



UNIVERSITÀ
degli STUDI
di CATANIA

***DIDACTIC REGULATIONS
MASTER'S DEGREE IN
CONSTRUCTION MANAGEMENT AND SAFETY***

*CLASS LM-26 – Ingegneria della Sicurezza
COORTE 2024/2025*

Approved by the Academic Senate in the session of March 26, 2024

- 1. GENERAL DATA**
- 2. ADMISSION REQUIREMENTS**
- 3. TEACHING ORGANIZATION**
- 4. OTHER EDUCATIONAL ACTIVITIES**
- 5. DIDACTICS SYLLABUS SUA-CDS - LIST OF COURSES**
- 6. OFFICIAL STUDY PLAN**
- 7. FINAL PROVISIONS**

1. DATI GENERALI
1.1 Department: Department of Civil Engineering and Architecture (DICAr) <i>Associated Department, if any:</i> none
1.2 Class: : LM-26 Safety Engineering
1.3 Location: Catania, Via Santa Sofia, 64 – 95123 Catania
1.4 Reference professional profiles : Function in a work context: The main functions of the professional figures trained at the end of the course of study are those of optimizing management and innovation and development of production, advanced design, planning, programming and management of complex systems of works, infrastructures and public services. Furthermore, the graduate must be able to manage the monitoring and maintenance of existing structures in order to guarantee their safety and functionality during operation Skills associated with the function The main skills provided and usable in the first years of employment concern: - procedures for the management of public procurement; - methods and tools for managing the safety of the construction process; - digital project management using BIM; - methods and techniques for project management; - methodologies for evaluating and defining the technical specifications and costs of components and systems; - methodologies for controlling production processes; - methodologies and tools for monitoring and evaluating the safety conditions of structures and infrastructures; - methodologies and tools for carrying out measurements, tests and checks; - methodologies and tools for the management of transport infrastructures; - methodologies and tools for the management of hydraulic and maritime works; - methods for infrastructure planning; -methodologies and tools for supply management Employment opportunities Graduates of the Master's Degree course will be trained to be able to fill the role of site manager, project manager, works manager, service and infrastructure manager, etc. The main employment opportunities are: Construction companies, monitoring and maintenance service companies. They will also be able to access the technical structures of the public administration responsible for the public procurement sector and the construction of major infrastructures. The course prepares you for the profession (codice ISTAT): 1. Construction and environmental engineers - (2.2.1.6.1) 2. Industrial and management engineers - (2.2.1.7.0)
1.5 Access to the course: Free
1.6 Lingua del Corso : English
1.7 Durata del corso: Biennial

2. REQUISITI DI AMMISSIONE

2.1 Curricular requirements

Candidates can enroll in the Master's degree course if they meet the following requirements:

a) They must hold one of the following qualifications:

Degree under Ministerial Decree 509/1999 or Ministerial Decree 270/2004, obtained from an Italian university, or a three-year University Diploma under Law No. 341 of November 19, 1990, or another academic qualification, including those obtained abroad, recognized as suitable by the Course of Study Council.

Degree in Class 8 – Civil and Environmental Engineering (Ordinance 509) or in Class L-7 Civil and Environmental Engineering (Ordinance 270) or Industrial Engineering (Class L-9).

b) They must have the following curricular requirements:

36 University Credits (CFU) acquired in any university course (Bachelor's, University Diploma, Specialized Degree, Master's Degree, University Master's) in the following scientific-disciplinary sectors: MAT/02, MAT/03, MAT/05, MAT/06, MAT/07, MAT/08, MAT/09, FIS/01, FIS/02, FIS/03, FIS/07; CHIM/03, CHIM/07, INF/01, ING-INF/05, SECS-S/01, SECS-S/02.

45 CFU acquired in any university course (Bachelor's, University Diploma, Specialized Degree, Master's Degree, University Master's) in the following scientific-disciplinary sectors: ICAR/01, ICAR/02, ICAR/03, ICAR/04, ICAR/05, ICAR/06, ICAR/07, ICAR/08, ICAR/09, ICAR/10, ICAR/11, ICAR/12, ICAR/13, ICAR/17, ICAR/20, ICAR/21, ICAR/22, GEO/05, ING-IND/08, ING-IND/09, ING-IND/10, ING-IND/11, ING-IND/12, ING-IND/13, ING-IND/14, ING-IND/15, ING-IND/16, ING-IND/21, ING-IND/22, ING-IND/28, ING-IND/31, ING-IND/33, ING-IND/35, ING-INF/04, ING-INF/07, CHIM/12.

