Polytechnic School - Department of Civil, Chemical and Environmental Engineering (DICCA)
Master's degree in Environmental Engineering
Class LM-35
DEGREE REGULATION

General part

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Art. 1 Premise and area of competence

This Regulation, in accordance with the Statute and the University Degree regulation (general part and special part), discipline the organisational aspects of the teaching activity of the Master's degree course in Environmental Engineering, as well as any other subject devolved to it by other legislative and regulatory sources.
The Degree regulation of the Master's degree Course in Environmental Engineering is resolved, pursuant to article 18, paragraphs 3 and 4 of the University Degree regulation, general part, by the Degree Programme Board (DPB) of Environmental Engineering and submitted for the approval of the Board of DICCA, after consultation with the Polytechnic School, with the prior favourable opinion of the Joint Committee of the School.

The resolutions of the DPB can also be taken in telematic mode according to the above-mentioned regulations and, in particular, of Article 14 "meetings with telematic mode" of the current General Regulation of the University (in force since 19/12/2018).

Art. 2 Admission requirements and procedures for verifying individual background

Admission to the Master's degree course in Environmental Engineering (Class LM-35) is subject to the possession of specific curriculum requirements and adequate personal background.

Curriculum requirements

In particular, possession of a three-year degree, obtained in Italy, in the following classes: L-7 Civil and Environmental Engineering, L-9 Industrial Engineering (Ministerial Decree 270/2004 or previous legal systems considered equivalent), or alternatively, possession of another qualification obtained abroad and recognised as suitable guarantees direct admission to this LM-35 ;

Alternatively, possession of specific numbers of ECTS obtained in sets of disciplinary-scientific sectors (SSD), characterising the fundamental learning areas.
In particular, holders of three-year, specialist or master's degrees as per Ministerial Decree 509/1999 or Ministerial Decree 270/2004, obtained at an Italian University, or holders of a five-year degree (prior to Ministerial Decree 509/1999), obtained at an Italian University, or alternatively holders of qualifications acquired abroad and recognised as suitable, who have passed at least 36 ECTS of the SSDs in the mathematics, physics and chemistry area and at least 12 ECTS of the following characterising SSDs, are admitted: ICAR01, ICAR02, ICAR03, ICAR07, ICAR08, ICAR09, ING-IND24, ING-IND25.

In the event that the candidate does not meet the curricular requirements, the DPB will indicate the curricular additions in terms of university credits or specific teaching units which must necessarily be acquired before a new application is submitted.

Furthermore, a good knowledge of the English language is required, understood as the ability to use the English language fluently, in written and oral form, with reference also to disciplinary lexicons (level B2).

The eligibility of qualifications obtained abroad is recognised by the competent Degree Programme Board on the basis of an assessment of the academic qualification, the training activities (examinations) carried out, and the CV

Adequacy of personal preparation
In order to be admitted to the Master's Degree Course in Environmental Engineering, students who meet the curriculum requirements must take a test, conducted in the form of a public interview, aimed at ascertaining the candidate's general preparation. Knowledge of fundamental notions of engineering and the subjects characterizing the degree class is assessed.

The adequacy of personal preparation is automatically verified for those who have obtained an Italian Bachelor's degree with a final grade of at least 9/10 of the maximum grade provided for by their degree. For those who do have obtained an Italian Bachelor’s Degree and do not have a B2 level or higher certification or attestation, the good knowledge of English is verified through online tests organised by the Language Skills Development Sector.In the event of an emergency or impediment that does not allow the examination to be held in the Sector, the examination will be carried out through an oral interview with a committee of DPB lecturers.
The result of the test shall only include the words "passed", "not passed".

For those who have obtained a qualification abroad, deemed equivalent during the assessment of curricular requirements, the adequacy of individual preparation is verified through an evaluation of the documentation uploaded by the candidate on the Dream Apply portal (https://apply.unige.eu/), according to the following criteria:
1. the "academic record" (grade point average, class rank, GPA...);
2. the quality of the university that awarded the first-level degree;
3. possible interview or test
Knowledge of the English language is verified through the possession of a qualification equivalent to an Italian Bachelor's degree awarded in English or through the presentation of a certificate at a level not lower than B2 or equivalent scale.

Art. 3 Training activities

The list of teaching units and other possible training activities, in the cohort 2021-2022, is given in the appropriate annex (Annex 1) which constitutes an integral part of this regulation.

A responsible professor is identified for each teaching unit. A professor is responsible for teaching whoever is in charge of teaching according to the law, i.e. the one to whom the relative Department Board has attributed the responsibility when assigning teaching tasks to professors.

The language used to provide training activities (lessons, exercises, workshops) shall be English.

Art. 4 Enrolment in individual training activities

In accordance with Article 6 of the University Regulations for students, in order to enrol in individual training activities you must have a qualification which allows access to the university.

Art. 5 Curricula

The Master's degree Course in Environmental Engineering is structured in curricula: Blue Engineering and Green Engineering.

The student, after a first year in which the skills considered to be the basis for the degree are provided, will find two suggested paths to deepen some aspects of environmental engineering. In particular, a more marine/atmospheric environment oriented path and a path more linked to the territory as a catchment area, industrial and urban environment.

Art. 6 Total time commitment

The definition of the hourly fraction dedicated to lessons or equivalent teaching activities is established, for each teaching unit, by the DPB at the same time as defining the Degree Programme Table. In any case, we assume the following interval of variability between classroom hours/trainingcredits (ECTS) equal to: 8 ÷ 10, understanding by "classroom hours" the hours of lesson or assisted teaching activity.

The definition of the assumed total time commitment, reserved for personal study or other training activities of an individual type, is established, for each teaching unit, in the annex (Annex 1) to this regulation.

The director of DICCA Department and the coordinator of the DPB shall be responsible for verifying compliance with the above provisions.

Art. 7 Study plans and prerequisites

Students can enrol full-time or part-time; for the two types of student there are different rights and duties. The student chooses the type of enrolment when presenting the study plan. The full-time student carries out his/her training activity considering the study plan defined by the Master's degree course, which is published in the Degree Programme Table. The study plan formulated by the student must contain an indication of the training activities and the ECTS that he/she intends to achieve, provided for by the official study plan for the didactic period, up to a maximum of 65 ECTS each year.

The part-time student is required to submit an individual study plan, specifying the number of ECTS he/she intends to achieve in accordance with the University's regulations on student contributions.

The enrolment of full-time and part-time students is regulated by the University Regulations for students considering the operational provisions resolved by the central government bodies and indicated in the Student Guide (published annually on the University's website).

The training path of the student is organised according with criteria of propaedeuticity. Therefore, the study plan is strongly recommended in coherence with the educational path.

The DPB may, with a reasoned resolution, authorise students who have demonstrated particularly high academic performance in the previous academic year to include in their study plan more than 65 ECTS, but in any case, not more than 75.

"Particularly high performance" means that the student has passed all the exams of his/her study plan by the month of September.
The study plan which has a shorter duration than the normal one is approved by the Degree Programme Board.
The method and deadline for the presentation of the study plan are established annually by the Polytechnic School and reported in the Degree Programme Table – Engineering Area.
The student may enter in his/her study plan free extra-curricular teaching units up to a maximum of 12 ECTS.

Art. 8 Attendance and methods of carrying out teaching activities

The teaching units may take the form of: a) lectures, including distance learning by telematic means; b) practical exercises; c) laboratory exercises; d) thematic seminars.
The articulated profile and the demanding nature of the lessons taught as part of the course of study make the attendance to the training activities strongly recommended for an adequate understanding of the topics and therefore for a good success in the exams.
The schedule of classes is divided into semesters. As a rule, the semester is divided into at least 12 weeks of lesson plus at least 4 weeks overall for verification tests and profit exams.
The period for profit exams ends with the beginning of the lessons of the following semester.
The lesson schedule for the entire academic year is published on the Course of Study's website before the start of the lessons of the academic year.
The schedule of classes guarantees the possibility of attendance based on the years of the course programme provided for by the current Degree Programme Table. For practical reasons, the compatibility of the timetable for all formally possible optional teaching choices is not guaranteed. Students must then formulate their study plan taking into account the time of the lessons.
From the second year onwards, the internship envisaged in the training programme may be carried out in DICCA laboratories, other universities, research centres, companies, public bodies, etc. In the case of mobility programmes for examinations or thesis abroad, the internship may also be offered in the foreign location where the programme is carried out.

