

DIDACTIC REGULATION OF THE MASTER'S DEGREE PROGRAM IN MECHANICAL ENGINEERING (LM-33)

Art. 1

Subject of the Regulation

1. This Regulation governs the didactic organization and the training activities of the Master's degree program in Mechanical Engineering, in coherence with the guidelines of the Academic Senate and the Department of Economics, Engineering, Society, and Business Organization, and in compliance with what is provided by the University Statute and the Didactic Regulation.

Art. 2

Title and classification category

1. The Master's degree program in Mechanical Engineering, class LM-33, is offered entirely in English at the Department of Economics, Engineering, Society, and Business Organization.

Art. 3

Educational objectives of the Master's Degree Course

1. The Master's degree program in Mechanical Engineering at the University of Tuscia aims to train professionals who can combine the skills of mechanical engineers in a multidisciplinary applied context, covering competencies in materials, new production technologies, energy, and environment. The current continuous and rapid technological progress offers new opportunities that in the past were not only economically unsustainable but also not considered possible. These different potential applications make it urgent for mechanical engineers to focus their skills in specific disciplinary areas starting from the second-level educational path. Targeted knowledge of processes, phenomena, modelling and design of specific sectors allows to shape their skills and make them useful and indispensable in complementary disciplines. Therefore, the planned training activities are strongly oriented towards the methodological and conceptual deepening of engineering subjects whose foundations were laid during the first-level degree course. In particular, the subjects in the distinctive areas aim to complement and deepen the classical skills of mechanical engineering related to mechanical design, machine construction, thermo-fluid dynamics, dynamic and alternative fluid machines, energy systems, mechanical technologies, mechanical and thermal measurements, and project and industrial plant management. Graduates must be knowledgeable in general about the theoretical-scientific aspects of basic sciences and engineering, and in-depth in the fields of mechanics and energy. They should be able to identify, interpret, describe, formulate, and solve complex or innovative problems; to design and manage complex and innovative systems, processes, and services; and to design and conduct experiments of high complexity. Special importance will be given to advanced methodologies of analysis and design, with reference to experimentation, numerical methodologies, production technologies, prototyping, and energy. In addition to mandatory subjects, thesis and internship, students will have the opportunity to choose between two alternative paths with the dual objective of completing the engineer's profile with highly demanded skills in the job market and diversifying the educational offer compared to what is already available at regional and national level. The first group of elective subjects focuses on the theme of energy and aims to provide students with the basics, tools, and methodologies necessary to address complex and

innovative problems related to energy conversion systems, including thermonuclear fusion, hydrogen-based systems, energy transport in its various forms, energy storage and transformation, and the application of innovative processing technologies and materials. Specific insights are also provided regarding energy saving and alternative energy systems, from the perspective of both the source and the type of conversion processes. The second group of subjects focuses on production and design, aimed at the design, production, and monitoring of both individual mechanical components and machinery and industrial plants using advanced design and analysis methods such as FEM, CFD, and CAD. Specific insights are also provided regarding the environment and biosystems, through which students will acquire knowledge about hydrological, agroforestry, and agri-food issues, which are strategic in any social, scientific, and industrial context, especially in our country. Students will thus have the opportunity to present themselves with a comprehensive profile on the job market also in the field of hydrological environmental monitoring, technological advancement for agriculture, and optimization of the agri-food chain, which represent a significant portion of the Italian industry, highly oriented towards export and innovation. Regarding the thesis, it was deemed suitable to allocate a substantial portion of training credits (15 CFU/ECTS), as practical experience in the field of mechanical engineering is a fundamental requirement for entering the workforce. The student is required to engage in a substantial experimental or design project related to the curriculum of one or more subjects studied during the degree program. This project culminates in the preparation of a technical paper (thesis) and its defence in front of a committee composed by teachers of the course. The student must demonstrate the acquisition of essential technical skills to address the technical challenge, the capacity to work autonomously, and proficient communication abilities. Both the paper and its presentation must be conducted in English.