Admission to the Master's degree course in Construction Management and Safety also requires proficiency in the English language at a level not lower than B2 of the Common European Framework (CEF). An assessment of candidates' individual preparation and admission requirements is provided according to the methods indicated in paragraph 2.2.

2.2 Admission tests and methods for assessing the adequacy of preparation

a) The knowledge and skills required for enrollment, as well as proficiency in the English language (not lower than level B2 of the Common European Framework), will be assessed by a Commission that, based on curriculum analysis, will verify the adequacy of personal preparation through an individual interview.

b) In order to allow access to graduates from educational paths that may not perfectly align with the entry requirements, an interview is scheduled to assess the knowledge and skills required for enrollment. The interview will cover basic topics related to the core scientific-disciplinary areas of the degree course. Simultaneously, proficiency in the English language, which must also be at least at level B2 of the Common European Framework, will be assessed. The examining commission consists of three structured faculty members, according to the procedures established by the University announcement

2.3 Criteria for the recognition of credits obtained in other degree programmes

The Degree Programme Board decides on the total or partial recognition of the credits acquired by a student in another university or in another course of study if the contents are consistent with the educational path. For students coming from degree courses belonging to the same class (LM-26 - Safety Engineering) the share of credits relating to the same scientific-disciplinary sector directly recognized to the student cannot be less than 50% of those already accrued.

2.4 Criteria for the recognition of professional knowledge and skills

Professional knowledge and skills, if appropriately certified and consistent with the training course, can be recognized for no more than 9 credits as "Additional training activities".

2.5 Criteria for the recognition of knowledge and skills acquired in post-secondary training activities carried out with the help of the university
Knowledge and skills gained in post-secondary training activities carried out with the help of the university are recognized only if they are related to activities of which the Course of Study Council is made aware in advance. In this case, the recognition is regulated by a specific resolution.
2.7 Maximum number of credits that can be recognized for the reasons set out in points 2.4 and 2.5
The maximum number of credits that can be recognized is 12. Recognition is made solely on the basis of the skills demonstrated by each student. Collectively awarded forms of recognition are excluded.

3. TEACHING ORGANIZATION
3.1 Frequency
Attendance at classes is strongly recommended as it is consistent with the proposed training model which aims to encourage gradual learning, the active participation of the student in the classroom, and dialogue between teachers and students. Some courses may provide differentiated examination methods for attending and non-attending students.
3.2 Methods of ascertaining attendance
The method of verifying attendance is the responsibility of the teacher, who can make use of the technological tools made available by the University.
3.3 Typology of teaching methods adopted
The didactic forms adopted are divided into: Lectures (F) 1 CFU = 7 hours of lectures in the classroom Practice activities (E) 1 CFU = 13 hours of classroom exercises laboratory activities (L) 1 CFU = 15 hours of teacher-assisted work in the classroom. activities for the final exam (PF) 1 CFU = 25 hours of self-employment If circumstances require it, in compliance with the provisions of the University bodies, teaching activities can also be carried out remotely.
3.4 Methods of verification of preparation

The methods of assessing the student's preparation vary according to the courses. This verification can be carried out through an oral exam, a written exam, the compilation of a course paper, through a practical or laboratory test and through a graphic test. It is possible to use only one of the aforementioned tests or, vice versa, to ascertain the student's preparation through the joint use of several exam tests.

In detail:

(O) oral exam

(S) written exam

(E) drafting a group paper/project (from which it is possible to deduce the individual contribution) or individual

(P) practical or laboratory test

3.5 Rules for the submission of individual study plans

As a rule, the presentation of an individual study plan by the student is limited to the choice of 9 credits for the activities of the student's choice.

The student who in the degree course of origin has acquired credits for courses with training contents similar to those present in the Course of Study in Construction Management and Safety can ask the Course Council for recognition of the credits acquired and the replacement of these courses with others that are consistent with the training path. Those for which credits have already been obtained during previous university careers, deriving from passing exams for courses with a similar name and the same number of credits, cannot be included as substitute courses and elective courses. In any case, the Study Program Council evaluates the individual study plan and approves it if it is not in conflict with current legislation.