Art. 9 Examinations and other profit exams

Profit exams can be carried out in written, oral, or written and oral, according to the methods indicated in the sheets of each teaching unit published on the website of the Master's degree course.
On request, specific learning verification arrangements may be provided to take into account the needs of disabled students and students with specific learning disorders (D. S. A.), in accordance with art. 29 paragraph 4 of the University Degree Regulation.
In the case of teaching units structured in modules with several professors, they participate collegially in the overall evaluation of the student's profit which cannot, however, be split into separate evaluations on the individual modules.
The calendar of profit exams is established by the ministerial deadline for the following academic year and is published on the website of the Master's degree course. The calendar of any intermediate verification tests is established by the DPB and communicated to the students at the beginning of each teaching cycle.
Examinations are held in periods of interruption of classes. Examinations may be planned during the period of the classes only for students who, in the current academic year, have not included training activities in their study plan.
All profit examinations of training activities must be passed by the student by the deadline set by the student secretariat of the Polytechnic School in view of the final examination, as indicated in the "reminder" published on the University website and accessible from the School's website.
The result of the examination, with the vote obtained, is verbalized in accordance with art. 29 of the

University Degree Regulation.
The profit examination Committees are appointed by the course coordinator and consist of at least 3 members, two of whom are full members, one of whom is the professor responsible for teaching. If the percentage of success for teaching is less than 30% consecutively for two academic years, the Committee will be composed of at least 5 professors and the report must certify the effective presence of at least 3 members. They may be members of the Committee who are experts in the subject identified by the course board on the basis of criteria that ensure the possession of scientific, didactic or professional requisites; these requisites may be presumed to be possessed by retired university professors. The Committees are chaired by the professor responsible for teaching and a deputy must be identified for each one.

Art. 10 Recognition of credits

The Board Degree Programme decides on the approval of applications for change or transfer from another degree course of the university or other universities in accordance with the rules provided forin the University Degree regulation, art. 21. The DPB also decides the recognition, as training credits, for a maximum number of 12 ECTS, of professional knowledge and skills certified in accordance with the current legislation.
The evaluation of applications for change will take into account the didactic specificities and the actuality of the educational content of the individual exams taken, reserving to establish from time totime any forms of verification and supplementary exams.

Art. 11 Mobility, studies abroad, international exchanges

The DPB strongly supports the student mobility, in particular through participation to mobility and international exchange programmes. The DPB shall ensure, in accordance with the rules in force, the recognition of the training credits obtained within these programmes and shall organise the training activities as appropriate in such a way as to make these activities easier and effective.

The DPB recognizes enrolled students, who have regularly completed a period of study abroad, the exams taken off-site and the achievement of the related credits with which the student intends to replace the exams of his own study plan.

For the purposes of the recognition of these examinations, the student at the time of the compilation of the plan of training activities, he intends to follow at the University abroad, must produce suitable documentation proving the equivalence of content between the teaching unit abroad and the teaching unit that intends to replace taught in the Master's degree Course in Environmental Engineering. Equivalence shall be evaluated by the DPB. The conversion of marks will take place according to criteria approved by the DPB, in accordance with the European ECTS system.

In the case of periods of study abroad for the preparation of the final examination, the number of credits recognised for this activity is established in relation to the duration of the period spent abroad.

Art. 12 Procedures for the final examination

The final examination consists in the discussion of a written thesis, aimed at ascertaining the candidate's technical-scientific and professional preparation.
For the purposes of obtaining a Master's Degree, the final examination consists of the writing of a theoretical, experimental or applicative thesis, elaborated by the student in an original way under the guidance of one or more supervisors, on subjects defined as relevant to a discipline for which the candidate has passed the exam. The thesis must in any case be coherent with the arguments discussed during the Master's degree.

At least one DPB lecturer must be present among the supervisors.
The thesis must be written in English; the writing of an extensive summary in Italian may be required by the DPB through the supervisor.
If a language other than English is used, the authorisation of the CCS is required, as well as a translation of the title and an extensive English summary.

The thesis must reveal the student's ability to deal with research and/or application issues. The thesis must consist of a project and/or the development of an application that proposes innovative solutions with respect to the state of the art.

The thesis must also reveal:

- preparation in the disciplines characterising the Master's Degree,
- a correct use of sources and bibliography,
- systematic and argumentative skills,
- clarity in the exposition,
- design and experimental skills,
- critical thinking skills.

The effort required of the student for the preparation of the final examination is commensurate with the number of credits allocated to the examination.
The Committee for the final examination is composed of at least five members, the majority of whommust be tenured professors and researchers and it is appointed by the Director of the DICCA Department.
The procedure for the final examination consists of the oral presentation of the thesis by the student to the Final Examination Committee, followed by a discussion of any questions raised by the members of the Committee.

If the student passes the final examination, the Committee assesses the final examination by attributing an increase, varying from 0 to 6 (maximum established by the School in agreement with the Departments and indicated in the Degree Programme Table), to the weighted average of the marks obtained in the examination tests relating to the educational activities that require a final mark, taking as a weight the number of credits associated with the individual educational activity.
Among the aspects that contribute to the definition of the mark attributed to the final examination, the Committee shall take particular account of
- quality, completeness and originality of the paper (up to a maximum of 3 points);
- presentation of the paper (up to a maximum of 2 point);
- evaluation of the student's career (duration of the candidate's studies, marks with honours, any period spent abroad for the writing of the paper or a substantial part of it) up to a maximum of 1 points.
Honours are awarded, subject to the unanimous approval of the Committee, to students who have obtained a final mark of at least 110 points. The dignity of printing for the master's thesis may be requested by the supervisor from the members of the Degree Committee at least 15 days before the graduation session, explaining the reasons. The dignity of printing is awarded by unanimous vote of the Graduation Committee.

Art. 13 Guidance services and tutoring

The Polytechnic School, in agreement with the DICCA Department, organises and manages a guidance and support service for students, in order to promote the different second-level training pathways.
The course of study identifies two tutors to support the students enrolled in the course.

Art. 14 Verification of obsolescence of credits

Credits acquired within the framework of the Master's degree course in Environmental Engineering are valid for 6 years. If the DPB recognizes the obsolescence of even a single part of the relative educational content, the DPB itself establishes the supplementary tests that must be taken by the student, defining the topic, the methods of verification and the composition of the examination committee.

Once the required tests have been passed, the DPB validates the credits acquired with a resolution. If the related training activity provides for a vote, it may be varied from the one previously obtained, on a proposal from the Examination Committee which carried out the verification.

Art. 15 Degree Programme Table

The DICCA Department, after consulting the Polytechnic School, approves and publishes annually the Degree Programme Table. In the Degree Programme Table are indicated the main provisions of the didactic system and the degree regulation of the Master's degree course, to which additional information may be added.

The Degree Programme Table of the Master's degree course contains the list of the teaching units activated for the academic year in question. Individual teaching units' sheets are published on the website of the degree course.

Annex 1 to the Degree Regulation of the Master's degree course in Environmental Engineering
List of training activities and related training objectives

Curriculum	Year	Code	Teaching unit_IT	Teaching unit_EN	ECTS	SSD	Type	Area	Language	Training Objectives	Hours for assisted teaching activity	Hours for personal study
GREEN AND BLUE ENGINEERING	1	98064	NUMERICAL CARTOGRAPHY AND GIS	NUMERICAL CARTOGRAPHY AND GIS	5	ICAR/06	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	The course provides the necessary tools for the management and analysis of the various spatial data available today relating to the terrestrial, marine and aerial environment, including the most recent and high-resolution ones such as LiDAR Digital Terrain Models and satellite images. Several applications supporting the management of the environment will be addressed through GIS (Geographic Information System) software.	50	75
GREEN AND BLUE ENGINEERING	1	98158	HYDROLOGY AND WATERSHED MANAGEMENT	HYDROLOGY AND WATERSHED MANAGEMENT	10	ICAR/02	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering			0	0
		97232	HYDROLOGY	HYDROLOGY	5	ICAR/02	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	Provide the knowledge of advanced hydrologic modelling focusing on the frequency analysis of extreme events (storm and flood), distributed and semi-distributed hydrological models and event-based modelling	50	75
		98069	WATERSHED MANAGEMENT	WATERSHED MANAGEMENT	5	ICAR/02	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	To provide interpretative and predictive tools for the analysis, design and management of ideas, projects and systems in the field of water resources at the watershed scale	50	75
GREEN AND BLUE ENGINEERING	1	98159	ENVIRONMENTAL FLUID MECHANICS	ENVIRONMENTAL FLUID MECHANICS	10	ICAR/01	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering			0	0

