparing costs, reliability, technical-economic advantages and disadvantages also with regard to interactions with energy markets.

employment opportunities:

National, foreign or multinational companies for the production of electrical components and equipment, companies for the management of electrical systems, industrial consultancy companies.

6. Expert in industrial research and development

function in a work context:

Carries out theoretical and/or applied research tasks, in centers or laboratories, also with roles of responsibility.

skills associated with the function:

Knowledge, skills and competences are required that allow the direction and/or participation in theoretical or experimental electrical research activities of any type, not excluding prototype creations using advanced calculation programs and laboratory instrumentation.

Technical skills and regulatory knowledge are also required to carry out or coordinate laboratory testing activities for third parties or relating to research activities. Finally, skills are required that allow the development of original and innovative solutions for the development of scientific research and that allow the ability to disseminate these solutions with related publications and/or patents. The ability to manage the technological transfer of the results obtained from the research is also required.

employment opportunities:

Public or private, national and international universities and research centers.

7. Expert in technical activities in public administration

function in a work context:

Performs tasks relating to the solution of technical problems or management of systems, equipment and services in the technical office of public administrations, also in roles of responsibility.

skills associated with the function:

Knowledge, skills and competences are required that allow you to operate as a manager in the preparation and management of technical-economic documentation for authorization requests, reports on the operation and maintenance of systems and services, and the management of personnel dedicated to technical activities.

Skills are required that allow you to evaluate compliance with technical standards by systems and/or equipment and to know how to work, if necessary, to plan their compliance, guaranteeing the efficiency of the systems over time.

Useful skills are needed for the verification and professional performance of technical installation, commissioning and maintenance interventions on systems in compliance with the expected times, quality and costs.

employment opportunities: Public Companies

8. Freelancer (subject to passing the State Exam after graduation)

function in a work context:

The master's graduate in Electrical Engineering who, by passing the appropriate state exam, is registered in the Register of Engineers in section A carries out tasks relating to freelance professional activity within companies, companies, private entities and public administrations or on his own behalf .

The characteristics of the engineering profession are indicated in the Presidential Decree of 5 June 2001 n. 328, "Modifications and additions to the regulations of the requirements for admission to the state exam and the related tests for the exercise of certain professions, as well as to the regulations of the relevant systems". In particular (art. 46 paragraph 2) the activities relating to section A "involve the use of advanced, innovative or experimental methodologies in the design, works management, estimate and testing of complex or innovative structures, systems and processes".

skills associated with the function:

Knowledge, skills and competences are required that allow the development of planning, design, development, works management, estimation, testing, management, environmental impact assessment of machines, industrial plants, systems for the production, transformation and distribution of energy, of industrial and technological systems and processes, of apparatus and instruments for diagnostics and medical-surgical therapy. For other competences, please refer to the Presidential Decree of 5 June 2001 n. 328 and subsequent amendments.

employment opportunities:

The professional opportunities of the section A freelancer in the industrial sector relating to the electricity sector are numerous and very diversified. As part of the professional activity involving private or public companies or bodies, the electrical engineer can carry out different types of activities in the sectors:

- concentrated production and/or distributed generation, transmission and distribution of electricity and power plants;
- the use of electricity in industrial, domestic, tertiary and transport systems;
- industrial automation and the electromechanical industry which produces components, apparatus and electrical machines for industrial and civil applications and for transport.

9. Sensors expert

function in a work context:

It carries out tasks relating to the design of sensors and/or the identification of the most suitable technology for sensors intended to be used in the control and automation of industrial processes, in energy management, in transport.

skills associated with the function:

Knowledge, skills and competences in the field of sensors for the control of industrial processes are required, to be involved in the design and implementation at industrial plants of systems for monitoring product transformation processes; skills in smart sensors for monitoring electricity grid or energy or transport network data.

employment opportunities:

Companies in the industrial automation, service and transport sectors.

10. Expert in sustainable mobility
function in a work context:

It carries out coordination tasks in the design and commissioning and monitoring of the performance of charging infrastructures, storage systems as well as testing functions of the hardware used. Analyzes the new storage technologies emerging on the market and the evolution of the legislation. Performs coordination tasks in the design of powertrains.

skills associated with the function:

Knowledge, skills and technical expertise in the field of converters and electric drives are required to allow the coordination of a working group oriented towards the design and management of charging infrastructures for electric road vehicles, charging systems and the main powertrains of electric cars. and hybrid.

employment opportunities:

Companies operating in the e-mobility sector, such as Plenitude-Be Power, Edison, ENEL, Helbiz, ABB etc.

Art. 4

Admission requirements and knowledge required for access to the Degree Program¹

For enrollment in the Master's Degree Course in Electrical Engineering, in compliance with art. 6 paragraph 2 of Ministerial Decree 270/04 and with the methods defined below and reported in more detail in the Master's Degree Teaching Regulations, specific access criteria regarding the possession of curricular requirements and the mandatory verification of the adequacy of the student's personal preparation. These requirements include, among other things, the ability to correctly use, in written and oral form, at least one European Union language other than Italian, also with reference to disciplinary lexicons.

Curricular requirements

To be admitted to the Master's Degree Course in Electrical Engineering you must possess the following curricular requirements: Degree pursuant to Ministerial Decree 509/00 or pursuant to Ministerial Decree 270/04 or equivalent qualification obtained abroad in the current classes L-08 (Class of Degrees in Information Engineering) or L-09 (Class of Degrees in Industrial Engineering) and at least 48 CFU in the sectors IIET-01/A (a time referred as ING-IND/31), IIND-08/A (a time referred as ING-IND/32), IIND-08/B (a time referred as ING-IND/33), IMIS-01/B (a time referred as ING-INF/07). Further types of curricular requirements are indicated in the Educational Regulations of the Course of Studies.

In any case, the CFU required to satisfy the curricular requirements must be possessed before the individual preparation is verified and before enrolment.

The criteria for the admission of the student to the Master's Degree Course in relation to the possession of the curricular requirements are defined in the Teaching Regulations of the Course of Studies.

Linguistic knowledge

In relation to the ability to correctly use, in written and oral form, at least one European Union language in addition to Italian, also with reference to disciplinary lexicons, the student must have as a prerequisite knowledge of English or another European language. European Union, in addition to Italian, at least level B2 according to the Common European Framework of Reference for Languages.

The teaching regulations will determine the methods for assessing the aforementioned level of knowledge of the language.

Adequacy of the student's personal preparation

¹ Artt. 7, 13, 14 of the University Didactic Regulations.

The assessment of the adequacy of the student's personal preparation is mandatory. The criteria for the admission of the student to the Master's Degree Course in relation to the adequacy of his personal preparation are defined in the Teaching Regulations of the Course of Studies.

Art. 5

Procedures for access to the Degree Program (CdS)

1. The CCD of the Degree Program normally regulates the admission criteria and any scheduling of enrolments, except in cases subject to different provisions of law².
2. Verification of personal preparation is always mandatory, and only students who meet the curricular requirements can access it.

For enrollment in the Master's Degree Course in Electrical Engineering, in compliance with art. 6 paragraph 2 of Ministerial Decree 270/04 and with the methods defined below, specific access criteria regarding the possession of curricular requirements and the mandatory verification of the adequacy of the student's personal preparation.

Curricular requirements

The Teaching Coordination Commission of the Master's Degree Course in Electrical Engineering evaluates, on the basis of the official programs of the courses achieved by the applicant, the curricular requirements referred to in art. 4 and recognizes the training credits in whole or in part. In the event that the curricular requirements are not satisfied, the curricular integration, in terms of credits, must be completed before enrollment in the master's degree course by carrying out, upon indication of the Commission, either an enrollment in the individual courses for curricular integration or a career abbreviation for the first level degree course.

Adequacy of the student's personal preparation

Only applicants who verify the curricular requirements access the assessment of the adequacy of personal preparation.

The criteria for the admission of the student to the Master's Degree Course in relation to the adequacy of his personal preparation are the following:

1. For students who have obtained a three-year degree from the Federico II University or from other Italian universities, to be enrolled in the master's degree course in Electrical Engineering the student must take a mandatory test to verify the adequacy of personal preparation. This test will consist of an interview aimed at evaluating the level of individual knowledge in the scientific-disciplinary sectors characterizing the Course of Studies (ING-IND/31 Electrotechnics, ING-IND/32 Converters, electrical machines and drives, ING-IND/33 Systems electrical for energy, ING-INF/07 Electrical and electronic measurements). Failure to pass the assessment of the adequacy of personal preparation does not allow enrollment in the master's degree course in Electrical Engineering. The Commission that evaluates the adequacy of the student's personal preparation is appointed by the Coordinator of the Course of Studies and is made up of a teacher for each scientific-disciplinary sector characterizing the Course of Studies in addition to the Coordinator who presides over it. The requirement of the adequacy of the student's personal preparation is considered automatically exceeded if the weighted average of exam credits obtained with the first level degree is equal to or greater than 24/30 regardless of the period taken to obtain the qualification. The weighted average (summation (grades x credits) / sum of credits) is calculated on all credits with a grade out of thirty acquired and useful for obtaining the first level degree.
2. For candidates in possession of a qualification obtained abroad, the adequacy of personal preparation is assessed through an interview to be held with the Commission referred to in point 1. A positive assessment allows enrollment only in the academic year for which it was

² National programmed access is regulated by L. 264/1999 and subsequent amendments and supplements.

obtained. If the candidate admitted to the Master's Degree does not proceed - according to the established deadlines - with enrollment in the academic year for which he was admitted - he will have to reapply and undergo evaluation again to access and enroll in subsequent academic years.

Art. 6

Teaching activities and university training credit (Teaching activities and CFU)

Each training activity, prescribed by the CdS detail sheet, is measured in CFU. Each CFU corresponds to 25 hours of overall training commitment³ per student and includes the hours of teaching activities specified in the curriculum as well as the hours reserved for personal study or other individual training activities.

For the Degree Program covered by this Didactic Regulations, the hours of teaching specified in the curriculum for each CFU, established in relation to the type of training activity, are as follows ⁴:

- Frontal lesson: 8 hours per CFU;
- Seminar: 8 hours per CFU;
- Assisted teaching exercises (in the laboratory or classroom): 12 hours per CFU;
- Practical laboratory activities with a high experimental or practical content: 25 hours per CFU;
- Internship: 25 hours per CFU.

For internship activities, one CFU corresponds to 25 hours of training commitment for each student. The CFU corresponding to each training activity are acquired by the student by satisfying the verification methods (exam, suitability or attendance) indicated in the course sheet.

Art. 7

Description of teaching methods

The didactic activity is carried out in modality conventional

If necessary, the CCD decides which courses also include teaching activities offered online.

Some courses may also take place in seminar form and/or involve classroom exercises, language, and computer laboratories.