3.6 Criteria for periodic verification of the non-obsolescence of cognitive content

Not provided

3.7 Criteria for verifying claims earned more than six years ago

Not provided

3.8 Criteria for the recognition of studies completed abroad The student can carry out part of his studies at foreign universities or equivalent institutions with which the university has stipulated student mobility programs recognized by the universities of the European Union and/or bilateral agreements which provide for the achievement of qualifications recognized by the two parties. The student is required to submit a specific application to the Degree Program Council in which he/she indicates the university to which he/she intends to go and the courses he/she intends to follow.

The Degree Course Council decides on the matter, specifying which courses are recognized and indicating the correspondence between the recognized training activities and the curricular activities of the degree course and the number of university training credits. The grade out of thirty is subsequently carried out through the ECTS Grading Scale, taking into account the student's average at the time of departure and on the basis of the following conversion table:

<i>ECTS</i>	$18 \leq \text{Media} < 23$	$23 \leq \text{Media} < 27$	$27 \leq \text{Media} \leq 30$
A	29	30	30 e lode
B	27	28	29
C	24	25	26
D	21	22	23
E	18	19	20
F	-	-	-
X	-	-	-

4. OTHER EDUCATIONAL ACTIVITIES

4.1 Elective activities

The student can freely choose 9 credits among all the courses of the University as long as they are consistent with the educational project and without overlapping with cultural contents already present in the study plan. The student is required to select, through a format on the student portal, the credits that he/she intends to include as elective activities. This inclusion will take place according to the rules and in the periods already indicated in paragraph 3.5 (Rules for the presentation of individual study plans) of these Regulations. The approval of the elective course is automatic if one of the courses previously approved by the Degree Programme Board is selected. In other cases, the inclusion of the chosen course is subject to the favourable opinion expressed by the Degree Course Council

4.2 Further training activities (art. 10, paragraph 5, letters c, d of Ministerial Decree 270/2004)

a) Additional language skills:

NO

b) Computer and telematic skills:

NO

c) Training and orientation internships *12 CFU*

d) Other useful knowledge for entering the world of work

NO

4.3 Study periods abroad a/o in Italy

Educational activities carried out abroad (see Section 3.8) for a minimum of 12 credits will be considered by the commission when evaluating the final exam, assigning a bonus on the degree grade as specified in point 4.4 below.

4.4 Final exam

To be admitted to the final examination, the student must have passed all the required exams in their study plan and must have obtained the credits set by the regulations. The final examination is assigned 12 ECTS credits. The final examination consists of the discussion of a thesis, which may also be carried out at a foreign university or research institution. The activities related to the thesis must take place under the supervision of one or more advisors, typically chosen from the faculty of the Department of Civil Engineering and Architecture, and in the case of a thesis conducted abroad, from the faculty/responsible persons of the University or research institution. The thesis can be theoretical, experimental, project-based, or compilatory in nature. The topic of the thesis must be relevant to the curriculum.

The grade for the final examination takes into account both the student's academic record and the committee's evaluation of the quality of the thesis with the following relationship:

$$V = (11/3) * M + C + L + (E1 + E2)$$

where:

V = Grade of the final examination calculated by rounding to the nearest whole number;

M = Weighted average grade of the exams taken (30 with honors = 30);

C = Grade assigned by the committee;

L = 0.2 for each exam graded 30 with honors;
 E1 = 1.1 in case of courses/thesis conducted abroad for a minimum of 12 ECTS credits;
 E2 = 0.3 for every 3 credits obtained abroad as part of internship activities.

In the calculation of V, the following constraint applies: $E1+E2 \leq 2$.

Each member of the Committee assigns a grade up to 1 in the case of a compulsory thesis, up to 3 in the case of a project-based thesis, and up to 5 in the case of a theoretical-experimental thesis.

The grade C assigned to the thesis is the arithmetic mean of the scores given by the Committee members.

If the value of V, calculated using the preceding relationship and rounded to the nearest whole number, is not less than 112 and the weighted average grade expressed in hundredths and rounded to the nearest whole number is not less than 103, the candidate may be awarded honors.

