



**UNIVERSITÀ DEGLI STUDI  
DELL'INSUBRIA**

**TEACHING REGULATIONS OF MASTER  
DEGREE IN ENVIRONMENTAL AND  
WORKPLACE SUSTAINABILITY  
ENGINEERING**

**TEACHING REGULATIONS OF THE COURSE  
ENVIRONMENTAL AND WORKPLACE  
SUSTAINABILITY ENGINEERING  
A.Y. 2026-2027**



## **Outline**

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### **1. General information and organization**

The Master's Degree Programme in Environmental Engineering and Workplace Sustainability — LM-35R - Environmental and Land Engineering (Ministerial Decree March 16, 2007, reformed pursuant to DM 1649/23) — is activated according to the 2025 academic structure.

The Degree Programme lasts two years and focuses on traditional environmental protection topics, integrated with workplace sustainability. Admission is subject to holding a Bachelor's degree obtained in any university programme and acquiring an adequate number of credits (CFU/ECTS) in basic and core disciplines related to Civil and Environmental Engineering.

The primary motivation for activating this degree programme was the request from Bachelor's graduates in Safety Engineering for Work and Environment (Ingegneria per la Sicurezza del Lavoro e dell'Ambiente - ISLA), a course already active at this institution, to have a Master's continuation, as well as meeting the demands of stakeholders in the industrial and service sectors whose feedback continuously contributes to evaluating the programme's outcomes.

The study plan is a balanced combination of traditional disciplines—mainly Environmental Engineering—and more recently defined subjects, such as energy management, building renovation, Fire Safety Engineering, and workplace sustainability. In particular, the educational plan is structured around three core groupings:

1. Specialized engineering subjects related to the environment;
2. Specialized engineering subjects related to workplace sustainability and proper workplace management;
3. Supporting scientific subjects.

Teaching methods include lectures, numerical and laboratory exercises, and guided technical visits. Students are also offered the opportunity to complete training experiences at public or private companies through external internships aimed at bridging academia and the professional world. Additionally, students can participate in mobility periods at foreign universities under existing Erasmus Agreements.

Students receive interdisciplinary training allowing them to develop appropriate skills in designing and managing works and services related to water purification (water supply and wastewater), gaseous effluent treatment, waste recovery, recycling, treatment, and disposal, and energy management (energy efficiency and distributed energy production), as well as environmental compatibility of plans and projects and workplace sustainability in civil and industrial contexts. Through laboratories and internships, students develop independent judgment, complex problem-solving analysis regarding environmental protection, and an in-depth knowledge of sector-specific technical standards. According to ISFOL, professionals trained in this type of degree programme deal with environmental monitoring, waste collection and treatment, environmental remediation, and workplace sustainability.

Graduates of this programme can access the Professional Register of Engineers (Civil and Environmental Section) upon passing the professional qualification exam. Graduates wishing to pursue further specializations can apply for Ph.D. programmes or 2nd-level Master's degrees.

- **Responsible Academic Structure:** Department of Theoretical and Applied Sciences (DiSTA)
- **President of the Degree Programme Board:** Prof. Bruno Dal Lago



- **Teaching Secretariat:** Receives by appointment via Microsoft Teams and answers inquiries submitted through INFOSTUDENTI.

## *2. Academic Calendar of the Degree Programme*

Educational activities take place at the Varese classrooms and are delivered in **Italian**.

- **Degree Programme Webpage:** [Uninsubria IASAL](#)
- **Lecture Schedule:** Published under the LESSON SCHEDULE section.
- **Exam Schedule:** Published on the [ESSE3 Exam List Page](#).

The academic calendar is divided into semesters:

- **1st Semester:** from 21.09.2026 to 23.12.2026
- **2nd Semester:** from 22.02.2027 to 28.05.2027
- **Exam Sessions:**  
From 07/01/2027 to 19/02/2027  
From 03/06/2027 to 31/07/2027  
From 01/09/2027 to 17/09/2027

To register for exams, students must log in to the ESSE3 web services using their university email credentials (@studenti.uninsubria.it). The minimum number of exam sessions is **6 per academic year**. Students in good standing with enrollment and tuition fees can take exams provided prerequisites have been met and course attendance has been acquired where required.