Detailed information on how each course is conducted can be found in the course sheets.

Art. 8

Testing of training activities⁵

1. The CCD, within the prescribed regulatory limits⁶, establishes the number of examinations and other means of assessment that determine the acquisition of credits. Examinations are individual

³ According to Art. 5, c. 1 of Italian Ministerial Decree No 270/2004, "25 hours of total commitment per student correspond to university training credits; a ministerial decree may justifiably determine variations above or below the aforementioned hours for individual classes, by a limit of 20 per cent".

⁴ The number of hours considers the instructions in Art. 6, c. 5 of the RDA: "of the total 25 hours, for each CFU, are reserved: a) 5 to 10 hours for lectures or guided teaching exercises; b) 5 to 10 hours for seminars; c) 8 to 12 hours for laboratory activities or fieldwork, except in the case of training activities with a high experimental or practical content, and subject to different legal provisions or different determinations by DD.MM."

⁵ Article 22 of the University Didactic Regulations.

⁶ Pursuant to the DD.MM. 16.3.2007 in each Degree Programs the examinations or profit tests envisaged may not be more than 20 (Bachelor's Degrees; Art. 4, c. 2), 12 (Master's Degrees; Art. 4, c. 2), 30 (five-year single-cycle Degrees) or 36 (six-year single-cycle Degrees; Art. 4, c. 3). Pursuant to the RDA, Art. 13, c. 4, "the assessments that constitute an eligibility evaluation for activities referred to in Art. 10, c. 5, letters c), d), and e) of Ministerial Decree no. 270/2004, including the final examination for obtaining the degree, are excluded from the calculation." For Master's Degree Program and single-cycle Master's Degree Program, however, pursuant to the RDA, Art. 14, c. 7, "the assessments that constitute a progress evaluation for activities referred to in Art.10, c. 5, letters d) and e) of Ministerial Decree no. 270/2004 are excluded from the exam count; the final examination for obtaining the Master's Degree and single-cycle Master's Degree is included in the maximum number of exams".

and may consist of written, oral, practical, graphical tests, term papers, interviews, or a combination of these modes.

2. The examination procedures published in the course sheets and the examination schedule will be made known to students before the start of classes on the Department's website.⁷
3. Examinations are held subject to booking, which is made electronically. In case the student is unable to book an exam for reasons that the President of the Board considers justifiable, the student may still be admitted to the examination, following those students already booked.
4. Before examination, the President of the Board of Examiners verifies the identity of the student, who must present a valid photo ID.
5. Examinations are marked out of 30. Examinations involving an assessment out of 30 shall be passed with a minimum mark of 18; a mark of 30 may be accompanied by honours by a unanimous vote of the Board. Examinations are marked out of 30 or with a simple pass mark. Assessments following tests other than examinations are marked out with a simple pass mark.
6. Oral exams are open to the public. If written tests are scheduled, the candidate has the right to see his/her paper(s) after correction.
7. The University Didactic Regulations govern Examination Boards⁸.

Art. 9

Degree Program structure and Study Plan

1. The legal duration of the Degree Program is 2 years. It is also possible to enrol, based on the contract, in compliance with the provisions of Article 24 of the RDA
The student must acquire 120 CFU⁹, attributable to the following Types of Training Activities (TAF):
 - A) basic,
 - B) characterising,
 - C) related or complementary,
 - D) at the student's choice¹⁰,
 - E) for the final exam,
 - F) further training activities.
2. The degree is awarded after having acquired 120 CFU by passing examinations, not exceeding 12, and the performance of other training activities.
Unless otherwise provided for in the legal framework of University studies, examinations taken as part of basic, characterising, and related or supplementary activities, as well as activities chosen autonomously by the student (TAF D) are taken into consideration for counting purposes.

⁷ Reference is made to Art. 22, c. 8, of the University Teaching Regulations, which states that "the Department or School ensures that the dates for progress assessments are published on the portal with reasonable advance notice, which normally cannot be less than 60 days before the start of each academic period, and that an adequate period of time is provided for exam registration, which is generally mandatory."

⁸ Reference is made to Art. 22, paragraph 4 of the RDA according to which "Examination Boards and other assessments committees are appointed by the Director of the Department or by the President of the School when provided for in the School's Regulations. This function may be delegated to the CCD Coordinator. The Commissions comprise of the President and, if necessary, other professors or experts in the subject. In the case of active courses, the President is the course instructor, and in such cases, the Board can validly make decisions even in the presence of the President alone. In other cases, the President is a professor identified at the time of the Board's appointment. In the comprehensive evaluation of the overall performance at the conclusion of an integrated course, the professors in charge of the coordinated modules participate, and the President is appointed when the Commission is appointed."

⁹ The total number of CFU for the acquisition of the relevant degree must be understood as follows: six-year single-cycle Degree, 360 CFU; five-year single-cycle Degree, 300 CFU; Bachelor's Degree, 180 CFU; Master's Degree, 120 CFU.

¹⁰ Corresponding to at least 12 ECTS for Bachelor's Degrees and at least 8 CFU for Master's Degrees (Art. 4, c. 3 of Ministerial Decree 16.3.2007).

Examinations or assessments relating to activities independently chosen by the student may be taken into account in the overall calculation corresponding to one unit¹¹. Tests constituting an assessment of suitability for the activities referred to in Article 10, paragraph 5, letters d) and e) of Ministerial Decree 270/2004¹² are excluded from the count. Integrated Courses comprising of two or more modules are subject to a single examination.

3. In order to acquire the CFU relating to independent choice activities, the student is free to choose among all the Courses offered by the University, provided that they are consistent with the training project. This consistency is assessed by the Didactic Coordination Commission. Also, for the acquisition of the CFU relating to autonomous choice activities, the "passing the exam or other form of profit verification" is required (Art. 5, c. 4 of Ministerial Decree 270/2004).
4. The study plan summarises the structure of the Degree Program, listing the envisaged teachings broken down by course year and, in case, by curriculum. At the end, the propedeuticities envisaged by the Degree Program are listed. The study plan offered to students, with an indication of the scientific-disciplinary sectors and the area to which they belong, of the credits, of the type of educational activity, is set out in Annex 1 to these Didactic Regulations.
5. Pursuant to Art. 11, paragraph 4-bis, of Ministerial Decree 270/2004, it is possible to obtain the Degree according to an individual study plan that also includes educational activities different from those specified in the Didactic Regulations, as long as they are consistent with the CdS detail sheet of the academic year of enrollment. The individual study plan is approved by CDS.

Art. 10

Attendance requirements¹³

1. In general, attendance of lectures is strongly recommended but not compulsory. In the case of individual courses with compulsory attendance, this option is indicated in the relative teaching/activity course sheet available in Annex 2.
2. If the lecturer envisages a different syllabus modulation for attending and non-attending students, this is indicated in the individual Course details published on the CdS web page (<https://ingegneria-elettrica.dieti.unina.it/index.php/en/>) and on the teacher's UniNA website.
3. Attendance at seminar activities that award training credits is compulsory. The relative modalities for the attribution of CFU are the responsibility of the CCD.

¹¹ Pursuant to the D.M. 386/2007.

¹² Art. 10, c. 5 of Ministerial Decree 270/2004: "In addition to the qualifying training activities, as provided for in paragraphs 1, 2 and 3, Degree Programs shall provide for: a) training activities autonomously chosen by the student as long as they are consistent with the training project [TAF D]; b) training activities in one or more disciplinary fields related or complementary to the basic and characterising ones, also with regard to context cultures and interdisciplinary training [TAF C]; c) training activities related to the preparation of the final exam for the achievement of the degree and, with reference to the degree, to the verification of the knowledge of at least one foreign language in addition to Italian [TAF E]; d) training activities, not envisaged in the previous points, aimed at acquiring additional language knowledge, as well as computer and telematic skills, relational skills, or in any case useful for integration in the world of work, as well as training activities aimed at facilitating professional choices, through direct knowledge of the job sector to which the qualification may give access, including, in particular, training and guidance programs referred to in Decree no. 142 of 25 March 1998 of the Ministry of Labour [TAF F]; e) in the hypothesis referred to in Article 3, paragraph 5, training activities relating to internships and apprenticeships with companies, public administrations, public or private entities including those of the third sector, professional orders and colleges, on the basis of appropriate agreements".

¹³ Art. 22, c. 10 of the University Didactic Regulations.

Art. 11

Prerequisites and prior knowledge

1. The list of incoming and outgoing propedeutics (necessary to sit a particular examination) can be found at the end of Annex 1 and in the teaching/activity course sheet (Annex 2).
2. Any prior knowledge deemed necessary is indicated in the individual Teaching Schedule published on the course webpage and on the teacher's UniNA website.

Art. 12

Degree Program Calendar

The Degree Program calendar can be found on the Department's website well before the start of the activities (Art. 21, c. 5 of the RDA).

Art. 13

Criteria for the recognition of credits earned in other Degree Programs in the same Class¹⁴

For students coming from Degree Programs of the same Class, the Didactic Coordination Commission ensures the full recognition of CFU, when associated with activities that are culturally compatible with the training Degree Program, acquired by the student at the originating Degree Program, according to the criteria outlined in Article 14 below. Failure to recognise credits must be adequately justified. It is without prejudice to the fact that the number of credits relating to the same scientific-disciplinary sector directly recognised by the student may not be less than 50% of those previously achieved.

Article 14

Criteria for the recognition of credits acquired in Degree Programs of different classes, in university or university-level Degree Programs, through single courses, at online Universities and in international Degree Programs¹⁵; criteria for the recognition of credits acquired in extra-curricular activities

1. With regard to the criteria for the recognition of CFU acquired in Degree Programs of different Classes, in university or university-level Degree Programs, through single courses, at online Universities and in International Degree Programs, the credits acquired are recognised by the CCD on the basis of the following criteria:
 - analysis of the activities carried out;
 - evaluation of the congruity of the disciplinary scientific sectors and of the contents of the training activities in which the student has earned credits with the specific training objectives of the Degree Program and of the individual training activities to be recognised.

Recognition is carried out up to the number of credits envisaged by the didactic system of the Degree Program. Failure to recognise credits must be adequately justified. Pursuant to Art. 5, c. 5-bis, of Ministerial Decree 270/2004, it is also possible to acquire CFU at other Italian universities on the basis of agreements established between the concerned institutions, in accordance with the regulations current at the time ¹⁶.

¹⁴ Art. 19 of the University Didactic Regulations.

¹⁵ Art. 19 and Art. 27, c.6 of the University Didactic Regulations.

¹⁶ Art. 6, c. 9 of the University Didactic Regulations.