		97233	ADVANCED FLUID MECHANICS	ADVANCED FLUID MECHANICS	5	ICAR/01	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	Presents the fundamental principles and laws that govern the motion of fluids. Simple practical problems are formulated and solved and the foundation to tackle more complex problems are laid	50	75
		97234	ENVIRONMENTAL FLUID MECHANICS	ENVIRONMENTAL FLUID MECHANICS	5	ICAR/01	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	Provides the basic knowledge of the transport processes and dispersion of pollutants in natural water bodies.	50	75
GREEN AND BLUE ENGINEERING	1	98160	ENVIRONMENTAL CHEMISTRY AND PROCESSES	ENVIRONMENTAL CHEMISTRY AND PROCESSES	10						0	0
		97236	CHEMISTRY OF ENVIRONMENTAL PROCESSES	CHEMISTRY OF ENVIRONMENTAL PROCESSES	5	CHIM/07	RELATED OR SUPPLEMENTARY LEARNING ACTIVITY	Related or supplementary learning activity	English	Learn to describe, discuss and compare structure and properties of inorganic and organic chemicals (including polymers and biomolecules) involved in environmental and technological processes, with particular attention to atmospheric and water chemistry and pollution. Students will acquire skills and methods to deal with problems related to the chemicals reactivity and interactions.	50	75

		98066	FUNDAMENTALS OF ENVIRONMENTAL PROCESSES	FUNDAMENTALS OF ENVIRONMENTAL PROCESSES	5	ING-IND/24	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	The course provides the basic knowledge of material balances and phase equilibria in multicomponent and multi-reacting systems, useful for modelling environmental compartments and environmental interfaces. Applications are related to health risk assessment, environmental contamination and processes for the treatment of chemical pollutants	50	75
GREEN AND BLUE ENGINEERING	1	98161	SUSTAINABILITY AND APPLIED ECOLOGY	SUSTAINABILITY AND APPLIED ECOLOGY	10						0	0
		98070	APPLIED ECOLOGY	APPLIED ECOLOGY	5	BIO/07	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	Provide fundamental knowledge on the methods for the evaluation of environmental issues due to human impacts on the biosphere, with specific regard to pollution and resource consumption.	50	75
		98071	LIFE CYCLE ASSESSMENT AND ECODESIGN	LIFE CYCLE ASSESSMENT AND ECODESIGN	5	ING-IND/26	RELATED OR SUPPLEMENTARY LEARNING ACTIVITY	Related or supplementary learning activity	English	Learn about sustainability, life cycle thinking and life cycle assessment as a tool to evaluate potential impacts along the life-cycle of a product for ecodesign purpose.	50	75
GREEN AND BLUE ENGINEERING	1	98257	INDUSTRIAL PROCESSES AND PRODUCTS	INDUSTRIAL PROCESSES AND PRODUCTS	10		CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering			0	0

		98237	ENVIRONMENTAL IMPACT OF INDUSTRIAL PROCESSES AND PRODUCTS	ENVIRONMENTAL IMPACT OF INDUSTRIAL PROCESSES AND PRODUCTS	5	ING-IND/27	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	To provide an in-depth knowledge of the main industrial processes, with particular reference to environmental and sustainability issues related to these processes and their products.	50	75
		98247	CLEAN ENERGY PRODUCTION	CLEAN ENERGY PRODUCTION	5	ING-IND/24	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	The course will be organised in sections devoted to different renewable energy production systems (e.g. photovoltaic and wind systems, fuel cells, wave energy, biomass thermochemical conversion, mini-hydro, ..).	50	75
GREEN AND BLUE ENGINEERING	1	104376	MATHEMATICAL METHODS FOR ENGINEERING	MATHEMATICAL METHODS FOR ENGINEERING	5	MAT/07	RELATED OR SUPPLEMENTARY LEARNING ACTIVITY	Related or supplementary learning activity	English	The course aims to provide a study of the most common partial differential equations (PDE) and their solution techniques through an analysis of various applications. The emphasis is devoted to second order PDE and the understanding of the specific analytical techniques for solving elliptic, parabolic and hyperbolic cases. The course also provides the tools to solve problems in various applications with numerical methods implemented through the use of Matlab.	0	75

GREEN AND BLUE ENGINEERING	2	56880	SUSTAINABLE PLANNING	SUSTAINABLE PLANNING	5	ICAR/20	ELECTIVE LEARNING ACTIVITY	Student's elective learning activity	English	The course aims at providing a vast and up-to-date knowledge on the main policies, laws and tools for sustainable planning. It examines in depth the most important spatial issues at the local and international level and analyses the European and Italian landscape in relation to: urban safety and security, natural/anthropic risk prevention, smart and sustainable mobility, waterfront renewal, waste management, eco-responsible tourism, energy planning.	40	85
BLUE ENGINEERING	2	90498	MACHINE LEARNING	MACHINE LEARNING	5	INF/01	ELECTIVE LEARNING ACTIVITY	Student's elective learning activity	English	Students will understand and learn how to use key machine learning algorithms.	50	75
GREEN ENGINEERING	2	90498	MACHINE LEARNING	MACHINE LEARNING	5	INF/01	ELECTIVE LEARNING ACTIVITY	Student's elective learning activity	English	Students will understand and learn how to use key machine learning algorithms.	50	75
GREEN AND BLUE ENGINEERING	2	98154	HYDRAULIC SYSTEMS DESIGN	HYDRAULIC SYSTEMS DESIGN	5	ICAR/02	ELECTIVE LEARNING ACTIVITY	Student's elective learning activity	English	To provide students with the capability of designing and managing hydraulic systems for water pumping and energy production, associated with urban drainage systems and environmental protection.	50	75
GREEN ENGINEERING	2	97235	ENVIRONMENTAL GEOTECHNICS	ENVIRONMENTAL GEOTECHNICS	10	ICAR/07	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering			0	0

		104334	SLOPE STABILITY	SLOPE STABILITY	5	ICAR/07	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	The purpose of the course is to provide students with theoretical and practical knowledge on the identification, characterization and analysis of landslide phenomena. The course focuses on the stability analyses of natural and artificial slopes, which are necessary to design mitigation countermeasures as well as for stabilizing landslides and preventing/reducing slope displacements.	50	75
		104335	GROUND ENGINEERING	GROUND ENGINEERING	5	ICAR/07	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	1) To introduce the various hydro-geological processes and the relevant analytical methods for engineering analysis; 2) To overview the main applications of groundwater flow principles as relevant to geotechnical engineers; 3) To introduce the fundamental aspects of capillarity in soils.	50	75
GREEN AND BLUE ENGINEERING	2	98068	EU AND TRANSNATIONAL ENVIRONMENTAL LAW	EU AND TRANSNATIONAL ENVIRONMENTAL LAW	5	IUS/14	RELATED OR SUPPLEMENTARY LEARNING ACTIVITY	Related or supplementary learning activity		Provide critical analysis of principles, rules and current trends and concerns of European Union and international environmental law.	50	75

GREEN AND BLUE ENGINEERING	2	98117	RESILIENCE OF THE BUILT ENVIRONMENT	RESILIENCE OF THE BUILT ENVIRONMENT	5	ICAR/09	ELECTIVE LEARNING ACTIVITY	Student's elective learning activity	English	Seismic risk analysis of the built environment in relation to natural events: hazard, exposure and vulnerability. Probabilistic seismic hazard assessment: occurrence of earthquakes, mitigation laws. Taxonomy and classification of the exposed assets. Vulnerability models: observational (macroseismic method), mechanical based (analytical or numerical) and hybrid methods. Evaluation of fragility curves from nonlinear dynamic analyzes (IDA, MSA and cloud method). Probabilistic framework for the calculation of risk. Analysis of economic consequences and losses (direct and indirect damage). The resilience of the built environment and the society: robustness and recovery time. Risk assessment, prevention and management of the seismic emergency in the case of monumental building: LV1 models, vulnerability and damage survey forms.	50	75
BLUE ENGINEERING	2	98162	COASTAL PROCESSES AND ENGINEERING	COASTAL PROCESSES AND ENGINEERING	10		CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering			0	0
		97237	COASTAL STRUCTURES AND SHORE PROTECTION	COASTAL STRUCTURES AND SHORE PROTECTION	5	ICAR/02	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	Principles of coastal structures planning and design and shore protection management	50	75