The proposal for honors may be made by one of the Committee members and must be decided unanimously.

5. SUA-CDS PROGRAMMED TEACHING LIST OF COURSES

A.Y 2024-2025

<i>n.</i>	<i>SSD</i>	<i>denomination</i>	<i>CFU</i>	<i>n. hours</i>		<i>prerequisites</i>	Learning objectives
				<i>lessons</i>	<i>Other activities</i>		
1	ICAR/17	BIM Fundamentals and Applications	9	28	65		<p>The course deals with issues related to understanding the construction process in its complexity, digital modeling and the use of the Building Information Modeling (BIM) methodology to adequately address the construction process in the era of digitalisation. Through the development of a design exercise, the theoretical contents are applied by the students through the development of information models for specific uses, addressing the issues of defining the customer's demand, interoperability, levels of detail and the representation and communication of data. The contents are summarized in: BIM methodology and interoperability to emphasize the potential of information sharing through the concept of data uniqueness.</p> <p>The knowledge acquired will be usable in supporting strategies to make cities and settlements humane inclusive and sustainable, safeguarding the built heritage through the adoption of innovative digital methods, in accordance with points 9,11,13 of the 2030 Agenda.</p>

2	ICAR/10	Construction Design and Project Management	6	21	39		The course develops the theme of project design and management in construction, its optimization and validation with particular attention to the knowledge of the construction process and project engineering methodologies. The course provides students with the skills necessary for a critical reading of the design project, and for its calibration on the context of implementation, both in terms of the client and the construction techniques and production capabilities of the companies. In particular, the topics of prefabrication, integrated management of the digital project through digital twins and production design will be addressed. The knowledge acquired will support sustainable development of building processes (Agenda 2030, points 8-9), with a view to responsible management of development strategies aimed at sustainable resource consumption (points 11-12)..
3	ICAR/08	Damage Monitoring of Structures and Infrastructures	6	21	39	2	The objective of the course is to introduce students to the safety analysis of structures and infrastructures subject to exceptional events such as earthquakes, very strong winds, environmentally induced aging, damage due to excessive loads, deterioration, corrosion, etc. Students will learn to design, implement and use a safety plan for the inspection, safety assessment and maintenance program of structures and infrastructure, with particular attention to large critical infrastructures such as bridges, dams etc. The course will cover the basics of dynamics and nonlinear behavior of structures, methods for vulnerability assessment, the most common monitoring methods. The course will have a strong applicative character, students will be introduced to the intelligent use of structural codes. The knowledge acquired will provide the basis of the technical skills necessary for the design of safe, sustainable and resilient structures and infrastructures in accordance with points 4, 9, and 11 of the 2030 Agenda.
4	SECS-S/06	Decision Analysis	6	21	39		The course presents the basic principles of decision theory and decision analysis with a focus on multi-criteria decision support. In particular, the course will introduce the basic principles of the normative approach, the descriptive approach and the prescriptive approach, to focus on the constructive approach. In this area the main multi-criteria decision support methods will be introduced: Multiple attribute value theory; additive utility; weighted sum; Hierarchical analytical process; TOPSIS; Choquet Integral; Stochastic analysis of multi-criteria acceptability; ELECTRE methods (ELECTRE IS, ELECTRE II, ELECTRE III, ELECTRE Tri); PROMETHEE methods (PROMETHEE I and II); Ordinal regression and robust ordinal regression; Stochastic analysis of multi-criteria acceptability. Multiobjective optimization methods will also be introduced with particular attention to interactive methods, also mentioning heuristic methodologies with specific attention to evolutionary algorithms. AI-related approaches such as rule-based decision-making methods will also be discussed. Particular attention will be paid to the application aspects by proposing case studies that can be addressed using the methodologies introduced. We will try to enable students to critically analyze the decision-making problems to be faced, defining the most appropriate methodologies to manage them. The knowledge acquired will be usable in supporting all decisions regarding projects relating to all the objectives of the 2030 Agenda, with a particular focus on sustainable development policies in accordance with points 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 17 of the 2030 Agenda.