2. Any recognition of CFU relating to examinations passed as single courses may take place within the limit of 36 CFU, upon request of the interested party and following the approval of the CCD. Recognition may not contribute to the reduction of the legal duration of the Degree Program, as determined by Art. 8, c. 2 of Ministerial Decree 270/2004, except for students who enrol while already in possession of a degree of the same level¹⁷.
3. With regard to the criteria for the recognition of CFU acquired in extra-curricular activities, within the limit of 12 CFU the following activities may be recognised:
 - Professional knowledge, skills, and certified skills, taking into account the congruence of the activity carried out and/or of the certified skill with the aims and objectives of the Degree Program as well as the hourly commitment of the duration of the activity.
 - Knowledge and skills acquired in post-secondary-level training activities, which the University contributed to developing and implementing.

Art. 15

Criteria for enrolment in individual teaching courses

Enrolment in individual teaching courses, provided for by the University Didactic Regulations¹⁸, is governed by the "University Regulations for enrolment in individual teaching courses activated as part of the Degree Program"¹⁹.

Article 16

Features and modalities for the final examination

Source: SUA

Framework: A5a (RAD) and A5b

Article 17

Guidelines for traineeship and internship

1. Students enrolled in the Degree Program may decide to carry out internships or training periods with organisations or companies that have an agreement with the University. Traineeship and internship are not compulsory and contribute to the award of credits for the other training activities chosen by the student and included in the study plan, as provided for by Art. 10, par. 5, letters d and e, of Ministerial Decree 270/2004²⁰.
2. The CCD regulates the modalities and characteristics of traineeship and internship with specific regulations.
3. The University of Naples Federico II, through the offices, ensures constant contact with the world of work to offer students and graduates of the University concrete opportunities for internships and work experience and to promote their professional integration.

Article 18

Disqualification of student status²¹

A student who has not taken any examinations for eight consecutive academic years incurs forfeiture unless his/her contract stipulates otherwise. In any case, forfeiture shall be notified to the student by certified e-mail or other suitable means attesting to its receipt.

¹⁷ Art. 19, c. 4 of the University Didactic Regulations.

¹⁸ Art. 19, c. 4 of the University Didactic Regulations.

¹⁹ R.D. No. 348/2021.

²⁰ Traineeships ex letter d can be both internal and external; traineeships ex letter e can only be external.

²¹ Art. 24, c. 5 of the University Didactic Regulations.

Article 19

Teaching tasks, including supplementary teaching, guidance, and tutoring activities

1. Professors and researchers carry out the teaching load assigned to them in accordance with the provisions of the RDA and the Regulations on the teaching and student service duties of professors and researchers and on the procedures for self-certification and verification of actual performance²².
2. Professors and researchers must guarantee at least two hours of reception every 15 days (or by appointment in any case granted no longer than 15 days) and, in any case, guarantee availability by e-mail.
3. The tutoring service has the task of orienting and assisting students throughout their studies and of removing the obstacles that prevent them from adequately benefiting from attending courses, also through initiatives tailored to the needs and aptitudes of individuals.
4. The University ensures guidance, tutoring and assistance services and activities to welcome and support students. These activities are organised by the Schools and/or Departments under the coordination of the University, as established by the RDA in Article 8.

Article 20

Evaluation of the quality of the activities performed

1. The Didactic Coordination Commission implements all the quality assessment forms of teaching activities envisaged by the regulations in force according to the indications provided by the University Quality Presidium.
2. In order to guarantee the quality of teaching to the students and to identify the needs of the students and all stakeholders, the University of Naples Federico II uses the Quality Assurance (QA)²³ System, developed in accordance with the document "Self-evaluation, Evaluation and Accreditation of the Italian University System" of ANVUR, using:
 - surveys on the degree of placement of graduates into the world of work and on post-graduate needs;
 - data extracted from the administration of the questionnaire to assess student satisfaction for each course in the curriculum, with questions relating to the way the course is conducted, teaching materials, teaching aids, organisation, facilities.

The requirements deriving from the analysis of student satisfaction data, discussed and analysed by the Teaching Coordination Committee and the Joint Teachers' and Students' Committee (CPDS), are included among the input data in the service design process and/or among the quality objectives.
3. The QA System developed by the University implements a process of continuous improvement of the objectives and of the appropriate tools to achieve them, ensuring that planning, monitoring, and self-assessment processes are activated in all the structures to allow the prompt detection of problems, their adequate investigation, and the design of possible solutions.

Article 21

Final Rules

²² R.D No. 2482//2020.

²³ The Quality Assurance System, based on a process approach and adequately documented, is designed in such a way as to identify the needs of the students and all stakeholders, and then translate them into requirements that the training offer must meet.

The Department Council, on the proposal of the CCD, submits any proposals to amend and/or supplement these Rules for consideration by the Academic Senate.

Article 22

Publicity and Entry into Force

1. These Rules and Regulations shall enter into force on the day following their publication on the University's official notice board; they shall also be published on the University website. The same forms and methods of publicity shall be used for subsequent amendments and additions.
2. Annex 1 (CdS structure) and Annex 2 (Teaching/Activity course sheet) are integral parts of this Didactic Regulations.



ANNEX 1

DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING (CLASS LM-28)

A.Y. 2026-27

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

STUDY PLAN A.Y. 2026-27

KEY

TYPE OF EDUCATIONAL ACTIVITY (TAF):

A = Basic

B = Characterising

C = Related or Supplementary

D = At the student's choice

E = Final examination and language knowledge

F = Further training activities

Year 1									
Course Title	SSD	Module	Credits	Hours	Type of Activities (lectures, workshop, ecc.)	Course modality (in person, by distance)	TAF	Disciplinary area	Mandatory/optional
SEMESTER 1									
Automatica	IINF-04/A ING-INF/04		6	48	Lecture	In person	C	Related or supplementary activity	Mandatory
Campi quasi-stazionari e applicazioni	IJET-01/A ING-IND/31		12	96	Lecture	In person	B	Electrical Engineering	Mandatory
Strumentazione numerica di misura	IMIS-01/B ING-INF/07		12	96	Lecture	In person	B	Electrical Engineering	Mandatory
SEMESTER 2									
Dinamica dei convertitori elettrici	IIND-08/A ING-IND/32		6	48	Lecture	In person	B	Electrical Engineering	Mandatory
Macchine elettriche e simulazioni	IIND-08/A ING-IND/32		6	48	Lecture	In person	B	Electrical Engineering	Mandatory
Attività formative affini a scelta dello studente dalla Tabella "B"			A-6	48	Lecture	In person	C	Related or supplementary activity	Student's choice
Modellistica dei sistemi elettrici	IIND-08/B ING-IND/33		12	96	Lecture	In person	B	Electrical Engineering	Mandatory

Year 2									
Course Title	SSD	Module	Credits	Hours	Type of Activities (lectures, workshop, ecc.)	Course modality (in person, by distance)	TAF	Disciplinary area	Mandatory/optional
SEMESTRE 1									
Mandatory Course (student's choice program from tab. II.1, II.2, II.3)	IIND-08/A ING-IND/32	Module 1 and 2	15	120	Lecture /Laboratory	In person	B	Electrical Engineering	Student's choice
Mandatory Course (student's choice program from tab. II.1, II.2, II.3)	IIND-08/B ING-IND/33	Module 1	9	72	Lecture /Laboratory	In person	B	Electrical Engineering	Student's choice

Student's choice program from tab. A.1, A.2, A.3)	Characterizing		0≤A≤6	48	Lecture /Laboratory	In person	B	Electrical Engineering	Student's choice
Program chosen autonomously by student			0≤A≤9	72	Lecture /Laboratory	In person	D		Student's choice
SEMESTER 2									
Mandatory Course (student's choice program from tab. II.1, II.2, II.3)	IIND-08/BING-IND/33	Module 2	6	48	Lecture /Laboratory	In person	B	Electrical Engineering	Student's choice
Student's choice program from tab. A.1, A.2, A.3)	Characterizing		6-A	48	Lecture /Laboratory	In person	B	Electrical Engineering	Student's choice
Program chosen autonomously by student			9-A	72	Lecture /Laboratory	In person	D		Student's choice
Further training activities ⁽¹⁾			3		Lecture /Laboratory	In person	F		Student's choice
Final verification			12		Lecture	In person	E		

The 3 credits intended for "Further knowledge" can be acquired in whole or in part through external internships or seminars organized by the Degree Course, possibly with the contribution of external companies; to start an internship you must have obtained at least 80 credits from the master's degree course.

List of propaedeuticities: none.

The second year of the course includes three structured paths as shown in the following tables II.1, II.2 and II.3. The student must choose only one of the three path and follow the courses provided in the chosen path.

Year 2: ELECTRIC MOBILITY PATH (Tab. II.1)									
Course Title	SSD	Module	Credits	Semester	Hour	Type of Activities	TAF	Disciplinary area	Mandatory/optional
Propulsione elettrica	IIND-08/AING-IND/32	Module 1: Azionamenti elettrici con progetto di controllo digitale	9	I	72	Lecture /Laboratory	B	Electrical Engineering	Mandatory
		Module 2: Sistemi di accumulo per reti e mobilità	6	I	48				
Sistemi Elettrici per la mobilità	IIND-08/BING-IND/33	Module 1: Pianificazione e Gestione dei Sistemi Elettrici	9	I	72	Lecture /Laboratory	B	Electrical Engineering	Mandatory

		Module 2: Sistemi Elettrici per i Trasporti	6	II	48				
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A.1 Table of curricular choices for ELECTRIC MOBILITY

Course title	SSD	Semester	Credits	Hours	Type of activity	TAF	Disciplinary area	Mandatory /optional
Tecniche e soluzioni innovative per l'efficientamento dei sistemi di trasporto	IIND-08/B ING-IND/33	II	6	48	Lecture /Laboratory	B	Electrical Engineering	Student's choice
Sistemi elettrici di bordo	IIND-08/B ING-IND/33	II	6	48	Lecture /Laboratory	B	Electrical Engineering	Student's choice
Electric and hybrid vehicles (Engl)	IIND-08/A ING-IND/32	II	6	48	Lecture /Laboratory	B	Electrical Engineering	Student's choice
Propulsione ferroviaria	IIND-08/A ING-IND/32	II	6	48	Lecture /Laboratory	B	Electrical Engineering	Student's choice
Misure e collaudi su macchine e impianti elettrici	IMIS-01/B ING-INF/07	II	6	48	Lecture /Laboratory	B	Electrical Engineering	Student's choice

Year 2: ELECTRICAL ENERGY AND SMART GRID PATH (Tab. II.2)