		98074	COASTAL HYDRO- AND MORPHO- DYNAMICS	COASTAL HYDRO- AND MORPHO- DYNAMICS	5	ICAR/01	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	The course is aimed at introducing the student to the hydrodynamics and morphodyanics of the coastal region	50	75
BLUE ENGINEERING	2	98163	MIXING PROCESSES IN GEOPHYSICAL FLOWS	MIXING PROCESSES IN GEOPHYSICAL FLOWS	10	ING-IND/06	RELATED OR SUPPLEMENTARY LEARNING ACTIVITY	Related or supplementary learning activity			0	0
		98075	GEOPHYSICAL FLUID DYNAMICS	GEOPHYSICAL FLUID DYNAMICS	5	ING-IND/06	RELATED OR SUPPLEMENTARY LEARNING ACTIVITY	Related or supplementary learning activity	English	To provide the basics of geophysical fluid dynamics: ruling equations and peculiar dynamical phenomena induced by apparent forces, i.e., centrifugal and Coriolis forces.	50	75
	2	98077	MIXING PROCESSES IN AIR AND SEA	MIXING PROCESSES IN AIR AND SEA	5	ING-IND/06	RELATED OR SUPPLEMENTARY LEARNING ACTIVITY	Related or supplementary learning activity	English	To provide an overview of existing dispersion models (atmosphere and sea)	50	75
GREEN ENGINEERING	2	98165	FLUVIAL AND TIDAL MORPHODYNAMICS	FLUVIAL AND TIDAL MORPHODYNAMICS	10	ICAR/01	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering			0	0
		97239	TIDAL ECO-MORPHODYNAMICS	TIDAL ECO-MORPHODYNAMICS	5	ICAR/01	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	Students will be instructed on the general processes involved in the morphodynamics and eco-morphodynamics of tidal environments, gaining useful skills to research and consultancy purposes	50	75

		98156	FLUVIAL HYDRAULICS AND MORPHODYNAMICS	FLUVIAL HYDRAULICS AND MORPHODYNAMICS	5	ICAR/01	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	The course provides competences on how the morphology of rivers and tidal estuaries is shaped by the action of steady and unsteady free-surface flows, with an eye to the mutual interactions between the flow, the morphology and the ecosystem.	50	75
GREEN AND BLUE ENGINEERING	2	98239	HARBOUR ENGINEERING	HARBOUR ENGINEERING	5	ICAR/02	ELECTIVE LEARNING ACTIVITY	Student's elective learning activity	English	Fundamentals of Port Planning and Design taking into account maritime operations and land requirements for terminals and inland transportation	50	75
GREEN AND BLUE ENGINEERING	2	98242	MITIGATION AND ADAPTATION TO CLIMATE CHANGE	MITIGATION AND ADAPTATION TO CLIMATE CHANGE	5	ICAR/03	ELECTIVE LEARNING ACTIVITY	Student's elective learning activity	English	The course provides competence about climate change and deals with the climatic fundamentals and the behavior of GHG in the atmosphere and oceans. Mechanisms of Mitigation and Adaptation are analized according to the Kyoto Protocol, the EU EmissionTrading System and the Paris Agreement	50	75
GREEN AND BLUE ENGINEERING	2	98244	TRAINEESHIP	TRAINEESHIP	3		OTHER ACTIVITY	Training and Orientation Traineeships	English	To develop a self-employment work to deepen theoretical or applicative problems or project development in the framework of a company/institution internship.	0	75

GREEN AND BLUE ENGINEERING	2	98245	EMOTIONAL AND SOCIAL COMPETENCES FOR ENGINEERING PROFESSIONALS	EMOTIONAL AND SOCIAL COMPETENCES FOR ENGINEERING PROFESSIONALS	2		OTHER ACTIVITY	Other Useful Knowledge for the Introduction into the Workplace	English	The main goal of the course is to learn how to successfully deal with professional challenges, emotions and relationships, overcoming the main obstacle to professional success: the lack of emotional maturityand the lack of adequate social skills.	20	30
GREEN AND BLUE ENGINEERING	2	98246	FINAL THESIS	FINAL THESIS	10		FINAL EXAMINATION	For the final examination	English	The final thesis consists in the development of a specific project that asses the scientific, technical and professional skills gained by the student at the end of his studies.	0	250
BLUE ENGINEERING	2	98258	MARINE BIODIVERSITY MANAGEMENT AND EMISSION TREATMENT PLANTS	MARINE BIODIVERSITY MANAGEMENT AND EMISSION TREATMENT PLANTS	10		CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering			0	0
		98248	MARINE BIODIVERSITY MANAGEMENT	MARINE BIODIVERSITY MANAGEMENT	5	BIO/07	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	Introduce students to the fundamental aspects of marine biodiversity management and conservation, with specific focus on biodiversity definition and measurement, ecosystem status evaluation, biodiversity maintenance and restoration of marine resources.	50	75
		98249	ENVIRONMENTAL SAFETY TECHNIQUES AND PLANTS	ENVIRONMENTAL SAFETY TECHNIQUES AND PLANTS	5	ING-IND/25	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	To provide students a solid knowledge on process and occupational safety problems of industrial plants, to introduce evaluation tools and fundamental design approaches to minimize and prevent risk for man, environment and assets.	50	75
GREEN ENGINEERING	2	98259	INDUSTRIAL ECOLOGY	INDUSTRIAL ECOLOGY	10						0	0

GREEN ENGINEERING	2	97238	WASTE UTILIZATION AND SOIL REMEDIATION	WASTE UTILIZATION AND SOIL REMEDIATION	5	ICAR/03	CORE LEARNING ACTIVITY	Environmental and Land Planning Engineering	English	The course offers a broad discussion of the issues of pollution, remediation and purification in the soil, based on the principles of the risk analysis. Beside the management of the contaminated sites, the solid waste treatment is also discusssed by analysing several case studies of incenerition, composting plants and landfills.	50	75
GREEN ENGINEERING	2	98250	BIOCHEMISTRY AND ENVIRONMENTAL BIOTECHNOLOGY	BIOCHEMISTRY AND ENVIRONMENTAL BIOTECHNOLOGY	5	CHIM/11	RELATED OR SUPPLEMENTARY LEARNING ACTIVITY	Related or supplementary learning activity	English	Basic concepts of biochemistry and microbiology, main metabolic routes and applications of environmental concern	50	75

SCUOLA POLITECNICA – Dipartimento di Ingegneria Civile, Chimica e Ambientale (DICCA)
Corso di laurea magistrale in Environmental Engineering
Classe LM-35 Ingegneria per l'Ambiente e il Territorio

Parte generale

Descrizione del funzionamento del Corso di Laurea

Art. 1. Premessa e ambito di competenza

Il presente Regolamento, in conformità allo Statuto ed al Regolamento Didattico di Ateneo (parte generale e parte speciale), disciplina gli aspetti organizzativi dell'attività didattica del Corso di Laurea Magistrale in Environmental Engineering nonché ogni diversa materia ad esso devoluta da altre fonti legislative e regolamentari.
Il Regolamento didattico del Corso di Laurea Magistrale in Environmental Engineering è deliberato, ai sensi dell'articolo 18, commi 3 e 4 del Regolamento Didattico di Ateneo, parte generale, dal Consiglio di Corso di Studio (CCS) di Environmental Engineering e sottoposto all'approvazione del Consiglio di Dipartimento DICCA, sentita la Scuola Politecnica, previo parere favorevole della Commissione Paritetica di Scuola.

Le delibere del CCS possono essere assunte anche in modalità telematica ai sensi dei sovraordinati regolamenti e, in particolare, dell'articolo 14 "Riunioni con modalità telematiche" del vigente Regolamento Generale di Ateneo (in vigore dal 19/12/2018).

Art. 2. Requisiti di ammissione. Modalità di verifica

L'ammissione al Corso di Laurea Magistrale in Environmental Engineering (classe LM-35) è subordinata al possesso di specifici requisiti curricolari e di adeguatezza della preparazione personale.

Requisiti curriculari:
In particolare, il possesso di una laurea triennale conseguita in Italia nelle classi L-7 Ingegneria Civile e Ambientale o L-9 Ingegneria Industriale (DM 270/2004 o previgenti ordinamenti ritenuti equivalenti), o, in alternativa, il possesso di un altro titolo acquisito all'estero e riconosciuto idoneo, garantiscono l'accesso

diretto a questa LM-35.

In alternativa viene richiesto il possesso di specifici numeri di CFU conseguiti in insiemi di Settori Scientifico Disciplinari (SSD), caratterizzanti le aree di apprendimento di base.
In particolare vengono ammessi i possessori di lauree triennali, specialistiche o magistrali di cui al DM 509/1999 o DM 270/2004, conseguite presso una Università italiana, oppure i possessori di una laurea quinquennale (ante DM 509/1999), conseguita presso una Università italiana o in alternativa i possessori di titolo acquisito all'estero e riconosciuto idoneo, che abbiamo superato almeno 36 CFU degli SSD dell'area matematica, fisica e chimica e almeno 12 CFU dei seguenti SSD caratterizzanti: ICAR01, ICAR02, ICAR03, ICAR07, ICAR08, ICAR09, ING-IND24, ING-IND25.