## *3. Orientation activities*

Orientation activities are provided at both university-wide and degree-programme levels:

- **Incoming Orientation:** Members of the Degree Programme Board present the IASAL programme at high school meetings, orientation fairs, and university events. Professors of mandatory courses hold seminars for undergraduate ISLA students regarding course content and related research. Individual orientation interviews, in-depth study days, seminars, and laboratory workshops are organized.
- **Ongoing Orientation and Tutoring:** Support is provided to students with disabilities or Specific Learning Disabilities (SLD/DSA) through individualized learning plans (including compensatory tools and dispensatory measures). A University Psychological Counselling service is available to all students.



#### *4. Specific educational objectives, expected learning outcomes, and occupational prospects*

##### **Educational Objectives**

The programme aims to train a professional capable of tackling environmental protection, natural and anthropogenic risk management, and workplace sustainability in an interdisciplinary manner. Graduates can work as self-employed professionals or employees in private companies and public administrations.

##### **Learning Areas**

1. **Specialized Environmental Engineering Subjects:** Solid technical-scientific knowledge of civil/environmental engineering; planning, design, and management of complex processes/systems in the perspective of sustainable resource use and circular economy; experimental study design; technical-regulatory frameworks.
2. **Supporting Scientific Subjects:** Advanced theoretical and scientific concepts in basic disciplines to analyze engineering problems requiring an interdisciplinary approach.
3. **Specialized Workplace Sustainability Subjects:** Planning and designing safe, sustainable workplaces; risk containment; incident simulation and structural/environmental effect estimation.
4. **Transversal Competencies:** Multidisciplinary teamwork, technical communication skills, problem-solving in corporate contexts, and continuous learning/updating.

##### **Expected Outcomes (Dublin Descriptors)**

- **Knowledge and Understanding:** Advanced methodological and operational knowledge in hydraulics, sanitary-environmental engineering, structures/sustainability, natural hazards, chemistry, physics, electrotechnics, and environmental regulations (including B2-level English technical terminology).
- **Applying Knowledge and Understanding:** Ability to design, monitor, and evaluate environmental components/processes; calculate structural safety; model fire/chemical risks; perform environmental compatibility and economic evaluations.
- **Making Judgments:** Independent judgment in selecting appropriate technical solutions for complex, multidisciplinary problems.
- **Communication Skills:** Ability to communicate technical concepts, drawings, and reports orally and in writing (including in English) to specialists and non-specialists.
- **Learning Skills:** Capability to consult handbooks, technical codes, and scientific literature for continuous professional development.



### Professional Profiles & Career Opportunities

- **Professional Role:** *Environmental and Workplace Sustainability Expert Engineer*
- **Functions:** Design and management of industrial plants; environmental risk analysis and safety management; eco-compatibility proposals; calculation, simulation, and unit sizing; technical consultancy and regulatory compliance.
- **Career Outlets:** Design/engineering firms; consulting companies; environmental and workplace safety control agencies; utility companies; environmental management firms; HSE (Health, Safety, Environment) departments in medium-to-large enterprises; Ph.D. programmes and industrial R&D.

### 5. Admission to the study programme

Admission requires specific curricular requirements and verification of adequate personal preparation:

1. **Curricular Requirements:** A Bachelor's degree (or equivalent foreign qualification) with at least:
  - **24 ECTS** in Basic Subjects of Class L-7 Civil & Environmental Engineering (SSD: INF/01, ING-INF/05, MAT/02–09, SECS-S/01–02, CHIM/03, CHIM/06–07, FIS/01–08).
  - **36 ECTS** in Core Subjects of Class L-7 (SSD: ICAR/01–11, ICAR/17, ICAR/20, ICAR/22, AGR/05, BIO/07, CHIM/12, GEO/02, GEO/04–05, GEO/11, ING-IND/09–11, ING-IND/22, ING-IND/24–25, ING-IND/27–31, ING-IND/33).
2. **Admission Interview:** Conducted by a dedicated committee of professors. A negative interview outcome prevents enrollment for that academic year.