Course Title	SSD	Module	Credits	Semester	Hour	Type of Activities	TAF	Disciplinary area	Mandatory/optional
Generazione da fonti rinnovabili e accumulo dell'energia elettrica	IIND-08/A ING-IND/32	Module 1: Sistemi di generazione fotovoltaica e eolica	6	I	48	Lecture /Laboratory	B	Electrical Engineering	Obbligatorio di orientamento
		Module 2: Sistemi di accumulo per reti e mobilità con project work	9	I	72				
Energia Elettrica e Reti Intelligenti	IIND-08/A ING-IND/33	Module 1: Pianificazione e Gestione dei Sistemi Elettrici	9	I	72	Lecture /Laboratory	B	Electrical Engineering	Obbligatorio di orientamento
		Module 2: Smart Grid e Risorse Energetiche Distribuite	6	II	48				

A.2 Table of curricular choices for ELECTRICITY AND SMART GRID								
Course title	SSD	Semester	Credits	Hours	Type of activity	TAF	Disciplinary area	Mandatory/optional
Modellistica dei Mercati dell'energia elettrica	IIND-08/B ING-IND/33	I	6	48	Lecture /Laboratory	B	Electrical Engineering	Student's choice
Integrazione delle fonti rinnovabili e dei vettori energetici	IIND-08/B ING-IND/33	II	6	48	Lecture /Laboratory	B	Electrical Engineering	Student's choice
Plasmi e fusione termonucleare	IJET-01/A ING-IND/31	II	9	72	Lecture /Laboratory	D	Electrical Engineering	Student's choice (*)
Sensori e Smart Metering	IMIS-01/B ING-INF/07	II	9	72	Lecture /Laboratory	D	Electrical Engineering	Student's choice (*)
Reti elettriche complesse e simulazione circuitale	IJET-01/A ING-IND/31	I	9	72	Lecture /Laboratory	D	Electrical Engineering	Student's choice (*)
Elettronica industriale di potenza	IIND-08/A ING-IND/32	I	6	48	Lecture /Laboratory	B	Electrical Engineering	Student's choice

(*) Recommended as an autonomous choice

Year 2: INDUSTRIAL AND DESIGN PATH (Tab. II.3)									
Course Title	SSD	Module	Credits	Semester	Hour	Type of Activities (lezione frontale, laboratorio ecc.)	TAF	Disciplinary area	Mandatory/optional
Sistemi di generazione e utilizzazione per l'industria	IIND-08/A ING-IND/32	Module 1: Azionamenti elettrici con progetto di controllo digitale	9	I	72	Lecture /Laboratory	B	Electrical Engineering	Obbligatorio di orientamento
		Module 2: Sistemi di generazione fotovoltaica e eolica	6	I	48				
Sistemi Elettrici per l'Industria	IIND-08/B ING-IND/33	Module 1: Metodologie di progettazione e degli impianti elettrici	9	I	72	Lecture /Laboratory	B	Electrical Engineering	Obbligatorio di orientamento
		Module 2: Elettificazione degli usi finali	6	II	48				

A.3 Table of curricular choices for INDUSTRIAL and DESIGN								
Course title	SSD	Semester	Credits	Hours	Type of activity	TAF	Disciplinary area	Mandatory/optional
Modellistica dei Mercati dell'energia elettrica	IIND-08/B ING-IND/33	I	6	48	Lecture /Laboratory	B	Electrical Engineering	Student's choice
Automazione dei Sistemi Elettrici	IIND-08/B ING-IND/33	II	6	48	Lecture /Laboratory	B	Electrical Engineering	Student's choice
Design of electric machines (Engl)	IIND-08/A ING-IND/32	II	6	48	Lecture /Laboratory	B	Electrical Engineering	Student's choice
Modelli numerici per campi, circuiti e sistemi	IJET-01/A ING-IND/31	I	9	72	Lecture /Laboratory	D	Electrical Engineering	Student's choice (*)
Misure e collaudi su macchine e impianti elettrici	IMIS-01/B ING-INF/07	II	6	48	Lecture /Laboratory	B	Electrical Engineering	Student's choice
Elettronica industriale di potenza	IIND-08/A ING-IND/32	I	6	48	Lecture /Laboratory	B	Electrical Engineering	Student's choice
Tecnica e diagnostica di isolamenti in Alta Tensione	IJET-01/A ING-IND/31	II	6	48	Lecture /Laboratory	B	Electrical Engineering	Student's choice

(*) Recommended as an autonomous choice. Offered within the Degree Programme in Electronic Engineering

Tabella B: Additional curricular educational activities chosen by the student (within the “Related and Supplementary Training Activities” area)

Course or Training activity	Credits	Semester	SSD	TAF	Ambito Disciplinare	Propedeuticità
Fondamenti di economia manageriale per l'ingegneria	6	I	ECON-04/A SECS-P/06	C	Related or supplementary activity	
Nozioni giuridiche fondamentali	6	I	GIUR-01/A IUS-01	C	Related or supplementary activity	
Sistemi energetici innovativi	6	I	IIND-06/A ING-IND/08	C	Related or supplementary activity	
Metodi matematici per l'ingegneria	6	I	MATH-03/A MAT/05	C	Related or supplementary activity	
Elementi di meccanica strutturale e del metodo degli elementi finiti	6	II	CEAR-06/A ICAR/08	C	Related or supplementary activity	
Dinamica delle macchine	6	II	IIND-02/A ING-IND/13	C	Related or supplementary activity	
Introduzione alla Fisica quantistica	6	II	FIS/02	C	Related or supplementary activity	
Sistemi elettrochimici avanzati e sostenibili per la transizione energetica	6	II	CHEM-06/A CHIM/07	C	Related or supplementary activity	

As "autonomous-chosen" training activities, the student will be able to draw not only from the teachings in Tables A1, A2, A3, B but also, and for a total of 9 credits, from training activities indicated in the following Table C. These activities are recommended but the student can freely draw from any University teaching consistent with the educational path.

Table C: Recommended choices - "Training activities chosen autonomously by the student"

Course or Training activity	Module (if present)	Credits	SSD	Prerequisites	Hosted within
Any teaching from tables A1, A2, A3, B					
SEMESTER 1					
Dispositivi e sistemi fotovoltaici		9	IINF-01/A ING-INF/01		LM ELN
Quantum circuit electrodynamics and quantum devices (Corso in lingua inglese) cod U4764		9	IJET-01/A ING-IND/31		LM Quantum Science and Engineering (D60-P65) (**)
Economia delle Utilities e delle Infrastrutture		9	ECON-04/A SECS-P/06		LM ELT
Tecnologia, innovazione e management per l'organizzazione di eventi culturali e spettacoli		9	ECON-04/A SECS-P/06		LM ELT
SEMESTER 2					
Misure per la compatibilità elettromagnetica		9	IMIS-01/B ING-INF/07		LM IELN
Controlli non lineari per convertitori e macchine elettriche		3	IIND-08/A ING-IND/32		LM ELT
Micromagnetismo e spintronica		3	IJET-01/A ING-IND/31		LM ELT
Progettazione di controllori industriali robusti e applicazioni		6	IINF-04/A		LM AUT/ROB
Foundations of Robotic (in lingua inglese)		9	IINF-04/A		LM AUT/ROB
Reti Wireless		9	IINF-03/A ING-INF/03		LM TELMD
Electrical technologies for smart infrastructures	Smart technologies for new power infrastructures	3	IIND-08/B ING-IND/33		LM ELT
	Measurements for infrastructure monitoring	3	IMIS-01/B ING-INF/07		LM ELT
Electrical technologies for the ecological transition	Electric mobility and generation from renewables	4	IIND-08/A ING-IND/32		LM ELT
	Electric energy storage	2	IJET-01/A ING-IND/31		LM ELT

Note:

- It is not possible to include in the study plans as "curricular activities chosen from Tables A.1, A.2, A.3 and "autonomously chosen by the student" more than one course in the same scientific-disciplinary sector (SSD).
- The "compulsory orientation" courses and the "further elective orientation courses" must be selected within the same orientation.
- Courses marked with (Engl) are taught in English.

** P65 for Academic Year 26/27, D60 for the successive years.

The inclusion of any of the courses in Table C as an activity of the student's independent choice and compliance with the instructions in Notes a) and b) make the study plan automatically approved. In other cases the plan must be specifically approved by the Educational Coordination Commission of the Course

of Studies.

It is explicitly noted that:

- Students who have not taken the "Mathematical methods for engineering" exam, or an equivalent, in the degree course of origin, must necessarily include this teaching (6 CFU) in the study plan within the subject " Similar/integrative".
- The student cannot take an exam already taken during the Degree Course during the Master's Degree Course.

ENGINEERING FOR TRANSITIONS

Recognition of educational activities carried out within the interdisciplinary training pathways "Minor IT"

Students enrolled in the Master's Degree Programme in Electrical Engineering may participate in the interdisciplinary educational pathways "Minor IT – Green Technologies" and "Minor IT – Smart Infrastructures", activated by the University within the inter-university flagship project "Engineering for Transitions".

Each minor is awarded upon completion of at least 30 ECTS credits of dedicated educational activities, normally including 12 extra-curricular ECTS credits. Participation in the project requires the submission of an individual Study Plan indicating the courses selected for the minor pathway. The Study Plan will be evaluated and approved by the Degree Programme Committee in accordance with the eligibility criteria established by the Committee through a specific resolution.

ANNEX 2

DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Automatica		Teaching Language: italiano
SSD: IINF-04/A (ING-INF/04)		CREDITS: 6
Year Course: I	Tipologia di Attività Formativa: C	
Modalità di svolgimento: in person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector studies the methods and technologies for the processing of information (data and signals) aimed at automation (i.e. planning, management and control, carried out automatically) of plants, processes and dynamic systems in general . Despite the physical-structural differences existing between these types of systems, the various process classes mentioned above lend themselves to being represented, modeled and simulated, and finally managed and controlled, using methodological tools that are largely invariant with respect to the particular application domain considered.		
Objective: Introduce the student to the design of control laws for single input, single output systems, with output and state feedback.		
Propaedeutics: none		
Types of examinations and other tests: written and oral test		



ANNEX 2

DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Strumentazione numerica di misura		Teaching Language: italiano
SSD: IMIS-01/B (ING-INF/07)		CREDITS: 12
Course Year: I	Type of Educational Activity: B	
TEaching Methods: in person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The course aims to strengthen the theoretical-applicative skills of the science and technology of electrical and electronic measurements, as well as modern measurement instrumentation. The illustrated methodologies concern, in general, the modeling and metrological characterization of measurement methods, components and systems; more specifically, the extraction, interpretation and representation of measurement information conducted with the aid of automatic systems.		
Objectives: Provide the theoretical principles for the processing of analog and digital signals. Illustrate the main problems related to sampling and conversion of signals into digital form. Present the tools for the analysis of signals in the frequency domain and the problems due to spectral dispersion. Examine, with reference to the IEEE-488 standard, the methods of interfacing between a processing system and the instrumentation for data acquisition. The theoretical part of the course is accompanied by lessons conducted in the laboratory aimed at enabling the student to set up and program automatic measurement stations through the use of system design software (LabView) and to exercise his ability to define and implement control logics and measurement approaches based on digital signal processing techniques.		
Propaedeutics: none		
Types of examinations and other tests: oral		