Nel caso in cui il candidato risultasse carente dei requisiti curriculari richiesti, il CCS indicherà le integrazioni curriculari in termini di crediti formativi universitari oppure di specifici insegnamenti che dovranno essere necessariamente acquisite prima di una nuova presentazione della domanda di ammissione.

E' inoltre richiesta una buona conoscenza della lingua inglese, intesa come capacità di utilizzare fluentemente, in forma scritta e orale, la lingua inglese con riferimento anche ai lessici disciplinari (livello B2).

L'idoneità di titoli conseguiti all'estero viene riconosciuta dal competente consiglio di corso di studi sulla base di una valutazione del titolo accademico, delle attività formative (esami) svolte, e del cv.

Adeguatezza della preparazione personale:
Per l'ammissione al Corso di Laurea Magistrale in Environmental Engineering, gli studenti in possesso dei requisiti curriculari devono sostenere una prova di verifica, svolta sotto forma di colloquio pubblico, e finalizzata ad accertare la preparazione generale del candidato. Viene valutata la conoscenza di nozioni fondamentali dell'ingegneria e delle materie caratterizzanti la classe di laurea.

L'adeguatezza della preparazione personale è automaticamente verificata per coloro che hanno conseguito la laurea triennale italiana~~,~~ con una votazione finale di almeno 9/10 del voto massimo previsto dalla propria laurea.
Per coloro che hanno conseguito la laurea triennale italiana e che non abbiano una certificazione o attestazione di livello B2 o superiore, la buona conoscenza della lingua inglese, è verificata tramite test on-line erogati dal settore di competenze linguistiche d'ateneo. Nel caso di situazioni di emergenza o di impedimento che non consentano l'esame presso il Settore, la verifica sarà effettuata tramite colloquio orale con una commissione di docenti del CCS.
L'esito delle prove prevede la sola dicitura superato, non superato.

Per coloro che abbiano conseguito un titolo all'estero, giudicato equivalente in sede di accertamento dei requisiti curricolari, l'adeguatezza della preparazione individuale è verificata attraverso una valutazione della documentazione caricata dal candidato sul portale Dream Apply (https://apply.unige.eu/), secondo i seguenti criteri:
1. il "curriculum accademico" (media dei voti, class rank, GPA…);
2. la qualità dell'Università che ha erogato il titolo di I livello;
3. eventuale colloquio o test
La conoscenza della lingua inglese viene verificata attraverso il possesso di un titolo di studio equivalente ad una laurea triennale italiana conseguito in lingua inglese o con la presentazione di una certificazione di livello non inferiore ad un B2 o scala equivalente.

Art. 3. Attività formative

L'elenco degli insegnamenti e delle altre attività formative attivabili nella coorte 2021-22, è riportato nell'apposito allegato (ALL.1) che costituisce parte integrante del presente regolamento.

Per ogni insegnamento è individuato un docente responsabile. È docente responsabile di un insegnamento chi ne sia titolare a norma di legge, ovvero colui al quale il Consiglio di Dipartimento di afferenza abbia attribuito la responsabilità stessa in sede di affidamento dei compiti didattici ai docenti.

La lingua usata per erogare le attività formative (lezioni, esercitazioni, laboratori) è l'inglese.

Art. 4. Iscrizione a singole attività formative

In conformità con l'articolo 6 del Regolamento di Ateneo per gli studenti, per iscriversi a singole attività formative occorre possedere un titolo di studio che permetta l'accesso all'Università.

Art. 5. Curricula

Il corso di laurea magistrale in Environmental Engineering è articolato in curricula: Blue Engineering e Green Engineering.
Lo studente, dopo un primo anno in cui vengono fornite le competenze ritenute di fondamento per la laurea, troverà due percorsi suggeriti in modo da approfondire alcuni aspetti dell'ingegneria ambientale. In particolare, un percorso più orientato all'ambiente marino/atmosferico e un percorso più legato al territorio inteso come bacino idrografico, ambiente industriale e urbano.

Art. 6. Impegno orario complessivo

La definizione della frazione oraria dedicata a lezioni o attività didattiche equivalenti è stabilita, per ogni insegnamento, dal CCS e specificata nella parte speciale del Regolamento. In ogni caso si assume il seguente intervallo di variabilità della corrispondenza ore aula/CFU: 8 ÷ 10 ore di lezione o di attività didattica assistita.

La definizione dell'impegno orario complessivo presunto, riservato allo studio personale o ad altre attività formative di tipo individuale, è stabilito, per ogni insegnamento, nell'allegato (ALL.1) del presente regolamento.

Il Direttore del dipartimento DICCA e il Coordinatore del CCS sono incaricati di verificare il rispetto delle predette prescrizioni.

Art. 7. Piani di studio e propedeuticità

Gli studenti possono iscriversi a tempo pieno o a tempo parziale; per le due tipologie di studente sono previsti differenti diritti e doveri.

Lo studente sceglie la tipologia di iscrizione contestualmente alla presentazione del piano di studio.

Lo studente a tempo pieno svolge la propria attività formativa tenendo conto del piano di studio predisposto dal corso di laurea magistrale, distinto per anni di corso e pubblicato nel Manifesto degli studi. Il piano di studio formulato dallo studente deve contenere l'indicazione delle attività formative, con i relativi crediti che intende conseguire, previsti dal piano di studio ufficiale per tale periodo didattico, fino ad un massimo di 65 dei crediti previsti in ogni anno.

Lo studente a tempo parziale è tenuto a presentare un piano di studio individuale specificando il numero di crediti che intende inserire secondo quanto disposto dal regolamento per la contribuzione studentesca di Ateneo.

L'iscrizione degli studenti a tempo pieno e a tempo parziale è disciplinata dal regolamento di Ateneo per gli studenti tenuto conto delle disposizioni operative deliberate dagli Organi centrali di governo ed indicate nella Guida dello studente (pubblicata annualmente sul sito web dell'Università).

Il percorso formativo dello studente è stato organizzato secondo criteri di propedeuticità. Pertanto il piano di studio è fortemente consigliato in coerenza con il percorso formativo.

Il CCS, con esplicita e motivata deliberazione, può autorizzare gli studenti che nell'anno accademico precedente abbiano dimostrato un rendimento negli studi particolarmente elevato ad inserire nel proprio piano di studio un numero di crediti superiore a 65, ma in ogni caso non superiore a 75.
Per "rendimento particolarmente elevato" si intende che lo studente abbia superato tutti gli esami del proprio piano di studio entro il mese di settembre.

Il piano di studio articolato su una durata più breve rispetto a quella normale, è approvato dal Consiglio del Corso di Studio.

La modalità e il termine per la presentazione del piano di studio sono stabiliti annualmente dalla Scuola Politecnica e riportate nel Manifesto degli studi- Area Ingegneria.

Lo studente può aggiungere nel proprio percorso formativo insegnamenti "fuori piano" fino ad un massimo di 12 cfu senza versare ulteriori contributi.

Art. 8. Frequenza e modalità di svolgimento delle attività didattiche

Gli insegnamenti possono assumere la forma di: (a) lezioni, anche a distanza mediante mezzi telematici; (b) esercitazioni pratiche; (c) esercitazioni in laboratorio; (d) seminari tematici

Il profilo articolato e la natura impegnativa delle lezioni tenute nell'ambito del corso di studio rendono la frequenza alle attività formative fortemente consigliata per una adeguata comprensione degli argomenti e quindi per una buona riuscita negli esami.
Il calendario delle lezioni è articolato in semestri. Di norma, il semestre è suddiviso in almeno 12 settimane di lezione più almeno 4 settimane complessive per prove di verifica ed esami di profitto.
Il periodo destinato agli esami di profitto termina con l'inizio delle lezioni del semestre successivo.

L'orario delle lezioni per l'intero anno accademico è pubblicato sul sito web del CdS prima dell'inizio delle lezioni dell'anno accademico.

L'orario delle lezioni garantisce la possibilità di frequenza per anni di corso previsti dal vigente Manifesto degli studi. Per ragioni pratiche non è garantita la compatibilità dell'orario per tutte le scelte formalmente possibili degli insegnamenti opzionali. Gli studenti devono quindi formulare il proprio piano di studio tenendo conto dell'orario delle lezioni.
Il tirocinio previsto nel percorso formativo può essere svolto, a partire dal secondo anno, nei laboratori del DICCA, in altre Università, Centri di Ricerca, Aziende, Enti Pubblici, etc… Nel caso di programmi di mobilità per esami o tesi all'estero il tirocinio può essere proposto anche nella sede estera in cui viene svolto il programma.

Art. 9. Esami e altre verifiche del profitto

Gli esami di profitto possono essere svolti in forma scritta, orale, o scritta e orale, secondo le modalità indicate nelle schede di ciascun insegnamento pubblicato sul sito web del Corso di Laurea Magistrale.