2. The course is organized according to a multidisciplinary training path, and graduates will be able to tackle and solve problems of considerable complexity, from the design of mechanical elements to the use and development of processing technologies and industrial processes, thus meeting the needs expressed by society and the workforce. In fact, the training path will aim to deepen the theoretical and applied knowledge of the typical sectors of mechanics, which can be summarized in the constructional-structural, technological-plant, and thermo-energetic areas. The in-depth preparation in the engineering field will allow master's graduates to perform managerial functions in various work contexts, both national and international, in public and private sectors. The acquired professionalism can be used in positions of responsibility in many sectors of industry: design, production, industrial and IT services, energy management, marketing, technical management, and logistics. The versatility acquired during the course of study will allow to find employment with leading roles even in small and medium-sized industrial realities, where adaptability, flexible approach, and multidisciplinary are required. The verification of the achievement of learning outcomes is carried out through oral and/or written exams.
3. The main career opportunities for graduates in Mechanical Engineering can be found in various fields: mechanical and electromechanical industries, electric energy production plants, manufacturing companies, public and private service companies, engineering consultancy, public and private entities operating in the energy supply sector, and freelance activities in design and/or consultancy.

Art. 4

Admission requirements and verification procedures

1. To be admitted to the Master's degree program in Mechanical Engineering at the University of Tuscia, candidates must hold a bachelor's degree or a three-year university diploma, or another recognized foreign qualification. Enrolment in the Master's degree program in Mechanical Engineering at the

University of Tuscia is contingent upon meeting curricular prerequisites, demonstrating sufficient personal preparation, and attaining a minimum language proficiency level of B2 in English.

2. Meeting Curricular Requirements: enrolment is allowed for students who have acquired through the completion of a bachelor's degree or a three-year diploma or another recognized suitable qualification or certified university training activities.

At least 36 CFU/ECTS in the following group of Italian SSDs (Scientific Disciplinary Sectors): CHIM/03 - General and Inorganic Chemistry; CHIM/07 - Chemical Fundamentals of Technologies; INF/01 - Computer Science; ING-INF/05 - Information Processing Systems; MAT/03 - Geometry; MAT/05 - Mathematical Analysis; MAT/07 - Mathematical Physics; MAT/08 - Numerical Analysis; FIS/01 - Experimental Physics; FIS/07 - Applied Physics.

At least 36 CFU/ECTS in the following group of Italian SSDs: ING-IND/08 - Fluid Machinery; ING-IND/09 - Energy Systems; ING-IND/10 - Industrial Technical Physics; ING-IND/11 - Environmental Technical Physics; ING-IND/12 - Mechanical and Thermal Measurements; ING-IND/13 - Applied Mechanics to Machinery; ING-IND/14 - Mechanical Design and Machine Construction; ING-IND/15 - Drawing and Methods of Industrial Engineering; ING-IND/16 - Technologies and Production Systems; ING-IND/17 - Mechanical Industrial Plants. For students holding a foreign degree or an Italian degree obtained under previous educational systems, the Course Council verifies the fulfilment of curricular requirements through an assessment of the student's academic background. An additional requirement is proficiency in the English language at least equivalent to level B2 (Common European Framework of Reference for Languages), demonstrated by possessing an appropriate language certification or, in its absence, by passing a specific evaluation test organized by the Department. Any curricular integrations in terms of CFU/ECTS must be acquired before the assessment of personal preparation adequacy.

3. Adequacy of Personal Preparation. The assessment of personal preparation adequacy is conducted through an interview with a committee appointed by the Department Council, composed of at least three professors.
4. The Master's degree program has open access.

Art. 5

CFU/ECTS required for degree completion, full- time and part-time students

1. To obtain the master's degree, it is necessary to acquire 120 University Educational Credits (CFU/ECTS).
2. At the time of enrolment in the first or second year, students can choose between full-time or part-time commitment, in accordance with Article 25 of the University Didactic Regulation and the Part-time Student Regulation.

Art. 6

Credit recognition in case of transfer from another course of study

1. Students requesting a transfer from another course of study, whether at this university or another, may apply for recognition of previously acquired CFU/ECTS.
2. The Course Council ensures the recognition of credits already earned by the student based on the degree class from which they transferred, according to the following criteria:

- Consistency of the CFU/ECTS obtained in the previous course of study with the educational paths of the Master's degree program in Mechanical Engineering, with minimum reference to the disciplinary field. The decision not to recognize credits must be adequately justified.
3. The recognition of previously acquired CFUs is decided by the Course Council.