ANNEX 2

DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Modellistica dei sistemi elettrici		Teaching Language: italiano
SSD: IIND-08/B (ING-IND/33)		CREDITS: 12 CREDITS
Course Year: I	Type of Educational Activity: B	
Teaching Methods: in person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The course contents are inherent to systems of interconnected components that use energetically significant electrical carriers and, therefore, ranges from the production to the transmission and use of electrical energy. The aspects covered include the analysis and control of systems. The tools used belong to the entire range of various electrical methodologies and include, in the application field of electrical systems, automation and power electronics, as well as the methodological aspects of safety and cost-effectiveness.		
Objectives: The training objectives of the course are the in-depth analysis of the modeling of electrical power systems in normal and fault operating conditions and the acquisition of skills in voltage and frequency regulation techniques.		
Propaedeutics: none		
Types of examinations and other tests: oral		



ANNEX 2

DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Dinamica dei convertitori elettrici		Teaching Language: italiano
SSD: IIND-08/A (ING-IND/32)		CREDITS: 6
Course Year: I	Type of Educational Activity: B	
Teaching Methods: in person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector includes studies concerning electrical machines, electrical sensors and actuators, power electronic components and converters, electrical and electronic materials, electrical drives, electrical and electronic technologies, electromechanical constructions and electrical industrial applications, and which translate basic and applicative problems of energy conversions, with the aim of making it available in the form, measure and quality necessary for the various applications in industry, in rail, cableway and road transport, in civil buildings and in services, starting from traditional and renewable energy sources.		
Objectives: The Course aims to provide the most used analysis methodologies for the formulation of the dynamic model of each electric power converter. Subsequently, the dynamic model of the main ac-dc converters (thyristor and transistor), dc-dc, dc-ac and ac-ac are obtained. Finally, in addition to studying some non-linear controls, some relevant applications of linear and non-linear controls are analyzed in the field of renewable energy, sustainable mobility and industrial automation.		
Propaedeutics: none		
Types of examinations and other tests: simulations of converter models and controls with MATLAB and oral test.		



ANNEX 2

DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Macchine elettriche e simulazioni		Teaching Language: italiano
SSD: IIND-08/A (ING-IND/32)		CREDITS: 6
Course Year: I	Type of Educational Activity: B	
Teaching Methods: in person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector includes studies concerning electrical machines, electrical sensors and actuators, power electronic components and converters, electrical and electronic materials, electrical drives, electrical and electronic technologies, electromechanical constructions and electrical industrial applications, and which translate basic and applicative problems of energy conversions, with the aim of making it available in the form, measure and quality necessary for the various applications in industry, in rail, cableway and road transport, in civil buildings and in services, starting from traditional and renewable energy sources.		
Objectives: The Course has first of all the objective of integrating the basic knowledge of electric machines and of providing the necessary tools for determining the operating characteristics and for analyzing the behavior of traditional and special rotating electric machines, in transient and of permanent behaviour.		
Propaedeutics: none		
Types of examinations and other tests: oral		



ANNEX 2

DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Campi quasi stazionari e applicazioni		Teaching Language: italiano
SSD: IIET-01/A (ING-IND/31)		CREDITS: 12
Course Year: I	Type of Educational Activity:: B	
Teaching Methods: in person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector studies the theoretical and experimental aspects and the development of the related applications of the two complementary strands of electromagnetic fields and electrical and electronic circuits in civil, industrial and information engineering. In the first line, problems of electromagnetic field, electromagnetic compatibility, magnetofluid dynamics and modeling and diagnostics of materials of electrical and magnetic interest are studied. ... The two complementary approaches are applied to the analysis, synthesis, numerical modeling and automatic design of electrical equipment, devices and systems,		
Objectives: The course aims to delve deeper into electromagnetism both in general and in particular with regard to the aspects connected to quasi-stationary approximate models of the electromagnetic field, to the point of reducing the field models to lumped parameter circuit models and distributed within applications of interest to electrical engineering.		
Propaedeutics: none		
Propaedeutics for: none		
Types of examinations and other tests: oral		



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Propulsione elettrica		Teaching Language: Italiano	
SSD: IIND-08/A (ING-IND/32) Modulo 1 : Azionamenti elettrici con progetto di controllo digitale Modulo 2 : Sistemi di accumulo per reti e mobilità		CREDITS: 15 CREDITS Modulo 1: 9 CREDITS Modulo 2: 6 CREDITS	
Course Year: II		Type of Educational Activity:: B	
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector studies electrical machines, electrical sensors and actuators, power electronic components and converters, electrical and electronic materials, electrical drives, electrical and electronic technologies, electromechanical constructions. It addresses basic and applicative problems of energy conversions, with the aim of making it available in the form, size and quality necessary for the various applications in rail, cableway and road transport. For these topics, the studies involve, in addition to traditional electrical methodologies, also those of power electronics, control devices, automation systems and processes and mechatronics, aimed at studying their behavioral models in a static and dynamic regime. The studies also extend to the integration of components into systems, to the management of conversion processes in transport energy systems.			
Objectives: Acquisition of the analysis and synthesis methodologies necessary for understanding the operating characteristics of controlled electric drives and their integration with the main electrical energy storage devices in the electric/hybrid propulsion systems of isolated vehicles or those connected to electrical networks. Acquisition of the relevant sizing and performance optimization methodologies, real-time simulation methods and experimental implementation of control techniques.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test, with discussion of a project.			

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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Sistemi Elettrici per la mobilità (Course divided into two modules)		Teaching Language: Italiano
SSD: IIND-08/B (ING-IND/33) Module 1: Pianificazione e Gestione dei Sistemi Elettrici Module 2: Sistemi Elettrici per i Trasporti		CREDITS: 15 CREDITS Module 1: 9 CREDITS Module 2: 6 CREDITS
Course Year: II	Type of Educational Activity: B	
Eaching Methods: in person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The course contents are inherent to systems of interconnected components that use energetically significant electrical carriers and, therefore, ranges from the production to the transmission and use of electrical energy. The aspects covered include the analysis and control of systems. The tools used belong to the entire range of various electrical methodologies and include, in the application field of electrical systems, automation and power electronics, as well as the methodological aspects of safety and cost-effectiveness.		
Objectives: The course's preliminary objective is to provide students with knowledge of the main planning and management problems of Smart Grids and to provide the tools for steady state and transient modeling and for the design of such systems. The aspects of electrical systems for transport are then explored in depth, providing knowledge of electrical systems for urban and extra-urban mobility, with particular reference to the analysis of constrained driving transport systems. The course expands training in the electrical system sector through the examination of electrical diagrams, design, planning, management and operation methods of electrical systems for mobility in the context of the liberalized transport sector.		
Propaedeutics: none Propaedeutics for: none		
Types of examinations and other tests: Oral test, with discussion of a project.		



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Generazione da fonti rinnovabili e accumulo dell'energia elettrica		Teaching Language: italiano	
SSD: IIND-08/A (ING-IND/32) Module I : Sistemi di generazione fotovoltaica ed eolica Module II : Sistemi di accumulo per reti e mobilità con project work		CREDITS: Modulo I: 6 CREDITS Modulo II: 9 CREDITS	
Course Year: II		Type of Educational Activity: B	
Eaching Methods: in person			
Contents extracted from the SSD declaration consistent with the training objectives of the course: The sector studies electrical machines, power electronic components and converters, electrical and electronic materials, electrical and electronic technologies, electromechanical constructions and electrical industrial applications. It addresses basic and applicative problems of energy conversions, with the aim of making it available in the form, measure and quality necessary for different applications starting from traditional and renewable energy sources. For these topics, the studies involve, in addition to traditional electrical methodologies, also those of power electronics, control devices, automation systems and processes, aimed at studying their behavioral models in a static and dynamic regime. The studies also extend to the integration of components in systems, the management of conversion processes in energy systems, the quality and safety of electrical conversion systems, and electrical energy.			
Objectives: Acquisition of the methodologies of analysis, sizing, control and optimization of the performance of electricity generation systems from photovoltaic and wind sources with also reference to their integration into electricity networks. Acquisition of the operating characteristics of electrical energy storage systems, together with the sizing and interfacing methodologies with electrical networks. Acquisition of the relevant real-time simulation methods and experimental implementation of control techniques.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test, with discussion of a project.			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Energia elettrica e reti intelligenti (Course composed by two modules)		Teaching Language: italiano
SSD: IIND-08/B (ING-IND/33)		CREDITS: 15
Module 1: Pianificazione e Gestione dei Sistemi Elettrici		Module 1: 9 CREDITS
Modulo 2: Smart Grid e Risorse Energetiche Distribuite		Module 2: 6 CREDITS
Course Year: II	Type of Educational Activity: B	
Teaching Methods: in person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The course contents are inherent to systems of interconnected components that use energetically significant electrical carriers and, therefore, ranges from the production to the transmission and use of electrical energy. The aspects covered include the analysis and control of systems. The tools used belong to the entire range of various electrical methodologies and include, in the application field of electrical systems, automation and power electronics, as well as the methodological aspects of safety and cost-effectiveness.		
Objectives: The course's preliminary objective is to provide students with knowledge of the main planning and management problems of Smart Grids and to provide the tools for steady state and transient modeling and for the design of such systems. The course has the further objective of providing students with knowledge of the main basic plant engineering aspects of intelligent networks (Smart Grids). In particular, the topics of the course include: a) definitions, operating conditions and main structures; b) the study of distributed energy resources (controllable loads, storage systems and distributed generation) and their coordination and impact with the power network; c) a general framework relating to the problems of energy forecasting and reliability and quality of the electricity service.		
Propaedeutics: none		
Propaedeutics for: none		
Types of examinations and other tests: Oral test, with discussion of a project.		