A richiesta, possono essere previste specifiche modalità di verifica dell'apprendimento che tengano conto delle esigenze di studenti disabili e di studenti con disturbi specifici dell'apprendimento (D.S.A.), in conformità all'art. 29 comma 4 del Regolamento Didattico di Ateneo.

Nel caso di insegnamenti strutturati in moduli con più docenti, questi partecipano collegialmente alla valutazione complessiva del profitto dello studente che non può, comunque, essere frazionata in valutazioni separate sui singoli moduli.

Il calendario degli esami di profitto è stabilito, secondo le scadenze ministeriali, per l'anno accademico successivo e viene pubblicato sul sito web del corso di laurea magistrale. Il calendario delle eventuali prove di verifica in itinere è stabilito dal CCS e comunicato agli studenti all'inizio di ogni ciclo didattico.

Gli esami si svolgono nei periodi di interruzione delle lezioni. Possono essere previsti appelli durante il periodo delle lezioni soltanto per gli studenti che, nell'anno accademico in corso, non abbiano inserito attività formative nel proprio piano di studio.

Tutte le verifiche del profitto relative alle attività formative debbono essere superate dallo studente entro la scadenza prevista dalla segreteria studenti della Scuola Politecnica in vista della prova finale, come indicato nel "promemoria" pubblicato sul sito web di Ateneo e accessibile da quello del CdS.

L'esito dell'esame, con la votazione conseguita, è verbalizzato secondo quanto previsto all'art. 29 del regolamento didattico di Ateneo.

Le commissioni di esame di profitto sono nominate dal coordinatore del corso di studio e sono composte da almeno 3 componenti, di cui due membri effettivi dei quali uno è il docente responsabile dell'insegnamento. Nel caso in cui la percentuale di superamento per l'insegnamento sia inferiore al 30% consecutivamente per due anni accademici la commissione sarà allargata ad almeno 5 docenti e la verbalizzazione dovrà certificare la presenza effettiva di almeno 3 componenti. Possono essere componenti della commissione cultori della materia individuati dal consiglio del corso di studio sulla base di criteri che assicurino il possesso di requisiti scientifici, didattici o professionali; tali requisiti si possono presumere posseduti da parte di docenti universitari a riposo. Le commissioni sono presiedute dal docente responsabile dell'insegnamento e per ognuna va individuato un presidente supplente.

Art. 10. Riconoscimento di crediti

Il CCS delibera sull'approvazione delle domande di passaggio o trasferimento da un altro corso di studi dell'Ateneo o di altre Università secondo le norme previste dal Regolamento didattico di Ateneo, art. 21. Delibera altresì l'eventuale riconoscimento, quale credito formativo, per un numero massimo di 12 CFU, di conoscenze e abilità professionali certificate ai sensi della normativa vigente.

Nella valutazione delle domande di passaggio si terrà conto delle specificità didattiche e dell'attualità dei contenuti formativi dei singoli esami sostenuti, riservandosi di stabilire di volta in volta eventuali forme di verifica ed esami integrativi.

Art. 11. Mobilità, studi compiuti all'estero, scambi internazionali

Il CCS incoraggia fortemente le attività di internazionalizzazione, in particolare la partecipazione degli studenti ai programmi di mobilità e di scambi internazionali. A tal fine garantisce, secondo le modalità previste dalle norme vigenti, il riconoscimento dei crediti formativi conseguiti all'interno di tali programmi, e organizza le attività didattiche opportunamente in modo da rendere agevoli ed efficaci tali attività.

Il CCS riconosce agli studenti iscritti, che abbiano regolarmente svolto e completato un periodo di studi all'estero, gli esami sostenuti fuori sede e il conseguimento dei relativi crediti che lo studente intenda sostituire ad esami del proprio piano di studi.
Ai fini dei riconoscimenti, lo studente all'atto della compilazione del piano delle attività formative che intende seguire nell'ateneo estero, dovrà produrre idonea documentazione comprovante l'equivalenza dei contenuti tra l'insegnamento impartito all'estero e l'insegnamento che intende sostituire, impartito nel corso di laurea magistrale in Environmental Engineering. L'equivalenza è valutata dal CCS.
La conversione dei voti avverrà secondo criteri approvati dal CCS, congruenti con il sistema europeo ECTS.

Per periodi di studio dedicati alla preparazione della prova finale, il numero di crediti riconosciuto, relativi a tale fattispecie, è messo in relazione alla durata del periodo svolto all'estero.

Art. 12. Modalità della prova finale

La prova finale consiste nella discussione di un elaborato scritto, tendente ad accertare la preparazione tecnico-scientifica e professionale del candidato.

Ai fini del conseguimento della laurea magistrale, l'elaborato finale consiste nella redazione di una tesi (di carattere teorico, sperimentale o applicativo) elaborata dallo studente in modo originale sotto la guida di uno o più relatori, su argomenti definiti attinenti ad una disciplina di cui il candidato abbia superato l'esame; la tesi deve essere comunque coerente con gli argomenti sviluppati nel corso della laurea magistrale.

Tra i relatori deve essere presente almeno un docente del Corso di Studio.
La tesi è redatta in lingua Inglese; al candidato potrà essere richiesta, dal CCS per tramite del relatore, la redazione di un sommario in lingua italiana.

In caso di utilizzo di altra lingua rispetto l'inglese è necessaria l'autorizzazione del CCS, la traduzione del titolo e la stesura di un ampio sommario inglese.

La tesi dovrà rivelare le capacità dello studente nell'affrontare tematiche di tipo applicativo e/o di ricerca. La tesi dovrà essere costituita da un progetto e/o dallo sviluppo di un'applicazione che proponga soluzioni innovative rispetto allo stato dell'arte.

La tesi dovrà altresì rivelare:
- ✓ adeguata preparazione nelle discipline caratterizzanti la laurea magistrale;
- ✓ corretto uso delle fonti e della bibliografia;
- ✓ capacità sistematiche e argomentative;
- ✓ chiarezza nell'esposizione;
- ✓ capacità progettuale e sperimentale;
- ✓ capacità critica.

L'impegno richiesto allo studente per la preparazione della prova finale è commisurato al numero di crediti assegnati alla prova stessa.

La Commissione per la prova finale è composta da almeno cinque componenti, professori e ricercatori di ruolo, compreso il Presidente ed è nominata dal Direttore del Dipartimento DICCA.

Le modalità di svolgimento della prova finale consistono nella presentazione orale della tesi di laurea da parte dello studente alla commissione per la prova finale, seguita da una discussione sulle questioni eventualmente poste dai componenti la commissione.

La valutazione della prova finale da parte della commissione avviene, in caso di superamento della stessa, attribuendo un incremento, variabile da 0 a 6 (massimo stabilito dalla Scuola di concerto con i Dipartimenti e riportato nel Manifesto degli Studi), alla media ponderata dei voti riportati nelle prove di verifica relative ad attività formative che prevedono una votazione finale, assumendo come peso il numero di crediti associati alla singola attività formativa.

Tra gli aspetti che concorrono alla definizione del punteggio attribuito alla prova finale, la Commissione dovrà particolarmente tenere in conto:
-qualità, completezza e originalità dell'elaborato (fino ad un massimo di 3 punti);
-esposizione dell'elaborato (fino ad un massimo di 2 punti);
-valutazione della carriera dello studente (votazioni con lode, eventuale periodo svolto all'estero per la redazione dell'elaborato o di una sua consistente parte) (fino ad un massimo di 1 punto).
-eventuale periodo svolto all'estero per la redazione dell'elaborato o di una sua consistente parte;
-durata degli studi del candidato.

La lode viene conferita, in presenza dell'approvazione unanime della Commissione, a studenti che abbiano conseguito una valutazione finale di almeno 110 punti. La dignità di stampa per il lavoro di tesi magistrale può essere richiesta dal relatore ai membri della Commissione di Laurea almeno 15 giorni prima della seduta di laurea, illustrandone le motivazioni. La dignità di stampa viene attribuita con voto unanime della Commissione della seduta di Laurea.

Art. 13. Orientamento e tutorato

La Scuola Politecnica, di concerto con il Dipartimento e il Corso di studi, organizza e gestisce un servizio di orientamento per gli studenti al fine di promuovere i diversi percorsi formativi di secondo livello.
Il Corso di Studio individua al suo interno due docenti tutor al fine di supportare gli studenti iscritti al corso.

Art. 14. Verifica dell'obsolescenza dei crediti

I crediti formativi universitari acquisiti nell'ambito del corso di laurea possono essere sottoposti a verifica di obsolescenza dopo 6 anni. Qualora il CCS riconosca l'obsolescenza anche di una sola parte dei relativi contenuti formativi, lo stesso CCS stabilisce le prove integrative che dovranno essere sostenute dallo studente, definendo gli argomenti delle stesse, le modalità di verifica, la composizione della commissione di esame.