### 6. Transfer procedures from other degree courses

Requests for transfer from other universities or degree programmes are evaluated by the Board based on course syllabus analysis, subject area (SSD) congruity, and educational objectives. Credit recognition is granted up to the maximum credits planned in the programme.

### 7. Simultaneous enrolment in two study programs

Simultaneous enrollment in two higher education courses is permitted pursuant to Law no. 33/2022 and Ministerial Decrees DM 930/2022 and DM 933/2022, subject to verification by a dedicated committee.

### 8. The educational path



The degree programme does not have separate curriculum tracks.

**Structure:**

- o 1st Year: 6 mandatory courses + 2 elective blocks.
- o 2nd Year: 3 mandatory courses + 1 elective block + 12 ECTS free choice + Technical English for Engineering (4 ECTS) + 14 ECTS total for thesis design, preparation, and final defense.

**Delivery:** In-person. Timetables are grouped into full days to accommodate working students.

**Attendance:** Attendance is not compulsory but strongly recommended.

**Workload Measurement** (ECTS/CFU): 1 ECTS = 25 total workload hours (including lectures and self-study).

- o Lectures: up to 8 hours/ECTS
- o Exercises: up to 12 hours/ECTS
- o Teaching Laboratories: up to 16 hours/ECTS
- o Seminars: up to 12 hours/ECTS
- o Fieldwork Laboratories: up to 16 hours/ECTS
- o Professional Internships: 25 hours/ECTS
- o Prerequisites: None.
- o Inhibitions: None.

### ***9. Rules for submitting study plans and individual study plans***

Students must submit their Study Plan online via ESSE3 during their first year, with the possibility to modify it in the second year.

- **Free Electives (TAF D - 12 ECTS):** Can be chosen from any courses offered across the University (subject to Board approval for coherence).
- **Recognition of Professional Skills:** Certified professional skills or post-secondary educational activities co-designed by universities can be recognized up to a maximum of **12 ECTS**.
- **Language Certification Recognition:** English certificates (level  $\geq$  B2) obtained within the last 5 calendar years (2 years for IGCSE, IELTS, TOEFL) can grant credit for *Inglese tecnico per l'Ingegneria*, supplemented by a brief oral test on engineering technical terminology.

### ***10. Opportunities offered during the educational pathway***

- **International Mobility:** Erasmus+ and international exchange programmes.
- **Tutoring Service:** Faculty tutors assist students with study plans and internship choices.
- **Student Collaborations:** 200-hour paid university work opportunities.



- **Internship / Stage Desk:** Curricular internships in public or private entities managed via the DiSTA Stage Desk under regional regulations (DGR 7763/2018).

### *11. Graduation / Awarding of the degree*

The final examination consists of a public defense of the Master's thesis before a Degree Committee (minimum 5 professors) using a PowerPoint presentation (max 15 minutes).

- **Total Credits for Final Exam:** 13 ECTS (1 ECTS Thesis Design + 12 ECTS Thesis Preparation & Defense).
- **Grading:** Out of 110. The base score is calculated as the weighted average of course grades.
- **Thesis Types & Maximum Additional Points:**
  - **Experimental Thesis:** Up to **12 points** (indicative duration: 8 months).
  - **Internal Theoretical/Bibliographical Thesis:** Up to **8 points**.
  - **Internship Report:** Up to **6 points**.
- **Academic Honors (Lode):** Requires a minimum base grade of **99/110** for experimental thesis, **103/110** for internal thesis, and **105/110** for internship reports. Unanimous committee approval is required.
- **Diploma Supplement:** Issued automatically in Italian and English following Europass standards.

### *12. Quality Assurance of the degree programme*

Quality Assurance (AQ) is overseen by the Degree Programme Board, the President, the internal AiQua Committee, and the Joint Teacher-Student Committee (CPDS).

- **Student Feedback:** Anonymous online evaluation questionnaires are filled out via ESSE3 prior to exam registration. The programme participates in the "Opinion Week" initiative and AlmaLaurea surveys.