5	ICAR/04	Management of Transport Infrastructures	9	28	65		<p>The course will provide the knowledge to create and manage a transport infrastructure, with specific insights into the main linear and punctual infrastructures (roads, railways and airports), providing the basis for analyzing and interpreting the design and construction standards and the tools for management of their operation.</p> <p>The knowledge acquired will be usable in the design and management of materials and systems aimed at improving the quality of life, in accordance with points 4, 8, 9, 11, 12, 13 of the 2030 Agenda</p>
6	ICAR/01	Management of Hydraulic and Maritime Infrastructures	9	28	65		<p>Starting from the analysis of numerous national and international projects, the course will adopt a "hands-on" approach to teach students how to copy in the planning, design, construction and management of large hydraulic and maritime infrastructures.</p> <p>In this context, the course will provide fundamental knowledge on the analysis of: (i) the hydraulic risk of urban, river and coastal areas; (ii) erosive processes, which can threaten the safety of settlements and infrastructure; (iii) offshore and coastal processes that influence the design, construction and management of ports and shipping channels. The course will also introduce cutting-edge methods (e.g. probabilistic design methods) to include the assessment of climate change influence within hydraulic and marine projects. Students will also benefit from the opportunity to meet top-level industry professionals during field visits and seminars. The knowledge acquired will be usable in the sustainable and equitable management of projects relating to water resources, hydraulic and maritime infrastructures, in accordance with points 3, 6, 7, 8, 9, 11, 12, 13, 14 and 15 of the 'Agenda 2030.</p>
7	ICAR/09	Performance and Safety Control of Structural Materials and Members	9	28	65		<p>The course aims to provide information relating to the behavior of the main structural, traditional and innovative materials. Furthermore, with reference to these materials, regulatory information and application indications will be provided for the control of their mechanical characteristics. Finally, the appropriate knowledge will be provided to carry out structural safety checks, through theoretical approaches or load tests, on structural elements in reinforced concrete or steel. The knowledge acquired will be usable in the design and management of structures in order to achieve an improvement the quality of life in accordance with points 3, 9, 11, 12, and 13 of the 'Agenda 2030</p>
8	ING-IND/35	Procurement and Supplier Management	9	28	65	3	<p>The course delves into how organizations secure external resources, including materials, services, jobs, technology and more, in both the private and public sectors. In particular, the course includes a focus on strategy, design, management and evaluation of procurement and sourcing activities.</p> <p>Specifically, the course will comprehensively cover the following key areas: (i) Procurement activities, i.e. identification of organizational needs, procurement decisions, supplier selection and evaluation, negotiations, management of orders and procurement processes; (2) Supplier management activities, i.e. performance monitoring, building buyer-supplier relationships, managing supply risk, collaborating with suppliers and co-innovation.</p> <p>The course will offer applications to the construction industry that highlight how the integration of construction management, purchasing and supplier management is critical to ensuring project success and risk control. The knowledge acquired will be usable in the strategies, design, management and evaluation of procurement and sourcing activities aimed at the sustainability of economic growth and for responsible consumption and production, in accordance with points 8, 9, 11 and 12 of the 2030 Agenda.</p>