Art. 7

Double Degree Programs and credit recognition for student mobility programs

1. Students enrolled in the Mechanical Engineering Course may access, following a selection process carried out through a specific call, Double Degree programs activated with foreign universities. Students participating in Double Degree programs undertake part of their academic curriculum at one of the partner universities, obtaining both degrees recognized in the countries involved in the agreement at the end of their studies. The access procedures to Double Degree programs, the educational offer, and the maximum number of students are specified in the agreements between the University of Tuscia and the partner universities.
2. Before departure, a student intending to utilize mobility programs must indicate the educational activities and the corresponding CFU/ECTS that intend to pursue at the foreign university, by means of a study plan (learning agreement) to be prepared under the supervision of the responsible faculty member in charge of the agreement/cultural exchange project. This study plan, approved by the Course Council, can be modified even after the student's departure.

Art. 8

Teaching organization

1. The didactic structure of the study program is organized according to Ministerial Decree no. 270/2004 in order to meet the requirements of LM-33 Class.
2. The didactic structure is included in the database of the Educational Offer of the Ministry of Education, University and Research, in accordance with Article 9, paragraph 3, of Ministerial Decree 22 October 2004, no. 270, and on the Department's website, and constitutes an integral part of this regulation.
3. The study program is primarily organized in semesters.
4. Students from other study programs at this University, different from LM 33 Class, or from study programs at other universities, must have completed a minimum of 32 CFU/ECTS in order to enrol in the second year.
5. The prerequisites for the subjects are regulated by the Course Council.

Art. 9

List and characteristics of subjects

1. The list of subjects, including their respective SSD (Scientific Disciplinary Sectors), relevance to core, related, and integrative activities, division into modules, assigned CFU/ECTS for each subject, language, distribution of subjects across the normal duration of the program, and any prerequisites, are detailed in the Student Guide.

2. In the presence of specific and substantiated educational needs, subjects may be structured into modules, provided that the overall content of the subject remains coherent with the educational objectives. In the event of subject division into modules, the final assessment of the educational activity must still be unique and inclusive of all educational content delivered in each module. Additionally, the division of the subject into modules must ensure compliance with minimum teaching requirements and transparency standards established by the study program.

Art. 10

Types of teaching methods

1. The educational program involves the use of various teaching methods with different specific objectives and distinct pedagogical significance.
2. The program includes:
 - Frontal lectures.
 - Laboratory activities.
 - Training activities aimed at acquiring specific professional skills, including internships or placements at public or private service or production facilities, and project work carried out in collaboration with organizations and companies, both in the private and public sectors.
 - Seminar activities.

Art. 11

Methods of achievement assessment and evaluation

1. For each educational activity, a final assessment is scheduled, the successful completion of which allows the acquisition of the credits assigned to that specific educational activity.
2. Final assessments may consist of:
 - Proficiency exams.
 - Suitability tests.
3. Proficiency exams and suitability tests can only be carried out during dedicated periods referred to as examination sessions.

Art. 12

Additional educational activities (article 10, paragraph 5, letter d), D.M. no. 270/04)

1. For activities referred to in article 10, paragraph 5, letter d) of D.M. no. 270/04, 9 CFU/ECTS are assigned, reserved for the acquisition of additional language skills, computer and telematic skills, and knowledge useful for entering the workforce and/or undertaking training internships and orientation.
2. For training or orientation internships and/or other knowledge useful for entering the workforce, such as seminars and project work carried out in collaboration with companies and organizations, both public and private, a total of 9 CFU/ECTS are assigned. In the case of training or orientation internships, credits will be acquired upon the student's presentation of a concise report documenting the activities carried out, countersigned by the academic tutor. In the case of project work, CFU/ECTS will be acquired upon the presentation and discussion of the activity carried out in front of a committee appointed by the Director, in the presence of the academic tutor. Professionalizing educational activities, such as project work, can

also be carried out by students working in groups, always under the guidance of an academic tutor. In the case of seminars, CFU/ECTS will be acquired only for seminars approved by the Department Council and by means of a certificate of participation or similar documentation of the student.

3. For activities aimed at deepening language skills, a maximum of 3 CFU/ECTS are assigned, which can be acquired through the passing of a final exam. The aforementioned activities aimed at acquiring proficiency can also be carried out using innovative teaching methodologies as well as technological and multimedia tools consistent with the educational objectives. Italian language skills will be considered valid only for non-native Italian speakers.
4. CFU/ECTS related to the acquisition of computer and telematic skills can be acquired through participation in laboratory activities proposed in the Educational Offer of the Mechanical Engineering Course and the passing, without assigned grade, of a final interview focusing on the topics developed in the laboratory.
5. In any case, the total CFU/ECTS for the overall educational activities referred to in Article 10, paragraph 5, letter d), D.M. no. 270/04 cannot exceed 9 CFU/ECTS.