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Sistemi di generazione e utilizzazione per l'industria		Teaching Language: italiano	
SSD: IIND-08/A (ING-IND/32) Module 1 : Azionamenti elettrici con progetto di controllo digitale Module 2 : Sistemi di generazione fotovoltaica e eolica		CREDITS: Module 1: 9 CREDITS Module 2: 6 CREDITS	
Course Year: II		Type of Educational Activity: B	
Teaching Methods: in person			
Contents extracted from the SSD declaration consistent with the training objectives of the course: The sector studies electrical machines, electrical sensors and actuators, power electronic components and converters, electrical drives, electrical and electronic technologies, electrical industrial applications. It addresses basic and applicative problems of energy conversions, with the aim of making it available in the form, measure and quality necessary for the various applications in industry and transport, starting from traditional and renewable energy sources. The studies involve not only traditional electrical methodologies, but also those of power electronics, control devices, automation systems and processes and mechatronics, aimed at studying their behavioral models in a static and dynamic regime. The studies extend to the integration of components in systems, the management of conversion processes in energy systems, the quality and safety of electrical conversion systems, and electrical energy.			
Objectives: Acquisition of the analysis and synthesis methodologies necessary for understanding the operating characteristics of controlled electric drives and their integration into complex industrial systems. Acquisition of the relevant real-time simulation methods and experimental implementation of control techniques. Acquisition of methodologies for the analysis, sizing and optimization of the performance of electricity generation systems from photovoltaic and wind sources, also for industrial applications.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test, with discussion of a project.			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Sistemi elettrici per l'industria (Course composed by two modules)		Teaching Language: italiano	
SSD: IIND-08/B (ING-IND/33) Module 1: Metodologie di progettazione per gli impianti Elettrici Module 2: Elettrificazione negli usi finali		CREDITS: 15 Module 1: 9 CREDITS Module 2: 6 CREDITS	
Course Year: II		Type of Educational Activity: B	
Eaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The course contents are inherent to systems of interconnected components that use energetically significant electrical carriers and, therefore, ranges from the production to the transmission and use of electrical energy. The aspects covered include the analysis and control of systems. The tools used belong to the entire range of various electrical methodologies and include, in the application field of electrical systems, automation and power electronics, as well as the methodological aspects of safety and cost-effectiveness.			
Objectives: Provide students of the LM in Electrical Engineering, upon completion of the basic training on medium and low voltage electrical systems, with specific electrical safety skills and methodologies for developing electrical system projects in the civil and industrial sectors and in general in the electrification in end uses.			
Propaedeutics: none Propaedeutics for; none			
Types of examinations and other tests: Oral test, with discussion of a project.			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Sistemi elettrici di bordo		Teaching Language: italiano	
SSD: IIND-08/B (ING-IND/33)		CREDITS: 6	
Course Year: II	Type of Educational Activity: B		
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The course studies electrical energy systems and systems in relation to applications to systems of interconnected components that use energetically significant electrical carriers and relating to the use of electrical energy in transport systems. This context includes, in particular, topics such as electrical safety, automation, reliability and diagnostics of electrical systems and electrical energy management, as well as on-board electrical systems, systems for electrified transport and multifaceted range of special electrical systems, from home automation to various computerized systems. The aspects covered include the analysis, planning, design, implementation, management and control of systems. The tools used belong to the entire range of various electrical methodologies and include, in the application field, electrical systems and automation.			
Objectives: The Course aims to integrate basic knowledge of electrical systems for mobility and to provide the necessary tools for the analysis and design of on-board electrical systems in free-driving and restricted-driving vehicles.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: oral			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Electric and hybrid vehicles		Teaching Language: English	
SSD: IIND-08/A (ING-IND/32)		CREDITS: 6	
Course Year: II	Type of Educational Activity: B		
Eaching Methods: in person			
Contents extracted from the SSD declaration consistent with the training objectives of the course: The sector studies electrical machines, electrical sensors and actuators, power electronic components and converters, electrical drives, electrical and electronic technologies, electrical industrial applications. It addresses basic and applicative problems of energy conversions, with the aim of making it available in the form, measure and quality necessary for the various applications in industry and transport, starting from traditional and renewable energy sources. The studies involve not only traditional electrical methodologies, but also those of power electronics, control devices, automation systems and processes and mechatronics, aimed at studying their behavioral models in a static and dynamic regime. The studies extend to the integration of components in systems, the management of conversion processes in energy systems, the quality and safety of electrical conversion systems, and electrical energy.			
Objectives: The objective is to enable the student to set up and solve design and control problems of an electric and hybrid powertrain and the energetic management of edge sources.			
Propaedeutics: none Propaedeutics for: none			
Types of examinations and other tests: oral			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Propulsione ferroviaria		Teaching Language: italiano	
SSD: IIND-08/A (ING-IND/32)		CREDITS: 6	
Course Year: II		Type of Educational Activity: B	
Eaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector includes studies concerning electrical machines, electrical sensors and actuators, power electronic components and converters, electrical and electronic materials, electrical drives, electrical and electronic technologies, electromechanical constructions and electrical industrial applications, and which translate basic and applicative problems of energy conversions, with the aim of making it available in the form, measure and quality necessary for the various applications in rail, cableway and road transport, starting from traditional and renewable energy sources. For these topics, the studies involve, in addition to traditional electrical methodologies, also those of industrial power electronics, control devices, automation systems and processes and mechatronics, aimed at studying their behavioral models in static and dynamic regimes. . The studies extend to the integration of components into systems and the management of conversion processes in transport energy systems.			
Objectives: Acquisition of fundamental knowledge for the choice, sizing and determination of the operating characteristics of the propulsion systems of rail transport and guided vehicles.			
Propaedeutics: none Propaedeutics for: none			
Types of examinations and other tests: oral			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Misure e collaudo su macchine e impianti elettrici		Teaching Language: italiano	
SSD: IMIS-01/B (ING-INF/07)		CREDITS: 6	
Course Year: II		Type of Educational Activity: B	
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The contents of the course include the research areas and theoretical-applicative skills of the science and technology of electrical and electronic measurements, as well as modern measurement instrumentation. The sector's own methodologies concern the modeling and metrological characterization of measurement methods, components and systems; the extraction, interpretation and representation of measurement information. Research topics include the design, implementation and characterization of measurement methods, components and systems, with particular attention to improving the metrological performance obtained.			
Objectives: The course, of a theoretical-applicative nature, has the objective of teaching students to design and carry out the testing of an electric machine or a low voltage electrical system. In particular, students acquire: - knowledge of the reference CEI standards; - knowledge of the instrumentation and measurement methods used; - skills for the design of an automatic measuring station for testing; - skills for programming, in the LabVIEW and Matlab environment, the control software of the testing station, for the execution of measurements, data processing, presentation of the results of interest.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test, with discussion of a project.			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Tecniche e soluzioni innovative per l'efficientamento dei sistemi di trasporto		Teaching Language: italiano	
SSD: IIND-08/B (ING-IND/33)		CREDITS: 6	
Course Year: II	Type of Educational Activity: B		
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector refers to systems of interconnected components that use energetically significant electrical carriers and, therefore, ranges from production from traditional and alternative sources, with cogeneration and storage, to the distribution and use of electrical energy. More specifically, topics such as automation and electricity management are covered. Aspects relating to the planning, management and control of systems are examined. The tools used belong to the entire range of various electrical methodologies and include, in the application area, the methodological aspects of quality and cost-effectiveness. Environmental aspects are also included.			
Objectives: The aim of the course is to present innovative technological techniques and solutions that find application for the efficiency of electrified transport systems. The object of the course is, in particular, the analysis of land transport systems. The course expands training in the electrical system sector through the examination of electrical diagrams, sizing and operation criteria of innovative electrical systems in the context of the liberalized transport sector. The final skills will be a synthesis of theoretical analyzes and numerical simulation activities.			
Propaedeutics: none Propaedeutics for: none			
Types of examinations and other tests: Oral test, with discussion of a project.			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Integrazione delle fonti rinnovabili e dei vettori energetici		Teaching Language: italiano	
SSD: IIND-08/B (ING-IND/33)		CREDITS: 6	
Course Year: II		Type of Educational Activity:: B	
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector refers to systems of interconnected components that use energetically significant electrical carriers and, therefore, ranges from production from traditional and alternative sources, with cogeneration and storage, to the distribution and use of electrical energy. More specifically, topics such as automation and electricity management are covered. Aspects relating to the planning, management and control of systems are examined. The tools used belong to the entire range of various electrical methodologies and include, in the application area, the methodological aspects of quality and cost-effectiveness. Environmental aspects are also included.			
Objectives: The objective of the course is the analysis of the problems and related solutions that arise in operating, in various applications, the integration of energy systems of various types of renewable sources with the presence of multiple energy carriers and multiple conversion systems.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Modellistica dei mercati dell'energia elettrica		Teaching Language: italiano	
SSD: IIND-08/B (ING-IND/33)		CREDITS: 6	
Course Year: II		Type of Educational Activity: B	
Eaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector refers to systems of interconnected components that use energetically significant electrical carriers and, therefore, ranges from production from traditional and alternative sources, with cogeneration and storage, to the distribution and use of electrical energy. More specifically, topics such as automation and electricity management are covered. Aspects relating to the planning, management and control of systems are examined. The tools used belong to the entire range of various electrical methodologies and include, in the application area, the methodological aspects of quality and cost-effectiveness. Environmental aspects are also included.			
Objectives: The course aims to provide students with the basic knowledge and tools necessary for the analysis of the main problems relating to energy exchange in the context of liberalized electricity markets. In particular, the topics covered by the course include: a) the basic elements of electricity markets at a national and international level; b) the study of the main mechanisms for the exchange of energy and network services in electricity systems operating under a free market regime; c) modeling for the study of the electricity exchange mechanisms and network services necessary for the safe and reliable operation of the electricity system.			
Propaedeutics: none			
Propaedeutics for:none			
Types of examinations and other tests: Oral test			