**PLANNED TEACHING – COHORT 2026/2027**

Mandatory courses refer to all the courses provided for the entire DC, which will have to be taken by all students enrolling in the current A.Y. (Enrolment cohort) in order to complete the degree program and obtain the qualification.

| 1st year                                             |              |                |                                   |      |       |                  |
|------------------------------------------------------|--------------|----------------|-----------------------------------|------|-------|------------------|
| Course title                                         | Module Title | Academic field | Disciplinary Field                | ECTS | Hours | Preparatory exam |
| ADVANCED HYDRAULICS                                  | -            | CEAR-01/A      | Hydraulics                        | 6    | 54    | -                |
| TECHNICAL ENGLISH FOR ENGINEERING                    | -            | ANGL-01/C      | English                           | 4    | 32    | -                |
| MACHINE AND ELECTROMECHANICAL SYSTEMS SECURITY       | -            | IJET-01/A      | Applied Electro-magnetism         | 9    | 80    | -                |
| ADVANCED ENVIRONMENTAL ENGINEERING                   | -            | CEAR-02/A      | Environmental Engineering         | 12   | 108   | -                |
| CIRCULAR ECONOMY AND SUSTAINABLE DEVELOPMENT         | -            | CEAR-02/A      | Environmental Engineering         | 6    | 54    | -                |
| GEOLOGICAL-ENVIRONMENTAL HAZARD AND TERRITORY SURVEY | -            | GEOS-02/C      | Structural Geology                | 6    | 48    | -                |
| Alternatively:                                       |              |                |                                   |      |       |                  |
| ANALYSIS AND STRUCTURAL RECOVERY                     | -            | CEAR-06/A      | Mechanics of Materials Structures | 6    | 48    | -                |
| ENVIRONMENTAL COMPATIBILITY OF PLANS AND PROJECTS    | -            | CEAR-02/A      | Environmental Engineering         | 6    | 48    | -                |
| Alternatively:                                       |              |                |                                   |      |       |                  |
| ECOLOGY AND SUSTAINABILITY                           | -            | BIOS-05/A      | Ecology                           | 6    | 48    | -                |
| ENVIRONMENTAL CHEMISTRY                              | -            | CHEM-01/B      | Environmental Chemistry           | 6    | 48    | -                |

| 2nd year                                                              |                                 |                |                                    |          |       |                  |
|-----------------------------------------------------------------------|---------------------------------|----------------|------------------------------------|----------|-------|------------------|
| Course title                                                          | Module Title                    | Academic field | Disciplinary Field                 | ECTS     | Hours | Preparatory exam |
| FIRE-STRUCTURES INTERACTION AND ELEMENTS OF FIRE-ENGINEERING          | -                               | CEAR-07/A      | Structural Analysis and Design     | 12       | 96    | -                |
| SAFETY ELEMENTS, INDUSTRIAL PROCESSES AND CHEMICAL/ENVIRONMENTAL RISK | -                               |                |                                    | 12       | 96    | -                |
|                                                                       | Chemical/Environmental Risk     | ICHI-01/B      | Principles of Chemical Engineering |          |       |                  |
|                                                                       | Safety and Industrial Processes | ICHI-02/A      | Chemical Plants                    |          |       |                  |
| TECHNOLOGIES FOR ENERGY SUSTAINABILITY                                | -                               | IIND-07/B      | Environmental Physics              | 9        | 72    | -                |
| Alternatively:                                                        |                                 |                |                                    |          |       |                  |
| AIR POLLUTION AND TREATMENT                                           | -                               | CEAR-02/A      | Environmental Engineering          | 6        | 48    | -                |
| TREATMENT PLANTS MANAGEMENT                                           | -                               | CEAR-02/A      | Environmental Engineering          | 6        | 54    | -                |
|                                                                       |                                 |                |                                    |          |       |                  |
| To be chosen by the student                                           | -                               | -              | -                                  | 12 to 20 | -     | -                |
| FINAL EXAM                                                            | -                               | -              | -                                  | 13       | 325   | -                |
| THESIS PROJECT                                                        | -                               | -              | -                                  | 1        | 25    | -                |



\*Assessment Legend: **V** = Grade Exam; **G** = Judgment/Evaluation; **I** = Pass/Fail Eligibility; **F** = Attendance.