Una volta superate le verifiche previste, il CCS convalida i crediti acquisiti con apposita delibera. Qualora la relativa attività formativa preveda una votazione, la stessa potrà essere variata rispetto a quella precedentemente ottenuta, su proposta della Commissione d'esame che ha proceduto alla verifica.

Art. 15. Manifesto degli Studi

Il Dipartimento DICCA, sentita la Scuola Politecnica, approva e pubblica annualmente il Manifesto degli studi

del Corso di Laurea Magistrale. Nel Manifesto sono indicate le principali disposizioni dell'ordinamento didattico e del regolamento didattico del corso di laurea magistrale, a cui eventualmente si aggiungono indicazioni integrative.

Il Manifesto degli studi del Corso di Laurea Magistrale contiene l'elenco degli insegnamenti attivati per l'anno accademico in questione. Le schede dei singoli insegnamenti sono pubblicati sul sito web del Corso di Laurea Magistrale.

Allegato 1 Parte speciale del Regolamento didattico del Corso di Laurea Magistrale in Environmental Engineering

Elenco delle attività formative attivabili e relativi obiettivi formativi

Indirizzo	Anno di corso	Codice_ins	Nome_ins	Nome_ins EN	CFU	SSD	Tipologia	Ambito	Lingua	Obiettivi formativi	Ore riservate attività didattica assistita	Ore riservate allo studio personale
GREEN AND BLUE ENGINEERING	1	98064	NUMERICAL CARTOGRAPHY AND GIS	NUMERICAL CARTOGRAPHY AND GIS	5	ICAR/06	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	The course provides the necessary tools for the management and analysis of the various spatial data available today relating to the terrestrial, marine and aerial environment, including the most recent and high-resolution ones such as LiDAR Digital Terrain Models and satellite images. Several applications supporting the management of the environment will be addressed through GIS (Geographic Information System) software.	50	75
GREEN AND BLUE ENGINEERING	1	98158	HYDROLOGY AND WATERSHED MANAGEMENT	HYDROLOGY AND WATERSHED MANAGEMENT	10	ICAR/02	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio			0	0
		97232	HYDROLOGY	HYDROLOGY	5	ICAR/02	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	Provide the knowledge of advanced hydrologic modelling focusing on the frequency analysis of extreme events (storm and flood), distributed and semi-distributed hydrological models and event-based modelling	50	75

		98069	WATERSHED MANAGEMENT	WATERSHED MANAGEMENT	5	ICAR/02	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	To provide interpretative and predictive tools for the analysis, design and management of ideas, projects and systems in the field of water resources at the watershed scale	50	75
GREEN AND BLUE ENGINEERING	1	98159	ENVIRONMENTAL FLUID MECHANICS	ENVIRONMENTAL FLUID MECHANICS	10	ICAR/01	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio			0	0
		97233	ADVANCED FLUID MECHANICS	ADVANCED FLUID MECHANICS	5	ICAR/01	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	Presents the fundamental principles and laws that govern the motion of fluids. Simple practical problems are formulated and solved and the foundation to tackle more complex problems are laid	50	75
		97234	ENVIRONMENTAL FLUID MECHANICS	ENVIRONMENTAL FLUID MECHANICS	5	ICAR/01	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	Provides the basic knowledge of the transport processes and dispersion of pollutants in natural water bodies.	50	75
GREEN AND BLUE ENGINEERING	1	98160	ENVIRONMENTAL CHEMISTRY AND PROCESSES	ENVIRONMENTAL CHEMISTRY AND PROCESSES	10						0	0

		97236	CHEMISTRY OF ENVIRONMENTAL PROCESSES	CHEMISTRY OF ENVIRONMENTAL PROCESSES	5	CHIM/07	AFFINI O INTEGRATIVE	Attività Formative Affini o Integrative	Inglese	Learn to describe, discuss and compare structure and properties of inorganic and organic chemicals (including polymers and biomolecules) involved in environmental and technological processes, with particular attention to atmospheric and water chemistry and pollution. Students will acquire skills and methods to deal with problems related to the chemicals reactivity and interactions.	50	75
		98066	FUNDAMENTALS OF ENVIRONMENTAL PROCESSES	FUNDAMENTALS OF ENVIRONMENTAL PROCESSES	5	ING-IND/24	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	The course provides the basic knowledge of material balances and phase equilibria in multicomponent and multi-reacting systems, useful for modelling environmental compartments and environmental interfaces. Applications are related to health risk assessment, environmental contamination and processes for the treatment of chemical pollutants	50	75
GREEN AND BLUE ENGINEERIN	1	98161	SUSTAINABILITY AND APPLIED ECOLOGY	SUSTAINABILITY AND APPLIED ECOLOGY	10						0	0

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		98070	APPLIED ECOLOGY	APPLIED ECOLOGY	5	BIO/07	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	Provide fundamental knowledge on the methods for the evaluation of environmental issues due to human impacts on the biosphere, with specific regard to pollution and resource consumption.	50	75
		98071	LIFE CYCLE ASSESSMENT AND ECODESIGN	LIFE CYCLE ASSESSMENT AND ECODESIGN	5	ING-IND/26	AFFINI O INTEGRATIVE	Attività Formative Affini o Integrative	Inglese	Learn about sustainability, life cycle thinking and life cycle assessment as a tool to evaluate potential impacts along the life-cycle of a product for ecodesign purpose.	50	75
GREEN AND BLUE ENGINEERING	1	98257	INDUSTRIAL PROCESSES AND PRODUCTS	INDUSTRIAL PROCESSES AND PRODUCTS	10		CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio			0	0
		98237	ENVIRONMENTAL IMPACT OF INDUSTRIAL PROCESSES AND PRODUCTS	ENVIRONMENTAL IMPACT OF INDUSTRIAL PROCESSES AND PRODUCTS	5	ING-IND/27	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	To provide an in-depth knowledge of the main industrial processes, with particular reference to environmental and sustainability issues related to these processes and their products.	50	75

		98247	CLEAN ENERGY PRODUCTION	CLEAN ENERGY PRODUCTION	5	ING-IND/24	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	The course will be organised in sections devoted to different renewable energy production systems (e.g. photovoltaic and wind systems, fuel cells, wave energy, biomass thermochemical conversion, mini-hydro, ..).	50	75
GREEN AND BLUE ENGINEERING	1	104376	MATHEMATICAL METHODS FOR ENGINEERING	MATHEMATICAL METHODS FOR ENGINEERING	5	MAT/07	AFFINI O INTEGRATIVE	Attività Formative Affini o Integrative	Inglese	The course aims to provide a study of the most common partial differential equations (PDE) and their solution techniques through an analysis of various applications. The emphasis is devoted to second order PDE and the understanding of the specific analytical techniques for solving elliptic, parabolic and hyperbolic cases. The course also provides the tools to solve problems in various applications with numerical methods implemented through the use of Matlab.	0	75

GREEN AND BLUE ENGINEERING	2	56880	SUSTAINABLE PLANNING	SUSTAINABLE PLANNING	5	ICAR/20	A SCELTA	A Scelta dello Studente	Inglese	The course aims at providing a vast and up-to-date knowledge on the main policies, laws and tools for sustainable planning. It examines in depth the most important spatial issues at the local and international level and analyses the European and Italian landscape in relation to: urban safety and security, natural/anthropic risk prevention, smart and sustainable mobility, waterfront renewal, waste management, eco-responsible tourism, energy planning.	40	85
BLUE ENGINEERING	2	90498	MACHINE LEARNING	MACHINE LEARNING	5	INF/01	A SCELTA	A Scelta dello Studente	Inglese	Students will understand and learn how to use key machine learning algorithms.	50	75
GREEN ENGINEERING	2	90498	MACHINE LEARNING	MACHINE LEARNING	5	INF/01	A SCELTA	A Scelta dello Studente	Inglese	Students will understand and learn how to use key machine learning algorithms.	50	75

GREEN AND BLUE ENGINEERING	2	98154	HYDRAULIC SYSTEMS DESIGN	HYDRAULIC SYSTEMS DESIGN	5	ICAR/02	A SCELTA	A Scelta dello Studente	Inglese	To provide students with the capability of designing and managing hydraulic systems for water pumping and energy production, associated with urban drainage systems and environmental protection.	50	75
GREEN ENGINEERING	2	97235	ENVIRONMENTAL GEOTECHNICS	ENVIRONMENTAL GEOTECHNICS	10	ICAR/07	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio			0	0
		104334	SLOPE STABILITY	SLOPE STABILITY	5	ICAR/07	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	The purpose of the course is to provide students with theoretical and practical knowledge on the identification, characterization and analysis of landslide phenomena. The course focuses on the stability analyses of natural and artificial slopes, which are necessary to design mitigation countermeasures as well as for stabilizing landslides and preventing/reducing slope displacements.	50	75

		104335	GROUND ENGINEERING	GROUND ENGINEERING	5	ICAR/07	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	1) To introduce the various hydro-geological processes and the relevant analytical methods for engineering analysis; 2) To overview the main applications of groundwater flow principles as relevant to geotechnical engineers; 3) To introduce the fundamental aspects of capillarity in soils.	50	75
GREEN AND BLUE ENGINEERING	2	98068	EU AND TRANSNATIONAL ENVIRONMENTAL LAW	EU AND TRANSNATIONAL ENVIRONMENTAL LAW	5	IUS/14	AFFINI O INTEGRATIVE	Attività Formative Affini o Integrative		Provide critical analysis of principles, rules and current trends and concerns of European Union and international environmental law.	50	75
GREEN AND BLUE ENGINEERING	2	98117	RESILIENCE OF THE BUILT ENVIRONMENT	RESILIENCE OF THE BUILT ENVIRONMENT	5	ICAR/09	A SCELTA	A Scelta dello Studente	Inglese	Seismic risk analysis of the built environment in relation to natural events: hazard, exposure and vulnerability. Probabilistic seismic hazard assessment: occurrence of earthquakes, mitigation laws. Taxonomy and classification of the exposed assets. Vulnerability models: observational (macroseismic method), mechanical based (analytical or numerical) and hybrid methods.	50	75

										Evaluation of fragility curves from nonlinear dynamic analyzes (IDA, MSA and cloud method). Probabilistic framework for the calculation of risk. Analysis of economic consequences and losses (direct and indirect damage). The resilience of the built environment and the society: robustness and recovery time. Risk assessment, prevention and management of the seismic emergency in the case of monumental building: LV1 models, vulnerability and damage survey forms.		
BLUE ENGINEERING	2	98162	COASTAL PROCESSES AND ENGINEERING	COASTAL PROCESSES AND ENGINEERING	10		CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio			0	0
		97237	COASTAL STRUCTURES AND SHORE PROTECTION	COASTAL STRUCTURES AND SHORE PROTECTION	5	ICAR/02	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	Principles of coastal structures planning and design and shore protection management	50	75
		98074	COASTAL HYDRO- AND MORPHO-DYNAMICS	COASTAL HYDRO- AND MORPHO-DYNAMICS	5	ICAR/01	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	The course is aimed at introducing the student to the hydrodynamics and morphodyanics of the coastal region	50	75

BLUE ENGINEERING	2	98163	MIXING PROCESSES IN GEOPHYSICAL FLOWS	MIXING PROCESSES IN GEOPHYSICAL FLOWS	10	ING-IND/06	AFFINI O INTEGRATIVE	Attività Formative Affini o Integrative			0	0
		98075	GEOPHYSICAL FLUID DYNAMICS	GEOPHYSICAL FLUID DYNAMICS	5	ING-IND/06	AFFINI O INTEGRATIVE	Attività Formative Affini o Integrative	Inglese	To provide the basics of geophysical fluid dynamics: ruling equations and peculiar dynamical phenomena induced by apparent forces, i.e., centrifugal and Coriolis forces.	50	75
	2	98077	MIXING PROCESSES IN AIR AND SEA	MIXING PROCESSES IN AIR AND SEA	5	ING-IND/06	AFFINI O INTEGRATIVE	Attività Formative Affini o Integrative	Inglese	To provide an overview of existing dispersion models (atmosphere and sea)	50	75
GREEN ENGINEERING	2	98165	FLUVIAL AND TIDAL MORPHODYNAMICS	FLUVIAL AND TIDAL MORPHODYNAMICS	10	ICAR/01	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio			0	0
		97239	TIDAL ECO-MORPHODYNAMICS	TIDAL ECO-MORPHODYNAMICS	5	ICAR/01	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	Students will be instructed on the general processes involved in the morphodynamics and eco-morphodynamics of tidal environments, gaining useful skills to research and consultancy purposes	50	75
		98156	FLUVIAL HYDRAULICS AND MORPHODYNAMICS	FLUVIAL HYDRAULICS AND MORPHODYNAMICS	5	ICAR/01	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	The course provides competences on how the morphology of rivers and tidal estuaries is shaped by the action of steady and unsteady free-surface flows, with an eye to the mutual interactions	50	75

										between the flow, the morphology and the ecosystem.		
GREEN AND BLUE ENGINEERING	2	98239	HARBOUR ENGINEERING	HARBOUR ENGINEERING	5	ICAR/02	A SCELTA	A Scelta dello Studente	Inglese	Fundamentals of Port Planning and Design taking into account maritime operations and land requirements for terminals and inland transportation	50	75
GREEN AND BLUE ENGINEERING	2	98242	MITIGATION AND ADAPTATION TO CLIMATE CHANGE	MITIGATION AND ADAPTATION TO CLIMATE CHANGE	5	ICAR/03	A SCELTA	A Scelta dello Studente	Inglese	The course provides competence about climate change and deals with the climatic fundamentals and the behavior of GHG in the atmosphere and oceans. Mechanisms of Mitigation and Adaptation are analized according to the Kyoto Protocol, the EU EmissionTrading System and the Paris Agreement	50	75
GREEN AND BLUE ENGINEERING	2	98244	TRAINEESHIP	TRAINEESHIP	3		ALTRE ATTIVITA'	Tirocini Formativi e di Orientamento	Inglese	To develop a self-employment work to deepen theoretical or applicative problems or project development in the framework of a company/institution internship.	0	75

GREEN AND BLUE ENGINEERING	2	98245	EMOTIONAL AND SOCIAL COMPETENCES FOR ENGINEERING PROFESSIONALS	EMOTIONAL AND SOCIAL COMPETENCES FOR ENGINEERING PROFESSIONALS	2		ALTRE ATTIVITA'	Altre Conoscenze Utili per l'Inserimento Nel Mondo del Lavoro	Inglese	The main goal of the course is to learn how to successfully deal with professional challenges, emotions and relationships, overcoming the main obstacle to professional success: the lack of emotional maturityand the lack of adequate social skills.	20	30
GREEN AND BLUE ENGINEERING	2	98246	FINAL THESIS	FINAL THESIS	10		PROVA FINALE	Per la Prova Finale	Inglese	The final thesis consists in the development of a specific project that asses the scientific, technical and professional skills gained by the student at the end of his studies.	0	250
BLUE ENGINEERING	2	98258	MARINE BIODIVERSITY MANAGEMENT AND EMISSION TREATMENT PLANTS	MARINE BIODIVERSITY MANAGEMENT AND EMISSION TREATMENT PLANTS	10		CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio			0	0
		98248	MARINE BIODIVERSITY MANAGEMENT	MARINE BIODIVERSITY MANAGEMENT	5	BIO/07	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	Introduce students to the fundamental aspects of marine biodiversity management and conservation, with specific focus on biodiversity definition and measurement, ecosystem status evaluation, biodiversity maintenance and restoration of marine resources.	50	75

		98249	ENVIRONMENTAL SAFETY TECHNIQUES AND PLANTS	ENVIRONMENTAL SAFETY TECHNIQUES AND PLANTS	5	ING-IND/25	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	To provide students a solid knowledge on process and occupational safety problems of industrial plants, to introduce evaluation tools and fundamental design approaches to minimize and prevent risk for man, environment and assets.	50	75
GREEN ENGINEERING	2	98259	INDUSTRIAL ECOLOGY	INDUSTRIAL ECOLOGY	10						0	0
GREEN ENGINEERING	2	97238	WASTE UTILIZATION AND SOIL REMEDIATION	WASTE UTILIZATION AND SOIL REMEDIATION	5	ICAR/03	CARATTERIZZANTI	Ingegneria per l'Ambiente e Territorio	Inglese	The course offers a broad discussion of the issues of pollution, remediation and purification in the soil, based on the principles of the risk analysis. Beside the management of the contaminated sites, the solid waste treatment is also discusssed by analysing several case studies of incenerition, composting plants and landfills.	50	75
GREEN ENGINEERING	2	98250	BIOCHEMISTRY AND ENVIRONMENTAL BIOTECHNOLOGY	BIOCHEMISTRY AND ENVIRONMENTAL BIOTECHNOLOGY	5	CHIM/11	AFFINI O INTEGRATIVE	Attività Formative Affini o Integrative	Inglese	Basic concepts of biochemistry and microbiology, main metabolic routes and applications of environmental concern	50	75