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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Plasmi e fusione termonucleare		Teaching Language: italiano	
SSD: IIET-01/A (ING-IND/31)		CREDITS: 9	
Course Year: II		Type of Educational Activity:: D	
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector studies the theoretical and experimental aspects and the development of the related applications of the two complementary strands of electromagnetic fields and electrical and electronic circuits in engineering (...) The two complementary approaches are applied to analysis, synthesis, numerical modeling and automatic design of electrical equipment, devices and systems, plasma engineering, thermonuclear fusion (...)			
Objectives: This is a specialized course focused on the basic elements of plasma physics and on the electromagnetic aspects of controlled fusion machines and in particular on the control of shape, position and current of the plasma in a tokamak.			
Propaedeutics: none Propaedeutics for: none			
Types of examinations and other tests: Oral test			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course:		Teaching Language:	
Reti elettriche complesse e simulazione circuitale		italiano	
SSD: IIET-01/A (ING-IND/31)		CREDITS: 9	
Course Year: II	Type of Educational Activity: D		
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector studies the theoretical and experimental aspects of the two complementary strands of electromagnetic fields and circuits and the development of related applications in the various sectors of engineering. ... In the second strand, electrical and electronic, signal and power circuits, nanocircuits, biocircuits and related models are studied: linear, non-linear and time-variant, lumped and distributed parameters, analog and digital, neural. The two complementary approaches are applied to the analysis, synthesis, physical and numerical modeling and automatic design of electrical and electronic equipment, devices and systems...			
Objectives: Enrich the baggage of methodologies and tools for the analysis of circuits, both theoretical and numerical, in view of the analysis of complex networks; introduce the main non-linear phenomenologies and complex dynamics, also in relation to application examples; develop the ability to qualitatively and numerically analyze complex circuits and networks by integrating knowledge of numerical models and circuit simulation.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Elettronica industriale di potenza		Teaching Language: italiano	
SSD: IIND-08/A (ING-IND/32)		CREDITS: 6	
Course Year: II		Type of Educational Activity: B	
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector includes studies concerning converters, electrical and electronic materials, electrical and electronic technologies that translate basic and applicative problems of energy conversions, with the aim of making it available in the form, measure and quality necessary for the different applications in the industry, in rail, cableway and road transport, in civil buildings and services, starting from traditional and renewable energy sources. For these topics, the studies involve, in addition to traditional electrical methodologies, also those of industrial power electronics, control devices, automation systems and processes and mechatronics, aimed at studying their behavioral models in static and dynamic regimes. . The studies extend both to the integration of components into systems and to the management of conversion processes in energy systems for industry, transport and the tertiary sector.			
Objectives: The course is oriented towards an in-depth study and broadening of topics relating to industrial power electronics. After a reference to the main configurations in the course, the criteria for the executive design and control of the electronic converters most used in industrial power electronics are provided.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test and discussion of a project.			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Sensori e smart metering	Teaching Language: italiano
SSD: IMIS-01/B (ING-INF/07)	CREDITS: 9
Course Year: II	Type of Educational Activity: D
Eaching Methods: in person	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The contents of the course include the research areas and theoretical-applicative skills of the science and technology of electrical and electronic measurements, as well as modern measurement instrumentation. The sector's own methodologies concern the modeling and metrological characterization of measurement methods, components and systems; the extraction, interpretation and representation of measurement information. Research topics include the design, implementation and characterization of measurement methods, components and systems, with particular attention to improving the metrological performance obtained.	
Objectives: The aim of the course is to provide the ability to independently design and develop measurement systems based on analog and digital sensors, measurement transducers, and on low-cost microcontroller hardware architectures for the numerical processing of the acquired signals. Particular attention is paid to the identification of the metrological characteristics of the sensors, both static and dynamic, for the most appropriate choice with respect to the project requirements, and on the creation of appropriate conditioning circuits. Attention is also focused on the main parameters of signal acquisition, on the optimal use of the hardware resources made available by a microcontroller, on the writing of efficient measurement algorithms in low and higher level C language and on how evaluate the metrological performance of the developed instrument. The course lays the foundations for the development of Smart Metering architectures for advanced monitoring applications in Smart Grids.	
Propaedeutics: none	
Propaedeutics for: none	
Types of examinations and other tests: Oral test and discussion of a project.	



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Automazione dei sistemi elettrici		Teaching Language: italiano	
SSD: IIND-08/B (ING-IND/33)		CREDITS: 6	
Course Year: II		Type of Educational Activity: B	
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector studies electrical and electronic energy systems and systems. The spectrum of applications considered extends to all systems of interconnected components that use energetically significant electrical carriers and refers, in particular, to the use of electrical energy in civil constructions, industry and the tertiary sector. This context includes, in particular, topics such as electrical safety and automation, as well as electricity management and the multifaceted range of special electrical systems, from home automation to various computerized systems. The aspects covered include the analysis, implementation, management and control of systems. The tools used belong to the entire range of various electrical methodologies and include, in the application field of electrical systems, automation, information technology, power electronics and the methodological aspects of cost-effectiveness.			
Objectives: The training objective of the course is the acquisition of skills on control strategies and automation techniques of electrical systems, in particular, in industrial contexts.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test			

ANNEX 2

DEGREE PROGRAM DIDACTIC REGULATIONS

IN ELECTRICAL ENGINEERING

CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Design of electric machines		Teaching Language: English	
SSD: IIND-08/A (ING-IND/32)		CREDITS: 6	
Course Year: II	Type of Educational Activity:: B		
Eaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector includes studies that concern electrical machines, electrical and electronic materials, electrical drives, electrical and electronic technologies, electromechanical constructions, and which translate basic and applicative problems of energy conversion, with the aim of making it available in the form, measurement and in the quality needed for different applications.			
Objectives: Acquisition of methodologies and procedures for the sizing and design of rotating electrical machines, with particular reference to asynchronous machines for industrial applications.			
Propaedeutics: in ingresso: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test			

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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Modelli numerici per campi, circuiti e sistemi		Teaching Language: italiano
SSD: IIET-01/A (ING-IND/31)		CREDITS: 9
Course Year: II	Type of Educational Activity:: D	
Teaching Methods: in person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector studies the theoretical and experimental aspects and the development of the related applications of the two complementary strands of electromagnetic fields and electrical and electronic circuits in engineering civil, industrial and information. In the first line, electromagnetic field problems are studied.... The two complementary approaches are applied ... to the numerical modeling and automatic design of electrical equipment, devices and systems		
Objectives: The course aims to illustrate to students the fundamental aspects of numerical modeling of interest to an electrical and information engineer, providing the basic tools for solving field problems with the calculator. The approach followed aims to mediate between the rigor required by a correct mathematical approach and the need to lead students to solve application problems more directly linked to their specific preparation. The MATLAB® programming language is used in the numerical laboratory. At the end of the course the students will be in possession of the useful tools for solving a field problem on the computer and to critically evaluate the expected characteristics of a numerical solution of a field problem, such as that which can be obtained directly with commercial codes.		
Propaedeutics: none		
Propaedeutics for: none		
Types of examinations and other tests: Oral test on program topics, in which it is also possible to discuss a paper based on an application of interest to the student.		



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Tecnica e Diagnostica di Isolamenti in Alta Tensione		Teaching Language: italiano
SSD: IIET-01/A (ING-IND/31)		CREDITS: 6
Course Year: II	Type of Educational Activity: B	
Teaching Methods: in person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector is interested in scientific and educational-training activities in the field of electrical engineering. The sector studies the theoretical and experimental aspects of the two complementary strands of electromagnetic fields and circuits and the development of related applications in the various sectors of engineering. In the first line, problems of electromagnetic field, electromagnetic compatibility, signal integrity, electro- and magneto-fluid dynamics, modeling and diagnostics of materials and systems of electrical and magnetic interest on the macro, micro and nanoscale are studied. ... The two complementary approaches are applied to the analysis, synthesis, physical and numerical modeling and automatic design of electrical equipment, devices and systems ...		
Objectives: The aim of the course is to learn the fundamental principles and phenomena connected with the application of High Voltages (HV), in order to acquire the knowledge necessary for the analysis, sizing and diagnostics of insulation subject to high electric fields.		
Propaedeutics: in ingresso:none		
Propaedeutics for: none		
Types of examinations and other tests: Oral test		

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DEGREE PROGRAM DIDACTIC REGULATIONS

IN ELECTRICAL ENGINEERING

CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Economia ed organizzazione aziendale		Teaching Language: italiano	
SSD: IEGE-01/A (ING-IND/35)		CREDITS: 6	
Course Year: I	Type of Educational Activity: C		
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector brings together skills for the integration of design, economic, organizational and management aspects in the engineering field. It is aimed at integrating design-oriented economic and management knowledge, highlighting the economic implications of projects, the relationships between design choices and company performance, the relationships between design and implementation of innovations, the methods of financing projects, the connection with the context in which the company operates.			
Objectives: The course aims to introduce students to the study of the economic and organizational problems of companies. The main training objectives of the course are the following: - Ability to analyze the economic and competitive characteristics of the market in which the company operates; - Knowledge of the methods of classifying company costs and the analysis of the production function; - Knowledge of the main types of organizational structures and the criteria for their choice.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Fondamenti di economia manageriale per l'ingegneria		Teaching Language: italiano
SSD: ECON-04/A (SECS-P/06)		CREDITS: 6
Course Year: I	Type of Educational Activity: C	
Eaching Methods: in person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector groups together the disciplines that concern the study of the economic structure with particular reference to geographical areas, production sectors and demographic evolution. The main fields of investigation are development processes; the analysis of production sectors; territorial problems of development, localization and planning; the innovation economy.		
Objectives: The course aims to provide students with a set of concepts, methods and tools useful for understanding the economic aspects of decision-making problems in the engineering field of manufacturing and service companies.		
Propaedeutics: none Propaedeutics for: none		
Types of examinations and other tests: Oral test		



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Nozioni giuridiche fondamentali		Teaching Language: italiano	
SSD: GIUR-01/A (IUS/01)		CREDITS: 6	
Course Year: I		Type of Educational Activity: C	
Eaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector includes studies relating to the private law system as it emerges from the legislation of the civil code and from its complementary laws. The studies also concern civil law, personal rights, family rights, information technology law and biolaw.			
Objectives: Introductory concepts: Law and rights; The subjects of the law; Property and other real rights: real rights and assets; the property; the real rights of enjoyment of other people's property; communion and condominium; The technical professional and contracts: Obligations and contracts; contracts; Procurement and public works: the private procurement contract; public procurement; The engineer and the practice of the profession: The professional system; the exercise of the profession.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course:		Teaching Language:	
Sistemi energetici innovativi		italiano	
SSD: IIND-06/A (ING-IND/08)		CREDITS: 6	
Course Year: I	Type of Educational Activity:: C		
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course:			
Thermal engine systems for the production of electricity and propulsion. Review of thermodynamics on plants with gas turbines and steam plants. Methods to improve the overall performance of a Thermal Engine System (IMT) and reduce the formation of CO2. Second law exergy and efficiency. Combustion and innovative fuels. Polluting emissions and methods to reduce them. Plants with gas turbines: Classification of TG; heavy duty, aeroderivative, aeronautical. Gas microturbine: general information; microgrid applications. Combined cycle plants. Mixed gas/steam systems: STIG, HAT and RWI cycle. IMT cogeneration and thermo-economic analyses. Coal gasification and biomass. Engine systems integrated with gasification systems. Fuel cells: operating principle and applications. Hybrid TG/cell systems. Solar-thermodynamic system: types and applications. ORC (Organic Rankine Cycle) systems. Geothermal systems: study and applications. Internal combustion engines: overview of the indicated cycle and characteristic quantities. Common rail diesel engine. Spark ignition engine with indirect (PFI) and direct injection (GDI). Notes on the fuels used. Dimensioned plans and power regulation. Polluting emissions from m.c.i and abatement methods. Supercharging. Engines powered by natural gas and dual/fuel engines. Hybrid propulsion system (HEV) for vehicle and aircraft applications. Hydroelectric plants. Energy storage systems.			
Objectives:			
The module provides fundamental knowledge of innovative electricity production and propulsion systems, highlighting their application aspects. The student must know how to set up and solve problems inherent to fluid machines, starting with the use of tools and methods typical of technical training.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Metodi matematici per l'ingegneria		Teaching Language: italiano	
SSD: MATH-03/A (MAT/05)		CREDITS: 6	
Course Year: I	Type of Educational Activity: C		
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector includes skills and research areas relating to mathematical analysis in all its aspects (harmonic, convex, functional, linear and non-linear), to the calculus of variations and to the theory of functions, both real and complex, as well as to the analytical theory of Numbers. The teaching skills of this sector also concern all the institutional aspects of basic mathematics.			
Objectives: The course aims to provide students with operational awareness of the fundamental concepts and results relating to the theory of analytic functions, distributions, Fourier series, Fourier and Laplace transforms and their applications.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: written and Oral test			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Elementi di meccanica strutturale e del metodo degli elementi finiti		Teaching Language: italiano	
SSD: CEAR-06/A (ICAR/08)		CREDITS: 6	
Course Year: I		Type of Educational Activity: C	
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: Basic problems of buildings concerning their response to stressing actions, their reliability and safety, their optimization and which concern statics, dynamics, instability, fracture, collapse, control of behavioral models aimed at describing this problem. These topics involve physical-mathematical modeling, computational mechanics, experimental analysis, structural identification.			
Objectives: The course aims to introduce students to the main cognitive, methodological and operational tools for analysis of the behavior of structural elements and calculation with the Finite Element Method. These tools are included in the design of elementary components or structures of interest for Electrical Engineering.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: written and Oral test			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Dinamica delle Macchine		Teaching Language: italiano	
SSD: IIND-02/A (ING-IND/1)3		CREDITS: 6	
Course Year: I		Type of Educational Activity: C	
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: Cultural and professional aspects inherent to the study of mechanical systems using the methodologies of theoretical mechanics. The typology of the machines studied is completely general; Furthermore, extensive reference is made to driving and operating machines, mechanical devices, automatic machines and robots, and vehicles. In particular, both the analysis and synthesis of the mechanical behavior of the machines and systems indicated above are studied. The analysis is divided into modeling, simulation, regulation and control of the same. Particular emphasis is placed on the study of the vibrational and tribological phenomena of the machines.			
Objectives: Provide students with the fundamental concepts and knowledge of issues relating to machine dynamics.			
Propaedeutics: none Propaedeutics for: none			
Types of examinations and other tests: written and Oral test			