9	IUS/10	Public Procurement Law	6	21	39	<p>The new Public Contracts Code (Legislative Decree 31 March 2023, n. 36) represents an element of great innovation, not only legal and technical, but also cultural, in the regulation of national public procurement.</p> <p>Drawing its origin from the delegated measures of the PNRR, the public procurement reform introduces a radical change of perspective in the regulation of the matter, orienting itself towards the new founding principles of "result", "trust" and "market access" and presents itself as the first "self-applicable" Consolidated Law, as the detailed regulatory provisions have already been implemented in its annexes.</p> <p>Starting from a comparative analysis with the previous discipline, the course analytically addresses the innovations introduced by the new Code starting from the general principles, analyzing the new figure of the Sole Project Manager and examining the most important operational profiles in the work sectors and in the provision of services and supplies up to the analysis of public company procurement regulations. The knowledge acquired are accordance with points 11,16 and 17 of the the Agenda 2030</p>
10	ICAR/11	Safety Engineering	9	28	65	<p>The course develops the theme of correct safety management in the design, construction and maintenance phases of the work with particular attention to workplace safety in its various meanings, including the prevention of accidents and occupational diseases of workers. The course provides students with the necessary skills to enable them to deal with the identification of dangerous factors, the quantification and management of risks for the analysis and construction of workplace safety. In particular, safety on construction sites is explored in detail regarding specific sector regulations and management choices. Identifying site-specific risk when planning work and implementing appropriate controls to avoid personal injury and property damage, monitoring work to provide timely detection and correction of unsafe practices and conditions, I The implementation of effective communication are included in safety management. The knowledge acquired will be usable in managing the health and safety of workers, in accordance with points 3, 4, 8, 11, 12, 14, 15 of the 2030 Agenda.</p>
11	ICAR/20	Spatial planning of infrastructure, urban facilities and landscape	9	28	65	<p>The course aims to provide a set of theoretical, analytical and practical tools to analyze the different characteristics of transport infrastructures and urban structures of high territorial relevance (health, educational, sports and cultural complexes), with a specific focus on their integration sustainable in the context of the landscape and the environment. The theoretical modules on infrastructure planning and landscape assessment will be integrated with transversal topics of suitability analysis, strategic environmental assessment, economic assessment and regulatory framework. During the course, students will analyze an assigned portion of a region, with a series of traditional tools (land use maps) and more innovative techniques (land cover and suitability analysis) to develop a project on a set of infrastructures and structures to minimize the overall impact on the landscape. The knowledge acquired in this course will allow us to address and govern issues related to the planning, design and management of urban infrastructures (health, education, sport, culture, energy) and transport, with a view to their sustainable integration with the components of environment and landscape and in accordance with objectives 11 and 12 but also 6.4, 7.a, 6.5, 6.6, 6.b, 7.2, 7.3, 7.a, 8.4, 9.1, 9.4 of the 2030 Agenda.</p>

6. OFFICIAL STUDY PLAN						
Cohort 2024-2025						
6.1 CURRICULUM UNICO						
<i>n.</i>	<i>SSD</i>	<i>denomination</i>	<i>CFU</i>	<i>Didactic form</i>	<i>Verification of preparation</i>	<i>frequency</i>
1° anno - 1° periodo						
9	<i>IUS/10</i>	<i>Public Procurement Law</i>	6	<i>F-E</i>	<i>O-E-S</i>	<i>yes</i>
1	<i>ICAR/17</i>	<i>Fundamentals and Applications of Building Information Modeling (BIM)</i>	9	<i>F-E</i>	<i>O-E-S</i>	<i>yes</i>
2	<i>ICAR/10</i>	<i>Construction Design and Project Management</i>	6	<i>F-E</i>	<i>O-E-S</i>	<i>yes</i>
4		<i>Elective Courses</i>	9		-	
1° anno - 2° periodo						
7	<i>ICAR/09</i>	<i>Performance and Safety Control of Structural Materials and Members</i>	9	<i>F-E</i>	<i>O-E-S</i>	<i>yes</i>
4	<i>SECS-S/06</i>	<i>Decision Analysis</i>	6	<i>F-E</i>	<i>O-E-S</i>	<i>yes</i>
10	<i>ICAR/11</i>	<i>Safety Engineering</i>	9	<i>F-E</i>	<i>O-E-S</i>	<i>yes</i>
2° anno - 1° periodo						
5	<i>ICAR/04</i>	<i>Management of Transport Infrastructures</i>	9	<i>F-E</i>	<i>O-E-S</i>	<i>yes</i>
6	<i>ICAR/01</i>	<i>Management of Hydraulic and Maritime Infrastructures</i>	9	<i>F-E</i>	<i>O-E-S</i>	<i>yes</i>
3	<i>ICAR/08</i>	<i>Damage Monitoring of Structures and Infrastructures</i>	6	<i>F-E</i>	<i>O-E-S</i>	<i>yes</i>
2° anno - 2° periodo						
11	<i>ICAR/20</i>	<i>Spatial planning of infrastructure, urban facilities and landscape</i>	9	<i>F-E</i>	<i>O-E-S</i>	<i>yes</i>
8	<i>ING-IND/35</i>	<i>Procurement and Supplier Management</i>	9	<i>F-E</i>	<i>O-E-S</i>	<i>yes</i>
		<i>Traineeship</i>	12			
		<i>Master Thesis</i>	12	<i>PF</i>		