Activity Types: **Lec** = Lecture; **Ex** = Exercise; **Lab** = Laboratory; **Sem** = Seminar; **Int** = Internship; **Prep** = Preparation.

## **Annex 2 – Summary of Mandatory Course Objectives**

| <i>Name of the Course</i>                    | <i>Year</i> | <i>Formative objectives – resume taken from the syllabus</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ADVANCED HYDRAULICS                          | I           | <p>This course aims to build upon the student's existing knowledge of hydraulics, focusing specifically on:</p> <ol style="list-style-type: none"> <li>1. fundamental principles of hydrodynamics and the associated equations,</li> <li>2. energy exchange between fluid flows and hydraulic machines, as well as issues related to local pressure drops,</li> <li>3. steady open-channel flow.</li> </ol> <p>The course is classified as a specialized engineering subject within the environmental field.</p> <p>Expected Learning Outcomes:</p> <p>Upon completion of the course, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. calculate hydrodynamic forces acting on stationary surfaces;</li> <li>2. calculate the power output of simplified hydroelectric plant configurations;</li> <li>3. perform cavitation checks at the discharge of reaction turbines and the suction side of centrifugal pumps;</li> <li>4. calculate steady-flow profiles in channels with simplified geometry;</li> <li>5. prepare spreadsheets to analyze the problems presented, paying particular attention to the sensitivity of the solution to variations in specific parameters;</li> <li>6. draft brief technical reports on the problems presented, including relevant figures and tables.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| ADVANCED ENVIRONMENTAL ENGINEERING           | I           | <p>This course provides an in-depth study and complements the fundamentals of Sanitary-Environmental Engineering, focusing specifically on pollution control systems. It aims to refine the knowledge and skills required for technical work in the fields of raw water treatment, wastewater treatment, and waste management, with a dedicated module for each of these topics.</p> <p>Expected Learning Outcomes:</p> <p>Upon completion of the course, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Recognize (or describe) the various types of waste and wastewater, the procedures for their classification, and the methods for their treatment and management</li> <li>2. Apply or perform calculations to correctly size and verify the functionality of various treatment units, including innovative purification technologies</li> <li>3. Evaluate design alternatives for treatment aimed at material and energy recovery and the reduction of environmental impacts associated with different types of facilities</li> <li>4. Understand and consult relevant industry regulations and standards</li> <li>5. Describe the administrative management of liquid effluents and waste</li> <li>6. Manage (or plan) the design of a treatment and disposal chain aimed at material and energy recovery, as well as the minimization of final residues and the environmental impact of the process</li> <li>7. Participate in the environmental monitoring of actual systems</li> <li>8. Assess occupational risks for industry personnel and identify ways to minimize them.</li> </ol>                                                                                                                                                                                                                                                                                                           |
| CIRCULAR ECONOMY AND SUSTAINABLE DEVELOPMENT | I           | <p>This course aims to provide knowledge regarding the methods and technologies for promoting the circular economy on a global scale, incorporating the following concepts: "preventing waste wherever possible," "creating value from waste when it is unavoidable," and "recovering value from end-of-life products." Based on the Sustainable Development Goals (SDGs), the course outlines targets and indicators for promoting environmental, social, and economic sustainability actions, alongside environmental communication and Life Cycle Assessment (LCA).</p> <p>Expected Learning Outcomes:</p> <p>Upon completion of the course, the student will be able to:</p> <ul style="list-style-type: none"> <li>• Understand the need for preparation and knowledge regarding Environmental Communication and Education for Sustainable Development.</li> <li>• Recognize Circular Economy (CE) actions.</li> <li>• Recognize actions linked to the Sustainable Development Goals (SDGs).</li> <li>• Identify contexts where the CE can be implemented, as well as the associated advantages and disadvantages.</li> <li>• Understand "life cycle thinking" (LCT) approaches and life cycle assessment methods—environmental (LCA: LCI &amp; LCIA), social (sLCA &amp; sLCC), and cost-based (eLCA)—to foster sustainable resource use and support the CE.</li> <li>• Know and understand environmental footprints and their application.</li> <li>• Know and understand technologies for preventing waste, creating value from waste, and recovering value from end-of-life products.</li> <li>• Know and understand the instruments introduced by the European Commission—such as the Circular Economy, Sustainable Development Goals, "Fit for 55," and the ESPR (Ecodesign for Sustainable Products Regulation)—and their application.</li> <li>• Know and understand the link between climate change and the CE.</li> </ul> |