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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Introduzione alla fisica quantistica		Teaching Language: italiano	
SSD: PHYS-01/A (FIS/01)		CREDITS: 6	
Course Year: I	Type of Educational Activity: C		
Eaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: It includes the skills necessary for the theoretical treatment of physical phenomena, starting from fundamental principles and laws and with the aid of adequate mathematical and computational tools, as well as the skills aimed at in-depth application of mathematics aimed at investigation, theoretical treatment and modeling of physical phenomena.			
Objectives: Provide students with basic knowledge of quantum physics in its fundamental, theoretical and phenomenological aspects.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Sistemi elettrochimici avanzati e sostenibili per la transizione energetica		Teaching Language: Italiano	
SSD: CHEM-06/A (CHIM/07)		CREDITS: 6	
Course Year: I	Type of Educational Activity: C		
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector is interested in scientific and educational - training activities in the field of the study of chemical and chemical-physical foundations in various technological fields, with particular regard to those that refer to materials, their properties and their interaction with the environment , providing a synthesis of the principles common to the different phenomenologies and the different categories of substances.			
Objectives: The course aims to provide the fundamental principles of electrochemical systems for energy conversion and storage. The following skills will be acquired: (i) Charge transfer mechanisms in first and second kind conductors (ii) Thermodynamic and kinetic aspects of the electrochemical processes that occur at the electrodes (iii) Main families of electrochemical devices (primary and secondary batteries, fuel cells)			
Propaedeutics: none			
Propaedeutics: in uscita: nessuna			
Types of examinations and other tests: Oral test			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Economia delle utilities e delle infrastrutture		Teaching Language: italiano	
SSD: ECON-04/A (SECS-P/06)		CREDITS: 9	
Course Year: II	Type of Educational Activity: D		
Eaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector groups together the disciplines that concern the study of the economic structure with particular reference to geographical areas, production sectors and demographic evolution. The main fields of investigation are development processes; the analysis of production sectors; territorial problems of development, localization and planning; the innovation economy.			
Objectives: The course presents the basic principles of quantum mechanics. Analyze quantum phenomena such as the photoelectric effect, black body radiation, and matter waves and some Elements of Nanofabrication and Conduction in Metals and Semiconductors. Understand the properties of graphene and carbon nanotubes and main Elements of Nano-Optics. By the end of this course, students should have a strong understanding of the core concepts of quantum mechanics, nanofabrication, conduction in metals and semiconductors, graphene and carbon nanotubes, and nano-optics. They should also be able to apply these concepts in practical applications and understand their significance in the field of electrical engineering.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Micromagnetismo e Spintronica		Teaching Language: italiano	
SSD: IIET-01/A (ING-IND/31)		CREDITS: 3	
Course Year: II		Type of Educational Activity: D	
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector studies the theoretical and experimental aspects and the development of the related applications of the two strands complementary fields of electromagnetic fields and electrical and electronic circuits in civil, industrial and information engineering. In the first line, problems of electromagnetic field, electromagnetic compatibility, magnetofluid dynamics and modeling and diagnostics of materials of electrical and magnetic interest are studied. ... The two complementary approaches are applied to the analysis, synthesis, numerical modeling and automatic design of electrical equipment, devices and systems,			
Objectives: Provide the fundamental elements for understanding the behavior of ferromagnetic materials on the micro- and nanometric scale, as well as spintronic devices with reference to applications in the field of electrical engineering.			
Propaedeutics: none Propaedeutics for: none			
Types of examinations and other tests: Oral test			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Electrical Technologies for Smart Infrastructures		Teaching Language: english	
SSD: Module IIND-08/B (ING-IND/33): Smart Technologies for New Power Infrastructures Module IMIS-01/B (ING-INF/07): Measurements for infrastructure monitoring		CREDITS: 6 Module IIND-08/B: 3 CREDITS Module IMIS-01/B: 3 CREDITS	
Course Year: II		Type of Educational Activity: D	
Eaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: IIND-08/B: The scientific sector of Sistemi Elettrici per l'Energia studies systems and infrastructures, which uses the electrical energy vector. The sector studies all the power infrastructures, from those of production to those of transmission, distribution and use of electrical energy. Analyzes focus on design and operation of power systems in terms of security, safety, automation, reliability and sustainability. IMIS-01/B: The module aims at enforcing the theoretical and practical skills related to the science and technology of the electrical measurements, as well as to the modern measurement instrumentation. Methods for modeling and characterizing measurement approaches, components and systems are discussed, with a focus on the sensing, interpretation and representation of the measurement information needed in infrastructures monitoring applications.			
Objectives: The goal is providing students with the knowledge of the fundamentals on the smart technologies for designing, operating, and maintaining the power infrastructures in the scenario of coming energy transition. The aim is to focus on components, devices, apparatuses and systems of power systems for generation, transmission, distribution and use of electrical energy carrier in industrial and mobility application.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test			

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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course:		Teaching Language:	
Electrical technologies for the ecological transition		english	
SSD:		CREDITS: 6	
Module 1:IIND-08/A (ING-IND/32) Electric mobility and Generation from renewables		Module (IIND-08/A): 4 CREDITS	
Module 2 SSD: IIET-01/A (ING-IND/31) Electric energy storage		Module (IIET-01/A): 2 CREDITS	
Course Year: II		Type of Educational Activity: D	
Eaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: (IIET-01/A) The sector studies the theoretical and experimental aspects and the development of the relative applications of electrical and electronic circuits, of which the relative models are studied: linear, non-linear and time-varying, with lumped and distributed parameters, with reference to analysis, synthesis, numerical modeling and automatic design of electrical equipment, devices and systems, to the environmental impact of electrical applications. IIND-08/A The sector studies electric machines, power electronic components and converters, electric drives, electrical and electronic technologies, addressing basic and application problems of energy conversion, with the aim of making it available in the form, size and quality necessary for the different industrial and transport applications, starting from traditional and renewable energy sources. In addition to traditional electrical methodologies, the studies also involve those of power electronics, control, automation systems and processes and mechatronics and also extend to the management of conversion processes in transport and electrical energy.			
Objectives: Addressed to Master's Degree Courses in Electrical and Non-Electrical Engineering, the Course aims to present the B aspects of electric mobility and the generation of electricity from renewable sources, and to discuss with students the advantages of these green technologies for the purposes of the ecological transition, together with the problems they may introduce. Particular attention is paid to the central role played by the different electrical energy storage systems in the areas covered.			
Propaedeutics: none			
Propaedeutics for: unina			
Types of examinations and other tests: Oral test			



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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Non-linear control for power converter and electrical machines		Teaching Language: Italiano	
SSD: IIND-08/A (ING-IND/32)		CREDITS: 3	
Course Year: II		Type of Educational Activity: D	
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector studies electric machines, power electronic components and converters, electric drives, electrical and electronic technologies, addressing basic and application problems of energy conversion, with the aim of making it available in the form, size and quality necessary for the different industrial and transport applications, starting from traditional and renewable energy sources. In addition to traditional electrical methodologies, the studies also involve those of power electronics, control, automation systems and processes and mechatronics and also extend to the management of conversion processes in transport and electrical energy.			
Objectives: The Course treats the main non-linear control for power electronic converters and electrical machines. In particular sliding mode control, passivity-based control and feedback-linearization control will be treated with applications in the field of renewable energy sources and electrical mobility.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: Oral test			

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DEGREE PROGRAM DIDACTIC REGULATIONS IN ELECTRICAL ENGINEERING CLASS LM28

School: Polytechnic School and Basic Sciences

Department: Department of Electrical Engineering and Information Technologies

Regulations in force since the academic year 2025-2026

Course: Further training activities		Teaching Language: Italiano	
SSD:		CREDITS: 3	
Course Year: II	Type of Educational Activity: F		
Teaching Methods: in person			
Contents extracted from the SSD declaratory consistent with the training objectives of the course: he contents are those provided for by Art. 10, c. 5 letter d) and e) of the Ministerial Decree. 270/2004 and subsequent amendments.			
Objectives: training activities aimed at acquiring further linguistic knowledge, as well as IT and telematic, relational skills, or in any case useful for entering the world of work, as well as training activities aimed at facilitating professional choices, through direct knowledge of the work sector for which the title of studio can give access, including, in particular, the training and orientation internships referred to in the decree of 25 March 1998, n. 142, of the Ministry of Labor. In the hypothesis referred to in article 3, paragraph 5, of the Ministerial Decree 270/2004 training activities relating to stages and training internships in companies, public administrations, public or private bodies including those in the third sector, professional orders and colleges, on the basis of specific agreements.			
Propaedeutics: none			
Propaedeutics for: none			
Types of examinations and other tests: eligibility verification.			