Art. 13

Final Exam

1. The final exam consists of the drafting and discussion of a master's thesis in the presence of a graduation committee.
2. The thesis is a written work, extensive and in-depth, drafted in an original manner by the graduating student according to modalities defined by the Department Council, in English, focusing on a subject related to the course of study, which must be prepared under the supervision of an advisor chosen by the student among the faculty members of the course of study.
3. The thesis must demonstrate advanced competence in the subject of study, highlighting both the elaboration of theoretical and/or empirical contribution and the ability for critical analysis of the study topic, and must necessarily demonstrate complete mastery of the subject under study, with particular reference to:
 - a. analysis of the theoretical foundations and methodological principles of the topic.
 - b. personal research contribution by the graduating student, carried out, where possible, in the form of original elaboration.
 - c. critical concluding analysis.
4. The required work of the graduating student must be consistent, in terms of effort and learning objectives, with the number of recognized educational credits, fixed at 15 CFU/ECTS.
5. The master's graduation committee is composed of at least five faculty members of the Study Program and, optionally, by instructors in this or other study programs appointed by virtue of the relevance between the instructor's specialization and the themes addressed by the candidates.
6. At least one week before the discussion, the candidate must prepare and send to the members of the master's graduation committee a summary of the thesis contents, of a maximum of two pages, illustrating the objectives of the work, the methodologies used, and the main results obtained.

7. The graduation grade is expressed in one hundred tenths (110) and is calculated by adding the following scores: a) arithmetic average expressed in one hundred tenths of the evaluations of the exams taken during the course of study, weighted according to the CFU/ECTS credits attributed to each exam; b) bonus (in one hundred tenths) for the duration and quality of the study path to be calculated based on the following table.

| Duration of the study program | | | | |
|-------------------------------|-------------|------------------------|-------------------------|-----------------------------------|
| Grade Average | In progress | 1 year behind schedule | 2 years behind schedule | More than 2 years behind schedule |
| 27,5-30 | 2,5 | 1,5 | 1 | 0,5 |
| 26,5-27,5 | 2 | 1 | 0,5 | 0 |
| 25,5-26,5 | 1,5 | 0,5 | 0 | 0 |
| 24-25,5 | 1 | 0 | 0 | 0 |
| 18-24 | 0,5 | 0 | 0 | 0 |

c) Variable increase from 0 to 7 points (out of 110) to be awarded based on the overall assessment of the thesis and its discussion; d) An additional point may be awarded at the committee's discretion to students whose curriculum included a significant study period abroad; an additional point may be granted if, during that period, the student earned at least 12 ECTS credits; e) The final degree score, thus composed, will be rounded to the nearest whole number; f) Honors may be granted to deserving students who have achieved an overall degree score of 111 out of 110 or higher, upon the advisor's recommendation and with unanimous committee approval.

Art. 14

Tutoring

- Pursuant to Article 14 of the University Didactic Regulation, the following tutoring activities are provided:
 - collaboration in various orientation initiatives aimed at students.
 - guidance and assistance to students during their course of study, in order to actively engage them in the learning process and eliminate barriers to effective course participation.
 - interaction with the student office.
 - post-graduation guidance and placement assistance.
- Tutoring activities will be carried out by appointed faculty members and/or appropriately selected qualified individuals, including students from master's and doctoral programs.
- Tutoring is among the responsibilities of all faculty members of the study program, in coordination with the Department Director or another faculty member delegated for this purpose.

Art. 15

Research Activities

- In support of the educational activities, the following research activities, which characterize the profile of the study program, are provided:
 - research activities typical of the disciplinary sectors envisaged by the study program.

Art. 16

Evaluation of the quality of organization and teaching results

1. The Department carries out initiatives for the evaluation and monitoring of educational activities through the following methods:
 - within the period specified by the Quality Office and in any case not later than the first proficiency exam for each subject, students are required to complete evaluation forms for teaching, which are then analyzed by the Evaluation Unit. The results of these forms will also be evaluated by the Department Council, the Course Council, and the Parity Commission.
 - introduction of a quality system for the study program, possibly certified and/or accredited, based on established scientific models as well as mandatory and voluntary regulations in force.

Art. 17

Final provisions

1. Matters not covered by this Regulation shall refer to the University Didactic Regulation and the Department Regulation.
2. Amendments to this Regulation are approved by the Department Council before being submitted to the Academic Senate.