| <i>Name of the Course</i>                                              | <i>Year</i> | <i>Formative objectives – resume taken from the syllabus</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                        |             | <ul style="list-style-type: none"> <li>• Demonstrate informed, independent judgment when evaluating CE initiatives and their environmental impact. Le competenze acquisite permetteranno un inserimento in attività orientate all'introduzione e sviluppo di azioni di economia circolare e tematiche collegate, in contesti pubblici e privati.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| MACHINE AND ELECTROMECHANICAL SYSTEMS SECURITY                         | I           | <p>The primary objective of the course is to provide the fundamental concepts enabling students to critically analyze complex situations regarding the safety of machinery, equipment, and the work environments in which they operate, with a specific focus on electrical safety and related issues (ATEX, electromagnetic fields, lightning hazards, and electrical fires).</p> <p>Expected Learning Outcomes:</p> <p>Upon completion of the course, the student will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the Machinery Directive/Regulation and other directives related to the safety of equipment and work environments;</li> <li>2. Analyze and apply European Union directives and regulations concerning the safety of machinery and industrial work environments;</li> <li>3. Analyze machinery and equipment from a safety perspective in light of the directives and regulations studied;</li> <li>4. Understand the main electromechanical systems (e.g., elevators, the industrial machinery and equipment analyzed);</li> <li>5. Recognize the primary sources of risk associated with machinery (mechanical and electrical hazards, ATEX, physical agents, etc.);</li> <li>6. Identify the main workplace risks associated with machinery (electrical hazards, lightning risks, ATEX, electromagnetic fields, confined spaces);</li> <li>7. Understand the key measures and devices used for protection against electrical, lightning, and ATEX hazards and for ensuring machinery safety; interpret technical datasheets; and understand the inspections and tests required for electrical safety;</li> <li>8. Acquire precise technical terminology appropriate for describing the topics covered.</li> </ol>                                                                                                                                                                 |
| GEOLOGICAL-ENVIRONMENTAL HAZARD AND TERRITORY SURVEY                   | I           | <p>The course aims to provide students with fundamental knowledge regarding terrain surveying and the hazards associated with geo-environmental processes. It will cover in depth the principles and methods for acquiring, managing, and utilizing geospatial data obtained through original surveys or existing databases. The course will introduce the predisposing and triggering factors linked to geo-environmental processes (such as seismic shaking, surface faulting, intense rainfall, and landslides), as well as methods for risk monitoring and mitigation.</p> <p>Expected Learning Outcomes:</p> <p>Upon completion of the course, students will have acquired theoretical knowledge and will be able to apply and communicate it correctly within a multidisciplinary professional context.</p> <p>Knowledge and Understanding:</p> <p>Knowledge of terrain surveying methods and the nature and occurrence of geo-environmental processes; understanding of information contained in thematic maps and data derived from various disciplines (geology, engineering, planning).</p> <p>Applying Knowledge and Understanding:</p> <p>Ability to understand and interpret scientific articles and technical-engineering documents, including those in English. Ability to explore data within a Geographic Information System (GIS). Ability to evaluate different problem-solving approaches, identifying advantages and potential critical issues. Ability to integrate information from various sources and critically evaluate it when data is incomplete or contradictory.</p> <p>Communication Skills:</p> <p>Ability to synthesize relevant information from technical documents and communicate it effectively to other professionals in the field. Ability to draft a detailed technical report on one of the topics covered in the course, whether theoretical in nature or based on a case study.</p> |
| SAFETY ELEMENTS, INDUSTRIAL PROCESSES AND CHEMICAL/ENVIRONMENTAL RISKS | II          | <p>The course aims to achieve the following objectives:</p> <ul style="list-style-type: none"> <li>- Characterize and model a generic chemical process, with particular reference to the dynamic simulation of ideal chemical reactors.</li> <li>- Identify safe and productive operating conditions for a generic synthesis process.</li> <li>- Conduct an advanced recursive operability analysis to identify process-related hazards and quantify the probability of occurrence of potential "Top Events."</li> <li>- Analyze accident events and reconstruct their causes.</li> <li>- Equip students with the skills necessary to assess risks to workers and the general population exposed to chemical hazards.</li> <li>- Plan experimental tests for risk assessment in order to define improvement measures.</li> </ul> <p>Expected Learning Outcomes:</p> <p>Upon completion of the course, the student will:</p> <ol style="list-style-type: none"> <li>1) have acquired the necessary competence for risk management in an industrial setting;</li> <li>2) have mastered all techniques for quantifying such risk;</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |



| <i>Name of the Course</i>                                    | <i>Year</i> | <i>Formative objectives – resume taken from the syllabus</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                              |             | <p>3) be able to reconstruct the physicochemical and plant-related dynamics involved in accident events;</p> <p>4) be able to size safety devices;</p> <p>5) be able to perform a risk assessment for human health and the environment;</p> <p>6) have mastered the main methods for studying pollutants (sampling, analysis, and exposure assessment);</p> <p>7) be able to apply these methods to assess long-, medium-, and short-term exposure to environmental pollutants within the risk assessment process and for the protection of human health and the environment.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| FIRE-STRUCTURES INTERACTION AND ELEMENTS OF FIRE-ENGINEERING | II          | <p>The course aims to provide students with the following competencies: (a) definition and organization of Fire Engineering, (b) calculation of fire load and fire simulation, (c) principles of occupant egress design, (d) calculation of thermal maps, (e) analysis of isostatic and hyperstatic structures subject to thermal gradients, (f) verification of structural elements exposed to fire—including steel, reinforced and prestressed concrete, composite steel-concrete, timber, or masonry—in accordance with current regulations, (g) design of passive fire protection for structural elements.</p> <p>Expected Learning Outcomes:</p> <p>Knowledge and understanding:</p> <ul style="list-style-type: none"> <li>• possessing the information necessary to critically approach the process of assessing a structure's fire resistance</li> <li>• acquiring the necessary information regarding the modeling of fire load and fire development</li> </ul> <p>Ability to apply knowledge and understanding:</p> <ul style="list-style-type: none"> <li>• ability to read, understand, and comment on scientific texts regarding structural behavior under fire load (including in English)</li> <li>• ability to identify key structural issues required to develop technical documentation supporting fire resistance reports</li> <li>• ability to perform and interpret fire simulations</li> <li>• ability to perform preliminary sizing, final sizing, and/or verification calculations for structural elements subject to static and thermal loads</li> </ul> <p>Learning skills:</p> <ul style="list-style-type: none"> <li>• ability to solve the proposed problems</li> </ul> <p>Communication skills:</p> <ul style="list-style-type: none"> <li>• demonstrating the ability to extract and synthesize relevant information</li> <li>• demonstrating good communication, reading, and writing skills</li> <li>• demonstrating the ability to communicate effectively with industry experts</li> </ul> |
| TECHNOLOGIES FOR ENERGY SUSTAINABILITY                       | II          | <p>The main objectives of the course are:</p> <ol style="list-style-type: none"> <li>1. to provide knowledge regarding key energy technologies that foster the sustainable energy transition;</li> <li>2. to provide the tools to understand the specific characteristics of various energy technologies and evaluate their performance.</li> </ol> <p>To this end, students will learn how to conduct energy audits, identify energy efficiency measures, analyze technological systems, and perform economic and financial evaluations of proposed interventions, presenting the results using various tools.</p> <p>Expected Learning Outcomes:</p> <p>Upon completion of the course, the student will be able to:</p> <ul style="list-style-type: none"> <li>• Conduct an energy audit of an energy system</li> <li>• Identify key energy efficiency measures (including the potential integration of renewable energy systems)</li> <li>• Critically analyze the technological and organizational context of the company in question to define an effective intervention strategy</li> <li>• Size specific interventions involving the replacement or integration of energy technologies</li> <li>• Perform economic and financial evaluations of proposed interventions, taking into account any available incentives</li> <li>• Present the results of their work using various tools: oral presentations, written reports, and spreadsheets.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |